DR. VITTHALRAO VIKHE PATIL COLLEGE OF ENGINEERING, AHMEDNAGAR.

DEPARTMENT OF MECHANICAL ENGINEERING

CERTIFICATE

This is to certify that the following Students

Mr. Adhode Sagar (B150090801)

Mr. Ayanar Santosh (B150090803)

Mr. Gudaghe Amol (B150090844)

Mr. More Rohit (B150090897)

hassuccessfully completed the seminar project stage-I entitled **"Productivity Improvement Through Multicavity Extrusion Die Manufacturing"** under my Supervision in the partial fulfillment of Bachelor of Engineering – Mechanical Engineering of SavitribaiPhule Pune University, during academic year 2018-19.

Date:

Place: Ahmednagar

PROF. Y.S. PATHARE

(H.O.D.)

(External Examinar)

Dr. K. B. KALE

(H.O.D.)

Dr.U.P.NAIK

(Principal)

DR. VITHALRAO VIKHE PATIL COLLEGE OF ENGINEERING, AHMEDNAGAR.

DEPARTMENT OF MECHANICAL ENGINEERING

CERTIFICATE

This is to certify that the following Students,

Mr. Amrutkar Dhiraj S.
Mr. Zope Hitesh A.
Mr. Thite Santosh M.
Mr. Vidhate Amol S.

Have successfully completed the project entitled "Automatic pneumatic bumper and breaking system for four wheeler" under my Supervision in the partial fulfillment of Bachelor of Engineering - Mechanical Engineering of Savitribai Phule Pune University, during academic year 2016-17.

Date:
Place: AHMEDNAGAR

Prof.Y.S.Pathare
(Project Guide)

Dr.K.P.Kale
(H.O.D.)

(External Examiner)

Dr.J. Jaykumar
(Principal)

Passion Automation & Engineering LLP.

Manufacturer of Special Purpose Machines and Process Automation.

Plot No: - H2/14, M.I.D.C. Area Ambad, Nasik - 422010.
Contact No:-7038825453 Fax No: - +91 9767954104
E-mail: sales@passionautoengineering.com, Web: www.passionautoengineering.com

Ref. Passion auto/NSK/2017-18/29

Date: 28/02/2018

To whom it may concern

This is to certify that the following students of B.E. mechanical, Dr. Vithalrao Vikhe Patil College of Engineering, Ahmednagar. Has successfully completed the project work on "Design & fabrication of helical spiral mixer "from the period of six months 1 Sept.2017 to 28 Feb.2018. Under the guidance of Mr. Kshatriya Vaibhav of Passion Automation & Engineering LLP, Nasik.

They are sincere students & dedicated to their work, I wish them success in life.

Students Name:

1) Mr. Godse Atul D.
2) Mr. Mhaske Mayur U.
3) Mr. Kulkarni Shantiprasad G.
4) Mr. Oswal Rahul D.

Passion Automation & Engineering

Proprietor

ISO/TS 16949 BUREAU VERITAS Certification

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kmtlindia@kmtsprings.com • Website Address : www.kmtsprings.com

Date:-31.05.2018

CERTIFICATE

To whom so ever it may concern

This is certify that, following students of BE Mechanical (Fourth Year) of PDVVP College of Engineering, Ahmadnagar have successfully completed their academic project on "Design For Installation of Gravity Roller Conveyor" for the period Aug 2017 to April 2018 in Kiran MACHINE Tools LTD, Jalgaon under the guidance of Mr. Jagdish Nimbhore, Production Head.

Project Team:-

1 Mr. Pavan S. Patil.

2 Mr.Chandan L. Rade .

3 Mr. Shubham K. Patil.

4.Mr.Akshay A Runwal.

We Confirm their project to be beneficial to our organization

This is certificate is issued to them as per their request to be produced for academic requirement.

(This Certificate is used for education purpose only)

For KIRAN MACHINE TOOLS LTD.

KMT

HR MANAGER

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Unique Metal Treaters

G-51, MIDC., Ahmednagar - 414 111. • Ph. : 0241-2779515 • E-mail : choure@uniquemetal.in

Date : 31/05/2018

CERTIFICATE

To whom so ever it may concern

This is to certify that, following Student of B. E. Mechanical (Fourth year) of DVVP College of Engineering, Ahmednagar have successfully completed their Academic project on **"Manufacturing & Heat Treatment on EN 24 for Heavy duty gears"** for the period Nove. 2017 to March 2018 in **Unique Metal Treaters Ltd.,** Plot No. G-51, M.I.D.C., Ahmednagar under the guidance of **Mr. Chaure G. S.**

Project Team :

1. **Badadhe Akshay Ashok**
2. **Bhosale Amol Nana**
3. **Bhutambare Santosh Revaji**

We confirm their project to be beneficial to our organization.

This certificate is issued to them as per their request to be produced for academic Requirement.

For - Unique Metal Treaters Ltd.,

Choure G. S.

FOR UNIQUE METAL TREATERS

Properitor

PROPRIETOR

Off : Sun Satellite. Bldg. C Flat No. 802. Sun City Rd., Off Sinhgad Road, Anand Nagar, Pune 411 051.

Mob. : 9890279029

SHIVAM FABRICATION & ENGINEERING WORKS

SIVRAM NAGAR, TAKLI ROAD, DASAK, JAIL ROAD, NASHIK ROAD - 422 101

Ref :

Date :

LETTER OF SPONSORSHIP

This is to certify that following students of **Dr.VithalraoVikhePatil College Of Engineering,ViladGhat, Ahmednagar** have completed their project work entitled "**Reverse Wheel Locking Mechanism**" for the fulfillment of Bachelor of mechanical engineering in our workshop under our guidance and supervision. All the accessories, parts required for analysis and the completion of the project are provided by workshop.

The work carried by all of them is original. we found them sincere and hardworking during their project work.

We wish all the best their future and career.

Name of Students:-

1. Vikram M. Shinde
2. Gurusiddhappa A. Koli
3. Soyeb J. Khan
4. Raziuddin R. Syed

SHIVAM FABRICATION & ENGINEERING WORKS

Proprietor

Mr.Vivek Adhav

(Shivam Fabrication and engineering works,

Jail Road, Nashik Road)

ISMT LIMITED
Solutions You Can Trust

G-39

27 - April-2018

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Miss. Sayyed Ayasha A., Mr. Gaikwad Akash V., Mr. Aher Amol S., Mr. Sarode Manoj S. student of final year BE MECHANICAL of Dr. Vithalrao vikhe patil college of engineering, Ahmednagar - 414111,were associated with us as a project trainee from 13-August-2017 to 27-April-2018, as a part of academic requirement.

They have worked on project entitled, "**Measurement system analysis**" under my guidance. They have successfully completed the project task assigned to them. The work presented by them is of immense use to us.

During their training with us,we found them to be sincere and hard working.

We wish them all the best in his future endeavors.

For ISMT LTD.

I.S.M.T. LTD. C-1 M.I.D.C. AHMEDNAGAR

Manish S. Thigale
Assistant vice president (QA)
ISMT LTD A
C-1,MIDC
Ahmednagar-414111
Maharashtra,
India.

L&T Electrical & Automation
Products

ASW/PER

Date – 16.02.2018

TO WHOM SO EVER IT MAY CONCERN

This is to certify that the following students of **B.E. (Mechanical), PDVVP college of Engineering, Ahmednagar**, have completed their project on **"Automated high voltage testing of changeover switch"**. They have excellently worked under the guidance of **Mr. Ravi Patre (Sr. Engineer – Switchgear Test Engineering)** from September 2017 to January 2018.

We observed that they are very sincere and hardworking. We wish them a successful and prosperous career ahead.

1. **Mr. Akash Sharma**
2. **Mr. Onkar Mane**
3. **Mr. Arshad Shaikh**

For Larsen & Toubro Limited

LARSEN & TOUBRO LIMITED A-9/A-10 M.I.D.C. AHMEDNAGAR

Ahmednagar Works

Chaitanya Khanwelkar

Asst. Manager – HR & IR

Larsen & Toubro Limited, Electrical & Automation, Electrical Standard Products
A-9, M. I. D. C., Ahmednagar - 414 111, Maharashtra, INDIA
Tel: +91 241 6606 125 Fax: +91 241 6606 367 www.Larsentoubro.com

Registered Office:
L&T House, N. M. Marg
Ballard Estate
Mumbai - 400 001, INDIA

Unit I : L-2, M.I.D.C. Area, Ahmednagar, Maharashtra, India 414111 Tel. : 0241 2779413
Unit II : E7 & E8, M.I.D.C. Area, Ahmednagar, Maharashtra, India 414 111 Tel. : 0241-2779413
Email : accounts@klassicwheels.com

Ref No.:- KWPL/HR/PRJ/2018 G-44 Date: 13th April 2018

TO WHOM SO EVER IT MAY CONCERN

This is to certify that, the below mentioned students from Padmashri Dr.Vitthalrao Vikhe Patil College of Engineering , Ahmednagar have successfully completed their Project with, **"Klassic Wheels Ltd. M.I.D.C Ahmednagar "** Since Dated 08 Aug. **2017 to 12.April 2018** on **"Gravitational Roller Conveyor For Handling and Separation of The Material".**

1) **Mr. Pawar Nikhil P**
2) **Mr. Dhabale Yogesh N**
3) **Mr. Kadam Sagar S**
4) **Mr. Jagtap Akash B**

We wish them all the best for their future endeavors.

For Klassic Wheels Limited

Madhur Bagayat

Mr. Madhur Bagayat
Group Head HR

ISMT LIMITED
Solutions You Can Trust

27 - April-2018

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Miss. Sayyed Ayasha A., Mr. Gaikwad Akash V., Mr. Aher Amol S., Mr. Sarode Manoj S. student of final year BE MECHANICAL of Dr. Vithalrao vikhe patil college of engineering, Ahmednagar - 414111,were associated with us as a project trainee from 13-August-2017 to 27-April-2018, as a part of academic requirement.

They have worked on project entitled, "**Measurement system analysis**" under my guidance. They have successfully completed the project task assigned to them. The work presented by them is of immense use to us.

During their training with us,we found them to be sincere and hard working.

We wish them all the best in his future endeavors.

For ISMT LTD.

I.S.M.T. LTD. C-1 M.I.D.C. AHMEDNAGAR

Manish S. Thigale
Assistant vice president (QA)
ISMT LTD A
C-1,MIDC
Ahmednagar-414111
Maharashtra,
India.

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To Whomsoever It May Concern

This is to certify that Miss Amruta P. Ishige (B120090850) and Miss Ashwini H. Dhadge (B120090835) have undergone internship in Crompton Greaves Power and Industrial Solutions Limited, Unit-1 Plant at Ahmednagar from 31st August 2017 to 31st May 2018. In fulfillment of the same, they have also successfully completed a project entitled "Performance of 3 Phase Squirrel Cage Induction Motor for Pump and Compressor Application" under the supervision of Miss Pallavi Muli, Executive (Marketing) and humane employee of our organization for the duration of the project.

We wish both students all the very best in their future endeavors.

Date: 31st May 2018

Place: Ahmednagar

Krishnadeep Nath

HR Department

Pallavi Muli

Marketing Dept.

CG Power and Industrial Solutions Limited
(Formerly Crompton Greaves Limited)
LT Motors Division: Industrial Systems
A-6/2, MIDC Industrial Area, Ahmednagar 414 111, Maharashtra, India
T +91 241 662 6195 F +91 241 277 7800

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Date: 31st May 2018

To Whomsoever It May Concern

This is to certify that Miss Pratiksha A. Dendage (B120090830) and Miss Snehal D. Bhagawat (B120090812) have undergone internship at Crompton Greaves Power and Industrial Solutions Limited from 31st August 2017 to 31st May 2018 under the guidance of Mr. Shivraj Nironi , Manager, Design and Development. In fulfillment of the same they have also completed a project on "Fan and Fan Cover Design for Induction Motor".

We wish both students all the very best for the future.

Thank-You.

31/5/18

Krishnasish Nath
Snr. Executive (HR)

CG Power & Industrial Solutions Ltd. LT Motors, MIDC, A'Nagar-414111

S. Nironi
Mgr. (Design and Development)

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Date:- 10th May 2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that, **Mr. More Abhijeet ,Mr. Jadhav Babasaheb ,Mr. Kolte Vinayak** Final year (BE.Mech) students of **Dr. Vitthalrao Vikhe Patil College Of Engineering Ahmednagar** , have completed a combined project on **"BEARING FAILURE ANALYSIS"** in our maintenance department under guidance of **Mr. Sunil Dhanak** during *31/07/18* to *10/05/19*

During this tenure of project we found them Sincere, Honest, Hardworking and Puntual.

We wish them a success in all their future endeavor.

For ISMT limited

10.5.19

Bhausaheb Ghemte
Asst. VP - ER

ISMT LIMITED B-1, M.I.D.C. AHMEDNAGAR

ISMT Tube Plant A
C-1, MIDC, Ahmednagar- 414 111, Maharashtra, India.
Phone: +91 241 2777937 / 2777960 | Fax: +91 241 2777363
www.ismt.com

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Products

ASW/PER

Date – 16.04.2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that the following students of **B.E. (Mech)** from **DVVP College of Engineering, Ahmednagar**, have completed their project on **"Optimization of Spot welding strength of MN2 Relay Heater Assembly"** They have excellently worked under the guidance of **Mr. Pravin Bhosale (Manager – Quality)** from 16th July 2018 to 31st December 2018.

We observed that they are very sincere and hardworking. We wish them a successful and prosperous career ahead.

1. **Mr. Joshi Shubham A.**
2. **Mr. Kalyankar Prasad S.**
3. **Mr. Khedkar Avinash D.**

For Larsen & Toubro Limited

Ahmednagar Works

Chaitanya Khanwelkar

Asst. Manager – HR & IR

Larsen & Toubro Limited, Electrical & Automation, Electrical Standard Products
A-9, M. I. D. C, Ahmednagar - 414 111, Maharashtra, INDIA
Tel: +91 241 6605 125 Fax: +91 241 6605 367 www.Larsentoubro.com

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Ballard Estate
Mumbai - 400 001, INDIA

Phone No. 0241-6611228, Ahmednagar.
E-mail : info@ankurengineering.com
Website : www.ankurengineering.com

ANKUR
ENGINEERING WORK
Manufacturers of Fabricated, Press Components & Assemble

Date: 17.04.2019

To Whom So Ever It May Concern

This is to certify the following students of B.E Mechanical from DVVP College of Engineering Ahmednagar have completed their Project on "DESIGN AND DEVELOPMENT OF PNEUMATIC PUNCHING MACHINE" They have excellently worked under the guidance of

Mr. Milind Kulkarni (CEO of Ankur Engineering Works F-15 MIDC AHMEDNAGAR)

From 16 July 2018 to 14 April 2019

During this tenure with us, they found to be diligent and hardworking and we wish them all the best in their future endeavors.

Name of the Students

1) Mr.Viraj Narayan Suryawanshi
2) Mr. Akshay Arun Shenkar
3) Mr.Suyash Ram Sarode
4) Mr. Nilesh Vijay Wakade

Thanks & Regards,

For Ankur Engineering Works

F-15 MIDC AHMEDNAGAR

Ankur Engineering Works F-15 MIDC A.Nagar

Mr. Milind Kulkarni

(CEO)

G – 7

Klassic Wheels Limited

(Formerly known as Klassic Wheels Private Limited)
Unit I : L-2, M.I.D.C. Area, Ahmednagar, Maharashtra, India 414111. **Tel. :** 0241-2779413
Unit II : E7 & E8, M.I.D.C. Area, Ahmednagar, Maharashtra, India 414 111. **Tel. :** 0241-2779413
Email : accounts@klassicwheels.com

Ref No.:- KWPL/HR/PRJ/2019

Date: 29th May 2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that, the below mentioned students from Dr.Vitthalrao Vikhe Patil College of Engineering , Ahmednagar have successfully completed their Project with, **"Klassic Wheels Ltd. M.I.D.C Ahmednagar "** Since Dated **17 July 2018 to 29 may 2019** on **"Design and Development of Roller Polishing Machine".**

1) Mr. Pawar Raghavendra U
2) Mr. Pinjari Raheman B
3) Mr. Shaikh Irfan A

We wish them all the best for their future endeavors.

For Klassic Wheels Limited

Mr. Chabukswar Jeevan
Manager HR

G-8

VEDANT ENTERPRISES

Industrial Fabrication,Traders in all Electrical,Mechanical Hydro - Pneumatic Accessories.

L- 169, M.I.D.C. Ahmednagar. 414 111. Mob:-9420009438

Ref.No.

VE/200419

Date :- / / 201

Date-20.04.2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that the following students of B.E. (Mech) from DVVP College of **Engineering, Ahmednagar,** have completed their project on **"Development of Frozen Yogurt Ice Cream Maker Machine".** They have excellently worked under the guidance of Mr. Udhav Kharmate from 11 October 2018 to 20 April 2019.

We observed that they are very sincere and hardworking. We wish them a successful and prosperous career ahead.

1. **Abhale Mahesh Vilas.**
2. **Balani Sanjay Chandu.**
3. **Bande Rajesh Bapurao.**

Vedant Enterprises

Proprietor

For Vedant Enterprises

Authorized Signatory

Accura Engineers
Works : D - 38/2, M.I.D.C., Ahmednagar - 414 111. (M.S.) India M. +91 9225325501
Email : accuraengineers@gmail.com

Date : 05.06.2019

To Whom It May Concern

This is to certify that Miss. **Savita S Chaudhari**, Mr. **Vitthal D Gite**, Mr. **Amol D Gore**, Mr. **Parmeshwar B Horkate** student of final year BE MECHANICAL of Dr. Vithalrao vikhe patil college of engineering , Ahmednagar -414111, were associated with us as a project trainee from August 2018 to April 2019 , as a part of their academic requirement.

They have worked on project entitled, **"OPTIMIZATION IN CYLINDRICAL GRINDING FOR C40 MATERIAL"** under the guidance. They have successfully completed the project task assigned to them. The work presented by them will be useful to us.

During their training with us, we found them to be sincere, hardworking and a responsible trainee.

We wish them all the best in their future endeavors.

SHREE ENTERPRISES

DATE = 21/05/2019

Manufacturers of P.C.B. (Printed Circuit Boards)

ADDRESS = PLOT NO 97,H.NO.1110 ,DHOKESHOWAR SOCIETY, VIKHE PATIL HOSPITAL ROAD ,WADGOAN GUPTA, TAL. NAGAR ,DIST. AHMEDNAGAR.

Letter of Sponsorship

To Whom It May Concern

This is to certify that 1. R SOORAJ
2. SHUBHAM ASHOK BORKUTE
3. VIKAS SUBHALAL YADAV
4. RAUT VIJAY ANIL

Students from **DVVP COE** has successfully completed their project, titled
Design and fabrication of PCB tinning machine

All necessary details were provided from our side for the establishment of this project.

We wish them the very best in all his future endeavors.

Thanking you,
With Regards,

SHREE ENTERPRISES PVT LTD.

For SHREE ENTERPRISES

Proprietor

SHREE ENTERPRISES

L&T Electrical & Automation
Products

Date – 03.06.2019

ASW/PER

TO WHOM SO EVER IT MAY CONCERN

This is to certify that the following students of **B.E. (Mech.)** from **PDVVP College of Engineering, Ahmednagar**, have completed their project on **"Life Improvement of Contactor"**. They have excellently worked under the guidance of **Mr. Vasant Sangle (Asst. Manager - Design)** from 6th August 2018 to 31st December 2018.

We observed that they are very sincere and hardworking. We wish them a successful and prosperous career ahead.

1. **Mr. Panchal Suraj Shivaji**
2. **Mr. Shirole Dnyaneshwar N.**
3. **Mr. Palve Ajit A.**
4. **Mr. Shere Akshay S.**

For Larsen & Toubro Limited

Ahmednagar Works

Chaitanya Khanwelkar

Asst. Manager – HR & IR

Larsen & Toubro Limited, Electrical & Automation, Electrical Standard Products
A-9, M. I. D. C, Ahmednagar - 414 111, Maharashtra, INDIA
Tel: +91 241 6605 125 Fax: +91 241 6606 367 www.Larsentoubro.com

Registered Office:
L&T House, N. M. Marg
Ballard Estate
Mumbai - 400 001, INDIA

G-19

CG Power and Industrial Solutions Limited
(Formerly Crompton Greaves Limited)
Stampings Division: Industrial Systems
B-110, B-111/B, B-112/2, MIDC Industrial Area, Ahmednagar 414 111. Maharashtra, India
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CGPISL/Stamping Div/HR/2019

Date- 28th May 2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that, Mr.Ingale Dipak Sunil, Miss.Gaware Prajakta Baban, Miss.Jadhav Vrushali Kacharu, Mr.Vyawahare Praful Prashant Final yr (BE.Mech) Students of Padmashri .Dr. Vitthalrao Vikhe Patil College of Engineering Ahmednagar, has completed a combined project on "**Improving Productivity of Notching (Schuler) Machine**" in our Production department under the guidance of Mr.Koshlendra Singh, during 28th September 2018 to 25th April 2019.

During this tenure of project we found them Sincere, Honest, Hardworking and Punctual.

We wish them a success in all their future endeavor.

For CG Power & Industrial Solutions Ltd.

Anandrao Palekar
Manager- HR -Stamping Division

4 – 4

ISMT LIMITED
Solutions You Can Trust

Date :- 08.05.2019

CERTIFICATE

To,

The principal,

D.V.V.P.C.O.E. Ahmednagar.

Subject: Completion letter for project work.

This is to certify that the following group of students from final year mechanical engineering of D.V.V.P.C.O.E. Ahmednagar. were associated with us for project entitled **" Effect Of Die Parameters On Dimensions Of Cold Drawn Metal Tube And Pulling Force"** was done by them in premises of ISMT Ltd. They have successfully completed their project work during academic year 2018-19.

During their work with us, we found them to be sincere and hard working.

1. Patil Indrajeet Shyamrao.
2. Garule Ashok Bapusaheb.
3. Bande Kunal Dattatrya.
4. Karale Dnyaneshwar Devidas.

Prof.V.P.Patekar
(Project Guide)
Dr.V.V.P. COEA

Mr.N.S.Bodakhe
AVP- CDS
ISMT Pvt.Ltd.
Tube Plant(A)

Mr.N.D.Dongarwal
AVP- CDS
ISMT Pvt.Ltd.
Tube Plant(A)

ISMT Tube Plant A
C-1, MIDC, Ahmednagar - 414 111, Maharashtra, India.
Phone : +91 241 2777937 / 2777960 | Fax : +91 241 2777363
www.ismt.com
CIN : L27109PN1999PLC016417

Ref.No. Date: / / 20

Date:7 June 2019

CERTIFICATE

To whom so ever it may concern

This is certify that, the below mentioned students from dr.vithalaro vikhe patil college of engineering, ahmednagar have successfully completed their project with om forge midc ahmednagar since dated 21 august 2018 to 7 June 2019 on **"Study Of Natural Polymer As Quenching Media For Medium Carbon Steel (EN8DM)".**

1.Mr. Pathare Abhijit R.
2.Mr. Patil Sanket D.
3.Mr.Pimple Somnath G.
4.Mr Pimpale Mahesh N.

We wish them all the best for their future endeavors

For Om Forge,

Mr.Amrute Sandeep S.
MR & Manager Metallurgy

ISMT LIMITED
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Date:- 10th May 2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that, **Mr.Bhagat Akshay, Mr.Deokate Gokul, Mr.Joshi Rushikesh, Mr.Gite Vikas** Final year (BE.Mech) students of **Dr. Vitthalrao Vikhe Patil College Of Engineering Ahmednagar** , has completed a combined project on **"Analysis and development on roller hearth furnace and its exo gas plant"** in our production department under guidance of Mr. D . R . Shendge during 30.08.2018 to 10.05.19.

During this tenure of project we found them Sincere,Honest,Hardworking and Puntual.

We wish them a success in all their future endeavor.

For ISMT limited

Bhausaheb Chemte
Asso. VP - ER

ISMT LIMITED * PUNE-14 *

ISMT Tube Plant A
C-1, MIDC, Ahmednagar - 414 111, Maharashtra, India.
Phone : +91 241 2777937 / 2777960 | Fax : +91 241 2777363
www.ismt.com
CIN : L27109PN1999PLC016417

Date:

CERTIFICATE OF COMPLAINCE

TO WHOMSOEVER IT MAY CONCERN

This is to certify that, following students of B.E. Mechanical (Fourth Year Vikhe Patil College of Engineering Ahmednagar, have successfully compl project on **"Detailed Study of Banjo Line for Cycle Time Reduction"** fo 2018 to March 2019' in AAM India Manufacturing Corporation Pvt Ltd, S under the guidance of **Mr.Dhanaji Ghadage.**

Project team

1. Miss. Ubale Asmita S.
2. Miss. Dolas Priyanka V.
3. Mr. Pawar Prasad M.

We confirm their project to be beneficial to our organization.

This certificate is issued as per above team request and to be produced for a

Regards,

Mr.Dhanaji Ghadage
Resident Engineer
Pune Mfg Facility
AAM India

AAM India Manufacturing Corporation Pvt. Ltd. Supa

Registered Office and Plant Address:
Gat No. 787 & 788, Village Hunga,
Taluka Parner, Ahmednagar- 414301,
Maharashtra, India.
Ph.: +91 (02488) 302225
Website: www.aam.com
Email: AAMIndiacommunications@aam.com
CIN: U34300PN2008FTC131618

L&T Electrical & Automation
Products

ASW/PER

Date – 31.05.2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that the following students of **B.E. (Mech.)** from **PDVVP College of Engineering, Ahmednagar**, have completed their project on **"Reduction of magnetic rejection of MCB at magnetic test bench"**. They have excellently worked under the guidance of **Mr. Kishor Deore (Asst. Manager - Quality)** from 10th September 2018 to 31st March 2019.

We observed that they are very sincere and hardworking. We wish them a successful and prosperous career ahead.

1. **Mr. Bolli Akshay Sanjay**
2. **Mr. Dalvi Prasad Ashok**
3. **Mr. Jadhav Rushikesh Kakarao**

For Larsen & Toubro Limited

Ahmednagar Works

Chaitanya Khanwelkar

Asst. Manager – HR & IR

Larsen & Toubro Limited, Electrical & Automation, Electrical Standard Products
A-9, M. I. D. C., Ahmednagar - 414 111, Maharashtra, INDIA
Tel: +91 241 6606 125 Fax: +91 241 6606 367 www.Larsentoubro.com

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Ballard Estate
Mumbai - 400 001, INDIA

Mob:-9881215208

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Ref.No.

Date :- / /201

Ref. No. HT2404/19

Date-24/04/2019

To.
The Principal/HOD Sir.
Department of Mechanical Engineering.
Dr Vitthalrao Vikhe Patil College of Engineering.
Ahmednagar 414111.

This is to inform you that the following students of your college (B.E. Mechanical) have carried out designing and fabrication work for the project **"Pneumatically Operated Sandal Foam Cutting M/C"** and successfully completed the testing under the supervision of company project guide Mr. Mahesh Shinde sir. All the results provided above are verified by actual experimentation.

Name of students :

1) Vyavahare Mayuresh Shatrughna

2) Shinde Ajit Ashok

3) Mapari Mangesh Eknath

4) Gujar Pramod Dattatray

Mr. Mahesh Shinde
Manager Support
Hi-tech Electronics & Press work

HI-TECH ELECTRONICS
PROPRIETOR

K. S. INDUSTRIES

MANUFACTURERS OF : PRECISION AUTO PARTS AND AGRICULTURAL IMPLEMENTS, SCHOOL SPORTS EQUIPMENTS AND GENERAL FABRICATORS

Works : B-64, M.I.D.C., Ahmednagar - 414 111.

Phone : O - 9325100235

Ref.

Date :

PROJECT COMPLETION LETTER

This is to certify that following students of **Dr. Vithalrao Vikhe Patil College of Engineering, Vilad Ghat, Ahmednagar** have completed their project work entitled "**Design and Manufacturing of Pipe Bending Machine**" for the fulfillment of **Bachelor of Mechanical Engineering** in our organization under our guidance and supervision. All the accessories, parts required for manufacturing and completion of project are provided by organization.

The work carried by all of them is original. We found then sincere and hard working during their project.

We wish all the best for their future and career.

Name Of Student :-

1) Dhangar Pankaj Prakash (B150090830)
2) Garkal Pankajkumar Saheba (B150090905)
3) Kasar Vishal Kashinath (B150090873)
4) Kutal Harshvardhan Vishwasrao (B150090885)

FOR KS INDUSTRIES

For M/s. K.S. Industries

Proprietor

L&T Electrical & Automation
Products

ASW/PER

Date – 03.06.2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that the following students of **B.E. (Mech)** from **DVVP College of Engineering, Ahmednagar**, have completed their project on **"To Reduce Rejections of MCB's due to Magnetic Failure"**. They have excellently worked under the guidance of **Mr. P S Dhonde (Manager – Manufacturing)** from 30th July 2018 to 31st December 2018.

We observed that they are very sincere and hardworking. We wish them a successful and prosperous career ahead.

1. **Mr. Madke Shubham Muralidhar**
2. **Mr. Naikwadi Pravin Punjiram**
3. **Mr. Lanke Suyog Popat**

For Larsen & Toubro Limited

Ahmednagar Works

Chaitanya Khanwelkar

Asst. Manager – HR & IR

Larsen & Toubro Limited, Electrical & Automation, Electrical St...
A-9, M. I. D. C., Ahmednagar - 414 111, Maha...
Tel: +91 241 6606 125 Fax: +91...

G-31

L&T Electrical & Automation
Projects

Larsen & Toubro Limited
Electrical & Automation
Electrical System & Equipment
A10 Gate No. 5 MIDC
Tel +91 241 661 4700
Fax +91 241 661 4908
www.lntebg.com

ASW/PERS/36

6th June 2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that the following students of **B.E. (Mech)** from **DVVP College of Engineering, Ahmednagar**, Have completed their projects on **"Design and Fabrication of Circuit Breaker CRM/HV Test Simulator Fixture"**. They have worked under the guidance of **Mr. Sudhansu S Dash (Asst. Manager - R&D)** from 18/08/2018 to 06/06/2019.

We observed that they are sincere and hardworking.

We wish them all the best.

1. **Mr. Pawan Kumar Chhabadiya**
2. **Mr. Utkarsh Digambar Gore**
3. **Mr. Maroti Nivrutti Bhalerao**

For LARSEN & TOUBRO LIMITED
ESE- Division

LARSEN & TOUBRO LIMITED
A 10
MIDC
A.NAGAR

Dhananjay G Kulkarni
Manager HR & Personnel

G-35

VEDANT ENTERPRISES

Industrial Fabrication,Traders in all Electrical,Mechanical Hydro - Pneumatic Accessories.

L- 169, M.I.D.C. Ahmednagar. 414 111. Mob:-9420009438

Ref.No.

VE/020419

Date :- / / 201

Date-05.04.2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that the following students of **B.E. (Mech)** from **DVVP College of Engineering, Ahmednagar,** have completed their project on **"Universal Bending Machine".** They have excellently worked under the guidance of Mr. Udhav Kharmate from 15 September 2018 to 5 April 2019.

We observed that they are very sincere and hardworking. We wish them a successful and prosperous career ahead.

1. **Jujgar Keshav Prabhakar.**
2. **Kadam Balaji Vishnu.**
3. **Kedar Rushikesh Arun.**
4. **Kharat Prashant Rameshrao.**

Vedant Enterprises

Proprietor

For Vedant Enterprises

Authorized Signatory

Tel.: 0241-2779032, Fax: 0241-
E-mail : yashtubes.anr@gmail.com • Website : www.yashashreetubes.com

Date: -26/04

CERTIFICATE

TO WHOM SO EVER IT MAY CONCERN

This is to certify that the following students of Dr. Vithalrao Vikhe Patil College of Engineering, Vilad Ghat, Ahmednagar has successfully completed their project work on **"Modification on Seamless Tube Cold Draw Bench"** as a part of their Mechanical Engineering degree curriculum from July 2018 to April 2019.

Students have completed above mentioned project with high level of enthusiasm, commitment, research and simulation under the guidance of *Mr A. V. Paliya, Director of Yashashree Tubes Pvt. Ltd, MIDC, Ahmednagar.*

Students were humble, sincere and punctual during their tenure with us. We are satisfied wi their efforts, performance and we confirm their project to be beneficial to our organization. We wish them bright and successful career in their future endeavour.

Project team:-

Mr Rakshasbhuwankar Shardul Sudhir

Mr Mahajan Ganesh Narendra

Mr Doifode Vaibhav Arjun

Mr Rakecha Vrushabhkumar Pravinkumar

For Yashashree Tubes Pvt Ltd

A.V.Paliya
Director

GKN SINTER METALS

GKN Sinter Metals Private Limited

E-41, M.I.D.C. AREA, AHMEDNAGAR - 414 111, INDIA
TEL. : +91 - 241 - 2777361, 2778575
FAX : +91 - 241 - 2777240
E-Mail : info.india@gknsintermetals.com
Website : www.gkn.com
CIN of the company : U29130PN1980PTC018827

Date: - 28/05/2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Mr. Amit Arun Pohekar, Nimish Nimad Sarturkar, Swapnil Parag Deshmukh & Ashutosh Babasaheb Dhadge** students of Dr. Vitthalrao Vikhe-Patil College of Engineering, Ahmednagar was working on voluntary basis in our organization & has successfully worked on the project named Analysis of Die-Holding Plate Bolts for Sizing Machine in between August 2018 to April 2019.

During their tenure in the organization, we found them hard working, sincere and diligent people and their behavior and conduct was good. We wish them all the best for their future endeavors.

This Certificate is being issued to them on their own request.

For GKN Sinter Metals Pvt. Ltd.

Sangram

GKN Sinter Metals Pvt. Ltd. Ahmednagar

Sangram Kadam
Manager – HR & IR

ISMT LIMITED
Solutions You Can Trust

CERTIFICATE

To,
The principal,
D.V.V.P.C.O.E. Ahmednagar.

subject: Completion letter for project work.

This is to certify that the following group of students from final year mechanical engineering of D.V.V.P.C.O.E. Ahmednagar. were associated with us for project entitled " Improvement in life of band saw blade" was done by them in premises of ismt Ltd. They have successfully completed their project work during academic year 2018-19.
During their work with us, we found them to be sincere and hard working.

1.Limbekar saurabh sanjay	B150090887
2.Dhavale snehal ajay	B150090831
3.Patil akash sunil	B150090913
4.Pasalkar mahesh sharad	B150090910

24/02/19

Mr. A.K Gaur
(AVP-Mech. Maint.)
ISMT Ltd. Ahmednagar

I.S.M.T. LTD. C-1 M.I.D.C. AHMEDNAGAR

Mr. R.T Bogam
(VP-Mech. Maint.)
ISMT Ltd. Ahmednagar

I.S.M.T. LTD. C-1 M.I.D.C. AHMEDNAGAR

L&T Electrical & Automation
Products

ASW/PER

Date – 03.06.2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that the following students of **B.E. (Mech.)** from **DVVP College of Engineering, Ahmednagar**, have completed their project on **"Testing of SDF by Six Sigma"**. They have excellently worked under the guidance of **Mr. Gaurav Deo (Engineer - Quality)** from 6th August 2018 to 31st December 2018.

We observed that they are very sincere and hardworking. We wish them a successful and prosperous career ahead.

1. **Mr. Dongarwal Nikhil Navneet**
2. **Mr. Chavan Dnyaneshwar Sudam**
3. **Mr. Kadu Sunil Gopinath**
4. **Mr. Mirashe Vaibhav Pradeep**

For Larsen & Toubro Limited

Ahmednagar Works

Chaitanya Khanwelkar

Asst. Manager – HR & IR

Larsen & Toubro Limited, Electrical & Automation, Electrical Standard Products
A-9, M. I. D. C., Ahmednagar - 414 111, Maharashtra, INDIA
Tel: +91 241 6606 125 Fax: +91 241 6606 367 www.Larsentoubro.com

Registered Office:
L&T House, N. M. Marg
Ballard Estate
Mumbai - 400 001, INDIA

ISMT LIMITED
Solutions You Can Trust

26-April - 2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that following students of final year BE MECHANICAL of Dr. Vithalrao vikhe patil college of engineering , Ahmednagar- 414111,were associated with us as a project trainee from 6 -August -2018 to 26- April-2019 , as a part of academic requirement.

They have worked on project entitled, **"Gear failure analysis of cold pilger mill"** under the guidance. They have successfully completed the project task assigned to them. The work presented by them is of immense use to us.

During their training with us, we found them to be sincere and hard working.

We wish them all the best in their future endeavors.

1) **Miss Bhagat Vaishnavee**
2) **Miss Kulkarni Anuja**
3) **Mr. Kale Akshay**
4) **Mr.Hume Akshay**

Prof.D.S Ghorpade	Mr.Sunil Dhanak	Mr R.T.Bogam
(Project Guide)	AVP Mech Maint	V.P Maint
Dr .V.V.P COE,	ISMT LTD	ISMT LTD
Ahmednagar,	Tube plant(A)	Tube plant(A)

KHANDELWAL
Machining Pvt. Ltd.

MANUFACTURERS OF ELECTRIC MOTORS & PUMPS
Plot No. C-28, MIDC., Ahmednagar - 414 111 (M.S.) India.
Tel. Off.: (0241) 2778860 Resi 2427046 Email kmplbka@yahoo.co.in

TO WHOM SO EVER IT MAY CONCERN

Date:- 05/04/

This is to certify that the following students of **B E (Mech)** from **D.V.V.P. college of Engineering Ahmednagar.** Have completed their project on " **Design & Implementation o motion controller for Industrial Paper cutting machine"** They have excellently worked under the guidance of **Mr Thorave sir (Quality Incharge)** from 20 July 2018 to 3 Jan 2019.

We observed that they are very sincere and hard working we wish them a successfull and prosperous career ahead.

1) **Mr Dhanwate Suyog G.**
2) **Mr Ghorpade Sudam V.**
3) **Mr kale Ganesh S.**
4) **Mr Kordakar Pravin N.**

For KAHANDELWAL MACHINING PVT LTD.

Khandelwal Machining Pvt. Ltd. C-28 M.I.D.C. Ahmednagar-414111

Thange S.D
Asst. Manager

L&T Electrical & Automation
Products

ASV/PER

Date – 28.05.2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that the following students of **B.E. (Mech.)** from **PDVVP College of Engineering, Ahmednagar**, have completed their project on **"An Automated Mechanical Calibration of Miniature Circuit Breaker"** They have excellently worked under the guidance of **Mr. Mahesh Rane (Asst. Gen. Manager – TUC)** from 22nd August 2018 to 31st January 2019.

We observed that they are very sincere and hardworking. We wish them a successful and prosperous career ahead.

1. **Ms. Borude Gayatri Dnyaneshwar**
2. **Ms. Gade Harshali Balu**

For Larsen & Toubro Limited

Ahmednagar Works

Chaitanya Khanwelkar

Asst. Manager – HR & IR

Larsen & Toubro Limited, Electrical & Automation, Electrical Standard Products
A-9, M.I.D.C., Ahmednagar - 414 111, Maharashtra, INDIA
Tel: +91 241 6606 125 Fax: +91 241 6606 367 www.Larsentoubro.com

Registered Office:
L&T House, N. M. Marg
Ballard Estate
Mumbai - 400 001, INDIA

G 57

Date: 07 JUNE 2019

TO WHOM SO EVER IT MAY CONCERNS

This is to certify that , following candidates

1) Mr. Sandesh Bhausaheb Yadav
2) Mr. Sachin Gorakshanath Bhalsing

was completed their Project on " Automation in Welding Machine " .

We are happy that to informs you that they completed allotted Project w

We found him sincere, hardworking, technically sound and result oriented

part of a team during his tenure.

ture"

Dr.Vithalrao Vikhe Patil College of Engineering, Ahmednagar

CERTIFICATE

This is to certify that the A Project Report entitled ***"Real Time Passenger Information and Bus Monitoring System"*** *is prepared by* ***Altap Shaikh, Snehal Wagh, Gitanjali Wakale, Bhagyashri Patil*** *of* ***B.E. Information Technology*** *Engineering, Pune, under the SPPU, Pune and his work is satisfactory. This work is done during year 2017-18.*

Date: 29/5/18

Project Guide [Prof.J.P.Gaidhani]

HOD,Information Technology[Prof.D.A.Vidhate] Project Co-Ordinator [Prof.S.S.Pophale]

Examination:

Internal Examiner :.....

External Examiner :.....

P.D.V.P.Patil College of Engineering * Ahmednagar * Dept. of Information Technology

Dr.Vithalrao Vikhe Patil College of Engineering, Ahmednagar

CERTIFICATE

This is to certify that the A Project Report entitled ***"A Food Recognition System For Diabetic Patient"*** *is prepared by* ***Amit Kumar Jha, Ayush Raina, Agarwal Bhushan, Tutare Smitali*** *of* ***B.E. Information Technology*** *Engineering, Pune, under the SPPU, Pune and his work is satisfactory. This work is done during year 2017-18.*

Date: 28/5/18

.....

Project Guide [Prof.D.A.Vidhate]

.....

HOD,Information Technology[Prof.D.A.Vidhate]

.....

Project Co-Ordinator [Prof.S.S.Pophale]

Examination:

Internal Examiner :.....

External Examiner :.....

P.D.V.V.Patil College of Engineering * Ahmednagar
Dept. of Information Technology

CERTIFICATE

This is to certify that the Project Report entitled

Monitoring Suspicious Discussion On Online forum By Data Mining

submitted by

BACHHAV MOURVIKA DINKAR	B120098506
AMBILWADE PRIYANKA VASANT	B120098502
DAFAL SUMIT NITIN	B120098516
FULARI PRIYANKA YASHWANT	B120098524

of BE IT is a bonafide work carried out by them under my guidance in partial fulfilment of the Final Year Of Bachelor Degreein Information Technology as prescribed by the University of Pune in academic year 2016-17

Prof.A.B.Bavane
Project Guide

Prof.D.A.Vidhate
Head of
Dept. of Information Technology

P.D.V.V.Patil College of Engineering
Dept. of Information Technology
Ahmednagar

External Examiner

Date:

Prof.Mrs S.S..Pophale
Project Co-ordinator(D.V.V.P.C.O.E)

DR. VITHALRAO VIKHE PATIL COLLEGE OF ENGINEERING, AHMEDNAGAR

DEPARTMENT OF INFORMATION TECHNOLOGY

CERTIFICATE

This is to certify that the Project Report entitled

A ANTI COLLUSION DATA SHARING IN DYANAMIC GROUPS OF CLOUD.

submitted by

BHATPURE AMIT SURESH	B120098509
DONGARGAVE KIRAN RAMESH	B120098522
HANGEKAR MANGESH ANIL	B120098532
PATIL ASHISH PRABHAKAR	B120098550

is a bonafide work carried out by them under the supervision of Prof.R.G.Raut and it is approved for the partial fulfillment of the requirement of Savitribai Phule Pune University for the award of the Degree of Bachelors of Engineering

Prof.R.G.Raut
Project Guide

Prof.D.A. Vidhate
Head of
Dept.of Information Technology

P.D.V.V.Patil College of Engineering
Dept. of Information Technology
Ahmednagar

External Examiner
Date:

Prof.Dr.J.Jayakumar
Principal (D.V.V.P.C.O.E.)

DR. VITHALRAO VIKHE PATIL COLLEGE OF ENGINEERING

CERTIFICATE

This is to certify that the seminar report entitled

"KEY AGGREGATE CRYPTOSYSTEM FOR DATA SHARING IN CLOUD STORAGE"

Submitted By

Ms. Karale Vasundhara
Ms. Shelar Kiran
Ms. Ganjewar Monika
Ms. Shaikh Akhtar

we have satisfactorily completed the work under my guidance in partial fulfillment as per curriculum of fourth year of Information Technology Engineering of Savitribai Phule Pune University in the academic year 2016-17.

Prof.S.S.Pophale
(Project guide)

P.D.V.V.Patil College of Engineering
Dept. of Information Technology
Ahmednagar

Prof.D.A.Vidhate
(HOD of Information. Technology)

D.V.V.P. COLLEGE OF ENGINEERING, AHMEDNAGAR
2016-2017

CERTIFICATE

This is to certify that the project entitled

"LANDSLIDE HAZARD ZONATION AND MAPPING OF PAWAS BASIN USING RS &GIS"

Submitted by

ISHAN SHAH	**(B1200900111)**
DEEPA SHETTY	**(B1200900117)**
SHAMAL SHINDE	**(B1200900123)**
SIDDHARTH SHINDE	**(B1200900124)**
TUMJOM ETTE	**(B1200900137)**

Has satisfactorily carried out the investigation and completed the project work.

This work is being submitted for the award of degree of Bachelor of Engineering. It is submitted in the partial fulfillment of the prescribed syllabus of Savitribai Phule Pune University , for the academic year 2016 -2017.

Dr. A.J.Shirke
(Project Guide)

Mrs. U.R.Kawade
(Head of Department)

(External Examiner)

Dr.JaykumarJayraman
(Principal)

SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE.
D.V.V.P. COLLEGE OF ENGINEERING, AHMEDNAGAR
DEPARTMENT OF CIVIL ENGINEERING

CERTIFICATE

This is to certify that the following Students have satisfactorily carried out the B.E project work entitled "ASSESSMENT OF PERFORMANCE AND BEHAVIOUR OF MRF IN RC STRUCTURE UNDER SEISMIC ACTIVITY" This work is being submitted for the award of Degree of Bachelor of Civil Engineering. It is submitted in the partial fulfillment of the prescribed syllabus of Savitribai Phule Pune University, for the academic year 2016-2017

SUBMITTED BY

GHADGE AVINASH R.	(B120090033)
ROKDE SUKANYA R.	(B120090107)
KALE BHAGWAN K.	(B120090059)
KULKARNI SUMIT V.	(B120090076)
MAHAJAN SHREEKANT S.	(B120090080)
MUNDHE ANIL S.	(B120090088)

PROF. A. A. GUPTA
(Guide)

PROF. U. R. KAWADE
(HOD Civil)

Dr. J. JAYAKUMAR
(Principal)

EXTERNAL EXAMINER

SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE (M.S.)

DR. VITHALRAO VIKHE PATIL COLLEGE OF ENGINEERING, VILAD GHAT, AHMEDNAGAR - 414111 Department of Civil Engineering

CERTIFICATE

This is to certify that the Project Report on

"ANALYSIS AND DESIGN OF PRE ENGGINEERED STEEL FRAME USING CASE STUDY"

is the bonafied work carried out by

Mr. RokadeSagar R.	**B120090106**
Mr. KumavatVaibhav G.	**B120090077**
Mr. Patil Pranav M.	**B120090096**
Mr. GadakhVinod B.	**B120090036**
Mr. SonawaleAmol G.	**B120090129**
Mr. GomaseGovinda S.	**B120090047**

Academic Year-2016-17

This report embodies the work carried out by the candidate in the college, towards the partial fulfillment of B.E. Course in Civil Engineering by the Savitribai Phule Pune University, Pune.

6/6/17

Prof. U.R. Kawade
Head of Department

Dr. J. Jayaraman
Principal

7/6/17

Prof. A. A. Waghmare
Project Guide

6-6-17

External Examiner

SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE
ACADEMIC YEAR 2016-17
D.V.V.P.COLLEGE OF ENGINEERING,
AHMEDNAGAR

CERTIFICATE

This is to certify that the following student have satisfactory carried out Final Year project report has completed work entitled,

"Application Of Silica Aerogel as Construction material"

This work is being submitted for the award of degree of Bachelor of Engineering in Civil Engineering .It is submitted in the partial fulfillment of the prescribed syllabus of SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE for the academic year 2016-17.

SUBMITTED BY

KHOJE POOJA C.	**B120090072**
MORE SONAM D.	**B120090085**
MOTE RUSHIKESH S.	**B120090087**
NAGDEVE TALASH W.	**B120090 090**
SHINDE AKSHAY B.	**B120090118**
WABLE PANKAJ K.	**B120090141**

Prof. A. H. SHIRKE
(Project Guide)

Prof. S.N. DAULE
(Project Co-guide)

Prof. U.B.KAWADE
(H.O.D.)
Dept of civil engg .

Dr.J.J.JAYKUMAR
Principal
D.V.V.P COE

6-6-17
External Examiner

SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE (M.S.)

DR. VITHALRAO VIKHE PATIL COLLEGE OF ENGINEERING,

VILAD GHAT, AHMEDNAGAR - 414111

Department of Civil Engineering

CERTIFICATE

This is to certify that the Project on

"HIGH STRENGTH CONCRETE USING VARIOUS ADMIXTURES"

is the bonafied work carried out by

Sonawane Sunil R. (B120090104)
Akade Rohan S. (B120090004)
Gadge Shubham R. (B120090038)
Deshmukh Supriya S. (B120090032)
Zine Nutan V. (B1200900113)
Yevelekar Sayali P. (B120090112)
The Student of B E. (Civil Engineering)
Academic Year-2017-18

This report embodies the work carried out by the candidate in the college, towards the partial fulfillment of B.E. Course in Civil Engineering by the Savitribai Phule Pune University, Pune.

Prof. U.R. Kawade
Head of Department
(Department of Civil Engineering)

(Dr. Shirke AT)
HOD-Civil

Dr. Jayakumar Jayaraman
Principal

Prof. P.K.Bhandari
Project Guide
(Department of Civil Engineering)

External Examiner

॥ न हि ज्ञानेन सदृशं पवित्रमिह विद्यते ॥

Dr. Vitthalrao Vikhe Patil Foundation's

Dr. Vithalrao Vikhe Patil College of Engineering Ahmednagar

DTE College Code: EN-5161

CERTIFICATE

This is to certify that the project report entitled

"IRRIGATION AND WATER MANAGEMENT OF PIMPALGAON MALVI VILLAGE."

Submitted by

Mr. Bhandari Rushabh M. (B120090016) **Mr. Lawande Prasad S. (B120090063)**

Mr. Bora Shubham A. (B120090022) **Mr. Gosavi Sangram B. (B120090046)**

Mr. Meher Abhijeet T. (B120090068) **Mr. Gagare Krushna S. (B120090039)**

The group has satisfactorily completed the work under my guidance as per curriculum of Final Year in civil Engineering of Savitribai Phule Pune University in the academic year 2017-18.

PROF. P.B.AUTADE
PROJECT GUIDE

(Dr Shirke AT)
HOD-Civil

PROF.U.R.KAWADE
H.O.D

EXTERNAL EXAMINER

DR.J.JAYARAMAN
PRINCIPAL

SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE (M.S.)

DR. VITHALRAO VIKHE PATIL COLLEGE OF ENGINEERING,

VILAD GHAT, AHMEDNAGAR - 414111

Department of Civil Engineering

CERTIFICATE

This is to certify that the Dissertation on

"Self-Healing Concrete – A Remedy For Micro Cracks"

is the bonafied work carried out by

Aditya Palve	B120090079
Venkatesh Sanganwar	B120090094
Suraj Badadhe	B120090008
Ashru Bhandwalker	B120090017
Harshada Patil	B120090081
Dhanshree Shinde	B120090103

The Student of B.E. (Civil Engineering)

Academic Year-2017-18

This report embodies the work carried out by the candidate in the college, towards the partial fulfillment of B.E.. Course in Civil Engineering by the Savitribai Phule Pune University, Pune.

Prof. P.A. Chavan
Project Guide

(Dr Shinke AT)
HOD-CM

Prof. U.R. Kawade
Head of Department
Department of Civil Engineering)

Dr. Jayakumar Jayaraman
Principal

Savitribai Phule Pune University, Pune, 2012 Course

DR. VITHALRAO VIKHE PATIL COLLEGE OF ENGINEERING, AHMEDNAGAR.

DEPDEPARTMENT OF CIVILENGINEERING

CERTIFICATE

This is to certify that the following Students

Mr. SHAIKH ILIYAS I. (B120090098)
Mr. PATL MANOJ R. (B120090082)
Mr. CHOCHANDE K.P. (B120090027)
Mr. AVHAD PANDURANG G. (B120090006)
Mr. KUTE SATISH R. (B120090062)
Mr. PARSHETTY S.S. (B120090093)

have successfully completed the projectentitled "Advance water distribution system for town by using PLC" under my Supervision in the partial fulfillment of Bachelor of Civil Engineering of SavitribaiPhule Pune University, during academic year 2017-18.

Date:
Place:

Prof. N.M.Mulik
(Project Guide)

(External Examiner)

Prof.U.R.Kawade
(H.O.D.)

Dr.Jayakumar Jayaraman
(Principal)

Dr.VITHALRAO VIKHE PATIL COLLEGE OF ENGINEERING,
AHMEDNAGAR, 414 111

CERTIFICATE

A Project Report Stage-II on

"UTILIZATION OF WASTE FOR MANUFACTURING OF CONSTRUCTION MATERIAL BY USING FOAMING AGENT"

Submitted by:

PATTEWAR MANIK H.	**B150090075**
MANE MONIKA R.	**B150090059**
RAUT PRAJAKTA R.	**B150090077**
KARPE GOVIND M.	**B150090048**

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A Project Report on

POLYHOUSE AUTOMATION USING PLC

Submitted by

Ghumare Sagar Ramdas (PRN:71846586F)
Londhe Saurabh Arjun (PRN:71702707E)
Patil Kalpesh Radhesham (PRN:71846659E)
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as a partial fulfilment of

Bachelor of Engineering

(Electrical Engineering)

Dr. Vithalrao Vikhe Patil College of Engineering,
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2019-20

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1 Introduction

1.1 Introduction

- Poly-house is controlled environment it uses all resources at their optimum efficiency and to help poly-house to do so automation is necessary.
- In poly-house crop friendly weather condition is created and continuously monitored as well as controlled with the help of sensors and controller.
- Sensors sense the parameters responsible to growth of the crop such as temperature, humidity, light intensity and sends signal to the controller.
- Controller checks the input signal from the sensors and compares with the set point and takes corrective action.
- In this way we can grow many crops in a year with great quality and with minimum use of resources.

1.2 Necessity

- The main necessity of this project is to design and construct a Polyhouse using a programmable logic controller which will give the following benefits:- 1.Reduce the total fertilizer input.
  2.Optimize the growth of the crop. 3.Protect
  the irrigation and many more.

1.3 Objective

- Poly house Cultivation is being developed to achieve good crops with less labor cost. Poly house is made up of polyethylene sheet having rectangular shape to grow the crops in a controlled environment even in unfavorable conditions.
- By using automated control system, crucial parameters like temperature, hu- midity and water level necessary for the growth of plants can be maintained and controlled automatically.
- The thickness of the sheet can be varied according to the requirement that depends on the crop type to be grown. This model has developed with var- ious nodes which are deployed inside poly house and are controlled by PLC technology.

1.4 Organization

- Literature survey we have made gives the brief survey of the project.
- The block diagram gives the ideal information about the project.
- An introduction to the designing of the project and implementation of the sensors using is been provided.
- All about the acquired results and problems faced are been discussed.
- Conclusion of the project is also given in the report.

2 Literature Survey

2.1 Literature Survey

- Today we have cheap sensors and more precise programmable controllers such as PLC available in the market. With the help of temperature, light intensity, humidity sensors and PLC automation of poly-house can be done. With the help of automation minimum and effective use of valuable resources can lead to achieve maximum crop. [1]
- Control and monitoring of environmental parameters inside a polyhouse farm, so as to ensure continuous maintenance of favorable crop atmosphere is the objective of the work presented in this paper. [2]
- The objective is achieved through the use of internet based technology. The system is also expandable to be integrated with mobile telephony.[6]
- To solve the problems that occur when farmers overuse chemical fertilizers, it is necessary to develop rapid and efficient portable measurement systems for the detection and quantification of nitrogen (N), phosphorus (P) and potassium (K) in soil.[3]
- Greenhouse temperature detection system based on linear offset interference developed in essential elements that influence the growth and the harvest es- timate of the corps, there are light, air, water, temperature, and soil.[8]

In the entire revision ,it has been observed that the old technologies could be taken over the smarter use of PLC and PID control, but the technologies had its demerits. After many survey and research we finally ended up in doing a project in agri- cultural sector. To make the irrigation simpler we planned of controlling several environmental parameters. Thus, the title to our project was given as 'Polyhouse Automation Using PLC'

The description of the above mentioned sensors are as follows:-

2.1.1 Humidity Temperature Sensor

- Temperature detection
  The temperature within the poly-house is one of the important parameter to control because it directly affects the crop and varies during the day and night. So when temperature is increases exhaust fan gets on to maintain the temperature and at night when sometimes temperature drops below setpoint incandescent lamp gets activate to maintain the temperature.

- Humidity detection
  Humidity is measured in relative humidity inside the polyhouse. The humidity decide an amount of water molecules present in the air of poly-house environ- ment. If the humidity of atmosphere get increased it will be sensed by the sensor and which further turns the fogger valves ON and the fogger will pro- vide water droplets to the atmosphere.

2.1.2 Soil Moisture Sensor

Soil moisture sensor senses the amount of nitrogen, phosphrous or potassium in fertilizers. Color sensor senses the color change and sends it to microcontroller in the form of electrical signal. Depending upon the amount of the component in fertilizer the color of solution changes.

2.1.3 pH Sensor

pH sensors measure the level of pH in sample solutions by measuring the activity of the hydrogen ions in the solutions. This activity is compared to pure water (a neutral solution) using a pH scale of 0 to 14 to determine the acidity or alkalinity of the sample solutions.

2.1.4 Fogger Valve/Pump

Foggers are used to maintain humidity or temperature control in polyhouse. Fog- gers manufactured from good quality virgin raw material, easy to install, reliable performance are some of the features of fogger.

2.1.5 Solenoid Valve

A valve is placed across the field, which help in drip irrigation. The valve is supposed to be opened or closed depending on the soil moisture level. The soil moisture level was determined by the soil moisture sensor.

2.1.6 Dosing Pump

A dosing pump is a small, positive displacement pump. It is designed to pump a very precise flow rate of a chemical or substance into either a water, steam or gas flow. A dosing pump is generally quite small and is powered by either a small electric motor or air actuator.

2.2 Design and implementation Details (Hardware Description)

2.2.1 Programmable Logic Controller (PLC)

A Programmable Logic Controller (PLC) is an industrial digital computer which has been ruggedized and adopted for the control of manufacturing processes, such as assembly lines or robotic devices, or any activity that requires high reliability control and ease of programming and process fault diagnosis.

PLCs were first developed in the automobile manufacturing industry to provide flexible, ruggedized and easily programmable controllers to replace hard wired re- lays, timers and sequencers. Since then, they have been widely adopted as high reliability automation controllers suitable for harsh environments. A PLC is an example of a hard real time system since output results must be produced in re- sponse to input conditions within a limited time, Otherwise unintended operation will result.

PLCs were first developed in the automobile manufacturing industry to provide flexible, ruggedized and easily programmable controllers to replace hard wired re- lays, timers and sequencers. Since then, they have been widely adopted as high reliability automation controllers suitable for harsh environments. A PLC is an example of a hard real time system since output results must be produced in re- sponse to input conditions within a limited time, Otherwise unintended operation will result.

The computer is connected to the PLC through USB, Ethernet, RS-232, RS- 485 or RS - 422 cabling.It is also possible to view and edit the program in functional block diagram, sequence flow charts and structured text. The PLC used in this project is Rockwell Automation Micro logix 1400.

Specification

- 24 Digital Inputs
- 12 Digital Output
- Channels Analog Inputs Modules IF4.
- 24V DC power supply.
- -20 to +60 degree celcius operating temperature.

Figure 1: Rockwell Automation Micro logix 1400.

Features and Benefits

- Expand your application capabilities with up to 7 expansion I/O modules for a maximum of 256 discrete I/O.
- Up to 6 embedded 100 kHz high speed counters (on controllers with dc inputs).
- 2 Serial ports with DF1/DH485/Mod bus RTU/DNP3/ASCII protocol sup- port.
- Ethernet port provides you with Ethernet/IP, DNP3 over IP and Mod bus TCP/IP protocol support as well as web server and email capabilities.
- Built-in LCD with backlight allows you to view controller and I/O status, and provides a simple interface for messages, bit/integer monitoring and manipu- lation.

Selection of Components

- The system deals with controlling the part of the polyhouse with the help of PLC using sensors such as Humidity temperature sensor, NPK sensor, pH sensor, etc.

2.2.2 Humidity Temperature Sensor

The TRH-555-series is a highly accurate temperature humidity transmitter using a digital technology sensor which gives fast and reliable output. It comes with a LCD digital display and is available in flameproof or weatherproof enclosures.

Figure 2: Temperature/Humidity Sensor

Specification

- Measurement Accuracy: 0.5C for Temperature
- 2 RH for Relative Humidity
- Response Time: Approx. 30 Seconds
- Start-up Time: Approx.30 Seconds
- Supply Voltage: (18 to 36 VDC); Typically 24 VDC
- Power Consumption: Less than 3.5 Watts
- Cable: 3 Wires (1.5 mm) flexible or Armoured Shielded Cable.
- Operating Temperature: -40 to +120C
- Storage Temperature: -50 to +130C
- Humidity: Below 95 percent Non-Condensing.

Features

- Highly accurate Digital technology sensor gives fast and reliable output.
- Temperature range is -40 to 120ºC with accuracy of 0.5 ºC.
- Relative Humidity range is 0 to 100 percent RH with accuracy of 2 percent RH.
- Long term stable output for both Temperature and RH.
- Calculated Dew point measurement based on measurement of Temperature and Humidity. User selectable Temperature, RH Dew point outputs.
- Digital Alphanumeric display with configurable backlit option.
- Non-intrusive programming for Flameproof models using Magnetic Pen.
- Password protected programming with password changing facility.
- Software calibration for both Temperature Humidity.

Working

The temperature within the poly-house is one of the important parameter to control because it directly affects the crop and varies during the day and night. Humidity is measured in relative humidity inside the polyhouse. The humidity decide an amount of water molecules present in the air of poly-house environment. If the humidity of atmosphere get increased it will be sensed by the sensor and which further turns the fogger valves ON and the fogger will provide water droplets to the atmosphere.

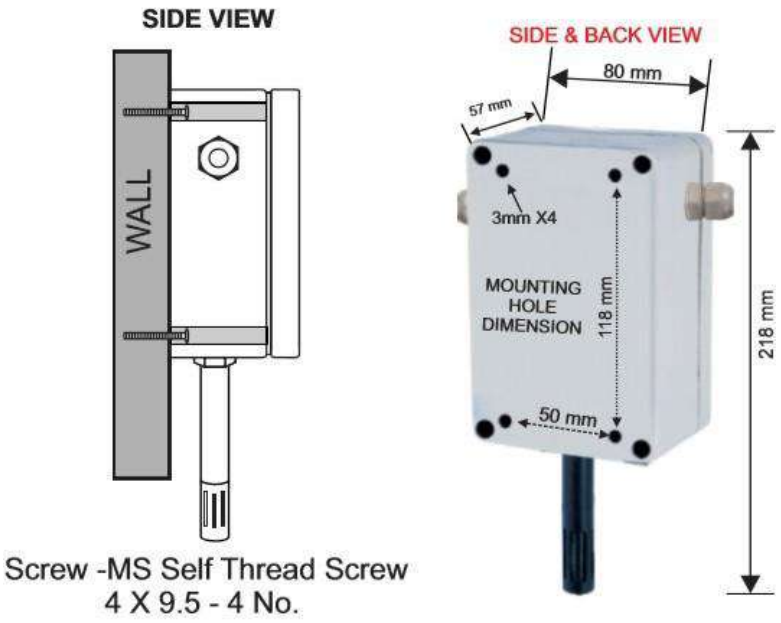


Figure 3: Waterproof enclosure dimensions

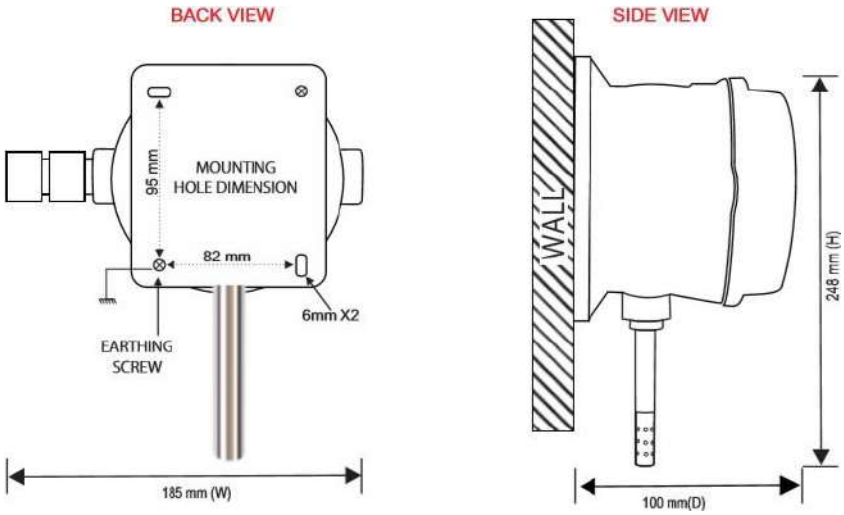


Figure 4: Flameproof enclosure dimensions

2.2.3 Soil Moisture Sensor

The Soil Moisture Sensor is used to measure the volumetric water content of soil. This makes it ideal for performing experiments in courses such as soil science, agri- cultural science, environmental science, horticulture, botany, and biology. Use the Soil Moisture Sensor to:

- Measure the loss of moisture over time due to evaporation and plant uptake.
- Evaluate optimum soil moisture contents for various species of plants.
- Monitor soil moisture content to control irrigation in greenhouses.

It is widely used in rice fields, greenhouse cultivation, rice, vegetable cultivation, orchard nursery, flowers and soil research.

Figure 5: Soil Moisture Sensor

Specification

- Required voltage- 5V
- The required current- less than 20mA
- Type of interface- Analog
- The required temperature- 10-30 degree celcius

Working

- Measuring soil moisture is important for agricultural applications to help farm- ers manage their irrigation systems more efficiently. Knowing the exact soil moisture conditions on their fields, not only are farmers able to generally use less water to grow a crop, they are also able to increase yields and the qual- ity of the crop by improved management of soil moisture during critical plant growth stages.
- In urban and suburban areas, landscapes and residential lawns are using soil moisture sensors to interface with an irrigation controller. Connecting a soil moisture sensor to a simple irrigation clock will convert it into a ”smart” irrigation controller that prevents irrigation cycles when the soil is already wet, e.g. following a recent rainfall event.
- Golf courses are using soil moisture sensors to increase the efficiency of their irrigation systems to prevent over-watering and leaching of fertilizers and other chemicals into the ground
- This sensor mainly utilizes capacitance to gauge the water content of the soil (dielectric permittivity).
- The working of this sensor can be done by inserting this sensor into the earth and the status of the water content in the soil can be reported in the form of a percent.

2.2.4 Solenoid Valve

A Solenoid valve is an electromechanical device in which the solenoid uses an elec- tric current to generate a magnetic field and thereby operate a mechanism which regulates the opening of the fluid flow in a valve.

Solenoid valves differ in the characteristics of the electric current they use, the strength of the magnetic field they generate, the mechanism they use to regulate the fluid, and the type and characteristics of fluid they control. The mechanism varies from linear action, plunger type actuators to pivoted armature actuators and rocker actuators. The valve can use a two port design to regulate a flow or use a three or more port design to switch flows between ports. Multiple solenoid valves can be placed together on a namifold.

Figure 6: Solenoid Valve

2.2.5 pH Transmitter

Hamilton H100 pH Transmitter combines ease of use and reliability. It has been designed for universal process application including use in pharmaceutical, chem- ical, food beverage industries as well as water / waste water treatment. The self-explaining user interface ensures comfortable and intuitive handling. Hamil- ton H100 pH Transmitter provides continuous sensor monitoring and preventive maintenance indication for maximal reliability.

The H100 transmitter provides an easy to use interface for traditional Hamilton sensors. Intuitive menus allow simplified configuration and calibration of the sensor. Sensor status is continually monitored and faults are visually identified with icons on the large LCD screen. The H100 universal power supply can accept either AC or DC power which allows for flexibility in most applications. The transmitter comes with Factory Mutual non-incendive rating for use in hazardous areas.

Figure 7: pH Transmitter

Specification

- Measuring range –1500 ... +1500 mV
- Ambient temperature –20 ... +55C
- Transport/Storage temperature –20 ... +70C
- Relative humidity 80 percent at temperatures up to 55C, maximum operating height 2000 m
- Power supply 24 (–15 percent) ... 230 V AC/DC (+10 percent)
- Frequency for AC 45 ... 65 Hz
- Power supply 24 (–15 percent) 230 V AC/DC (+10 percent); approx. 5 VA, 2.5 W, AC: 45 ... 65 Hz

Dimensions

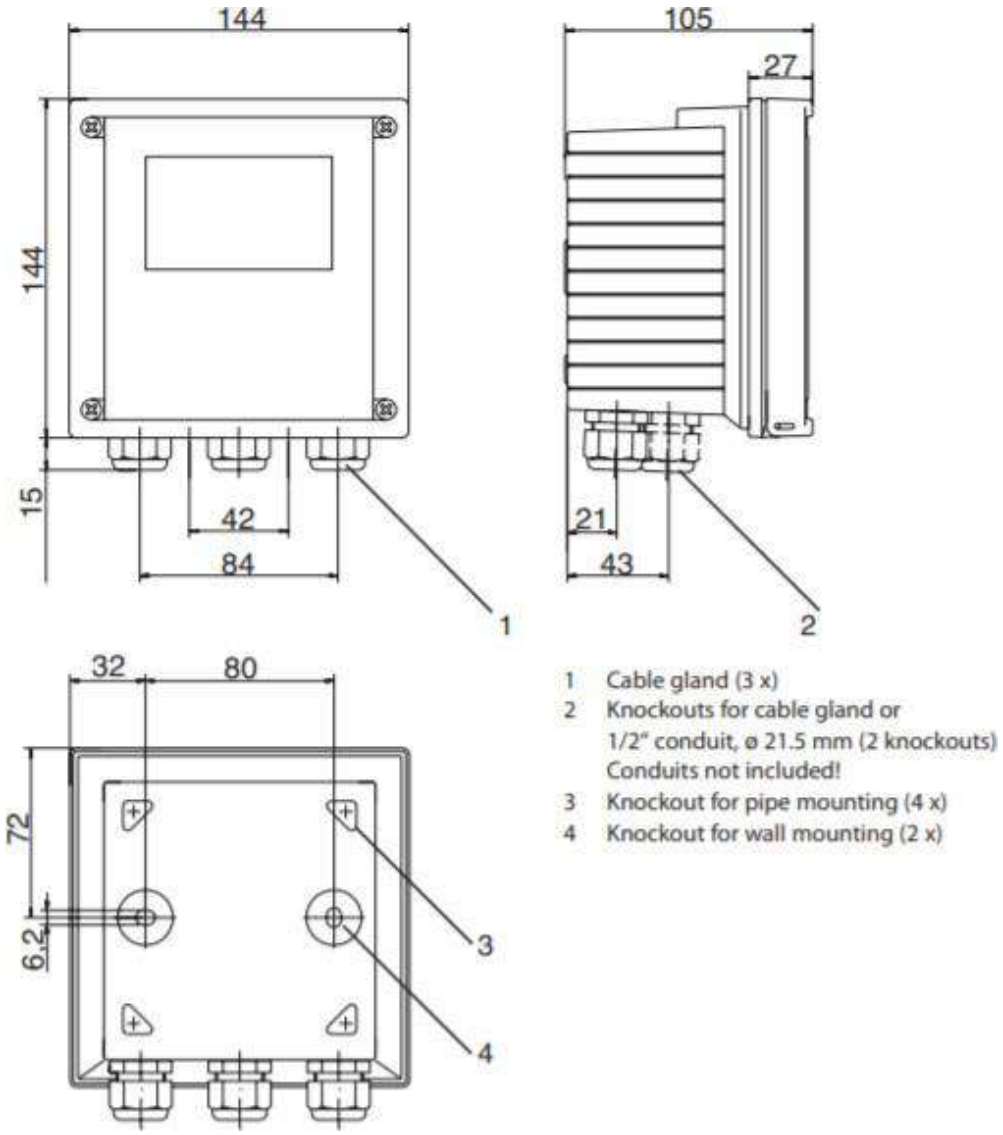


Figure 8: Dimensions of pH Transmitter

Connections

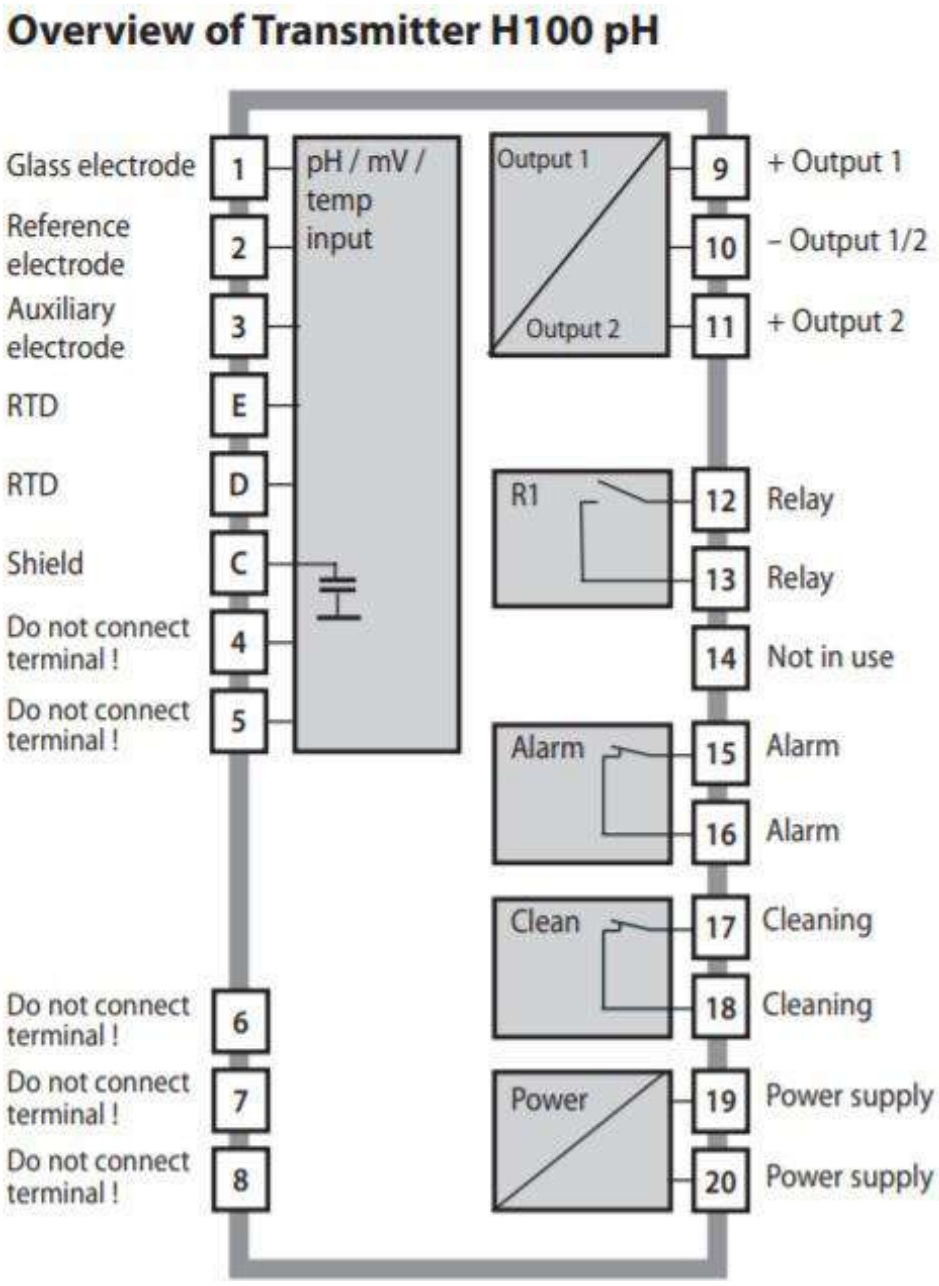


Figure 9: Connections of pH Transmitter

VP Cable Connection

Connecting the sensor to the VP cable

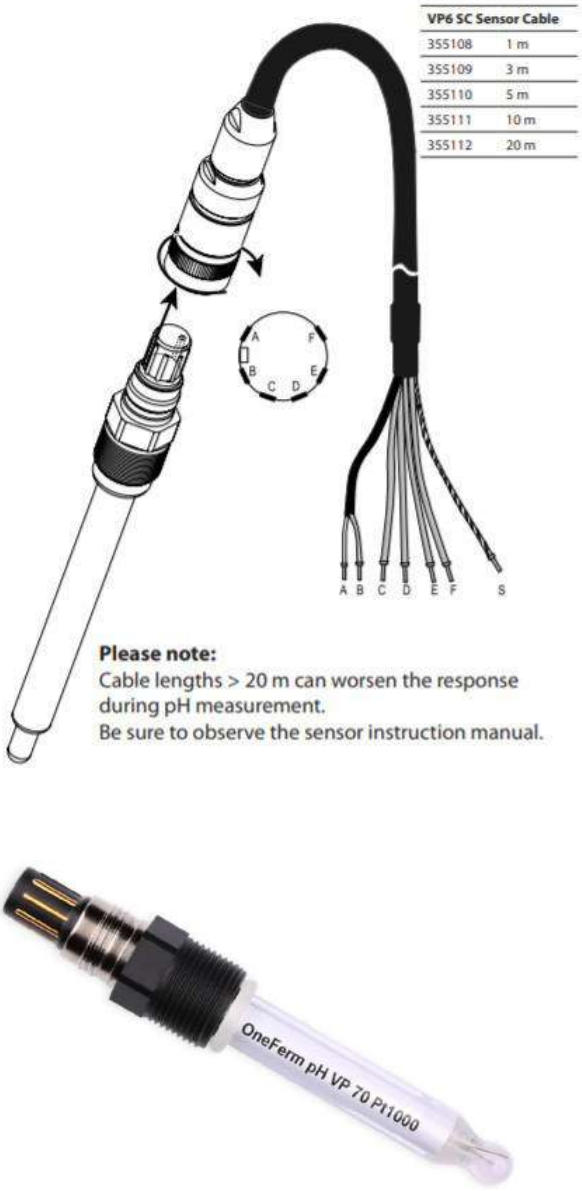


Figure 10: Cable connection of pH transmitter

Figure 11: Bottom section of pH transmitter

2.2.6 Fogger Valve

Foggers are used to maintain humidity or temperature control in Polyhouse.

Fog is an excellent alternative to mist for germination and propagation in green- houses for many reasons. It provides a more uniform wetting across the plants in your greenhouse. It achieves deeper penetration into the foliage, it is more effi- cient and has lower maintenance costs. It doesn't take much management to keep the humidity high and not saturate your growing medium. It is also excellent for cooling.

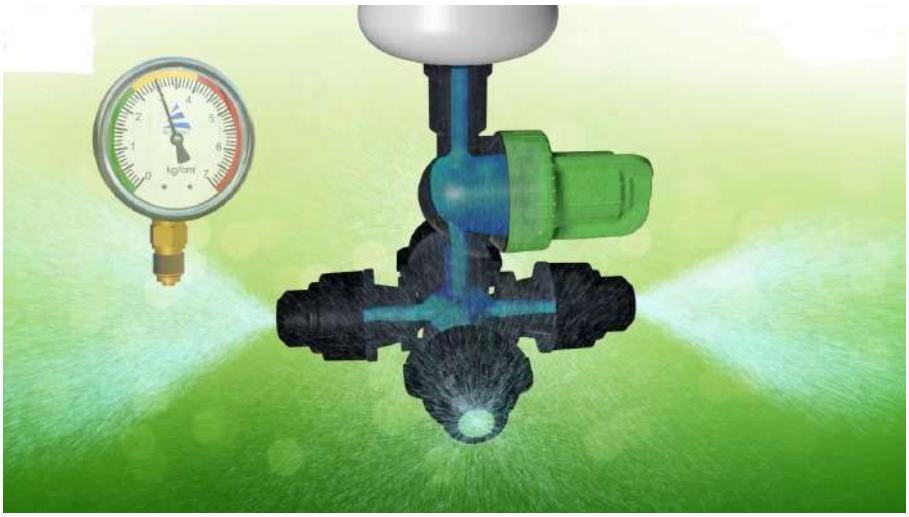


Figure 12: Fogger Valve

Features

- Available in 4way, 2way mid single way with antileak
- Operates at a low pressure. Hence, high pressure pumps are not necessary.
- Can be mounted on 16mm drip laterals.
- Comes with a no drain valve.
- Easy to dissemble and clean.
- Made from best engineering plastic.
- Can be used with our special antirodent laterals for poultry sheds.
- Reasonable pricing.

Figure 13: Foggers Application in Polyhouse

2.2.7 Dosing pump

A dosing pump, which is a positive displacement pump, is designed to inject a chemical or another substance into a flow of water, gas or steam. Dosing pumps, which are typically small, provide an extremely precise flow rate for maximum control. They are the central part of an integrated dosing system designed for automatic dispersion of chemicals. This dosing definition applies to a wide range of applications and industries, from waste water treatment to food processing.

Figure 14: Dosing pump

Working

A dosing pump draws a measured amount of liquid into its chamber and injects the chemical into a tank or pipe that contains the fluid that is being dosed. It's powered by an electric motor or an air actuator and has a controller that turns the pump on and off and manages the flow rate. Some models include more sophisti- cated control systems.

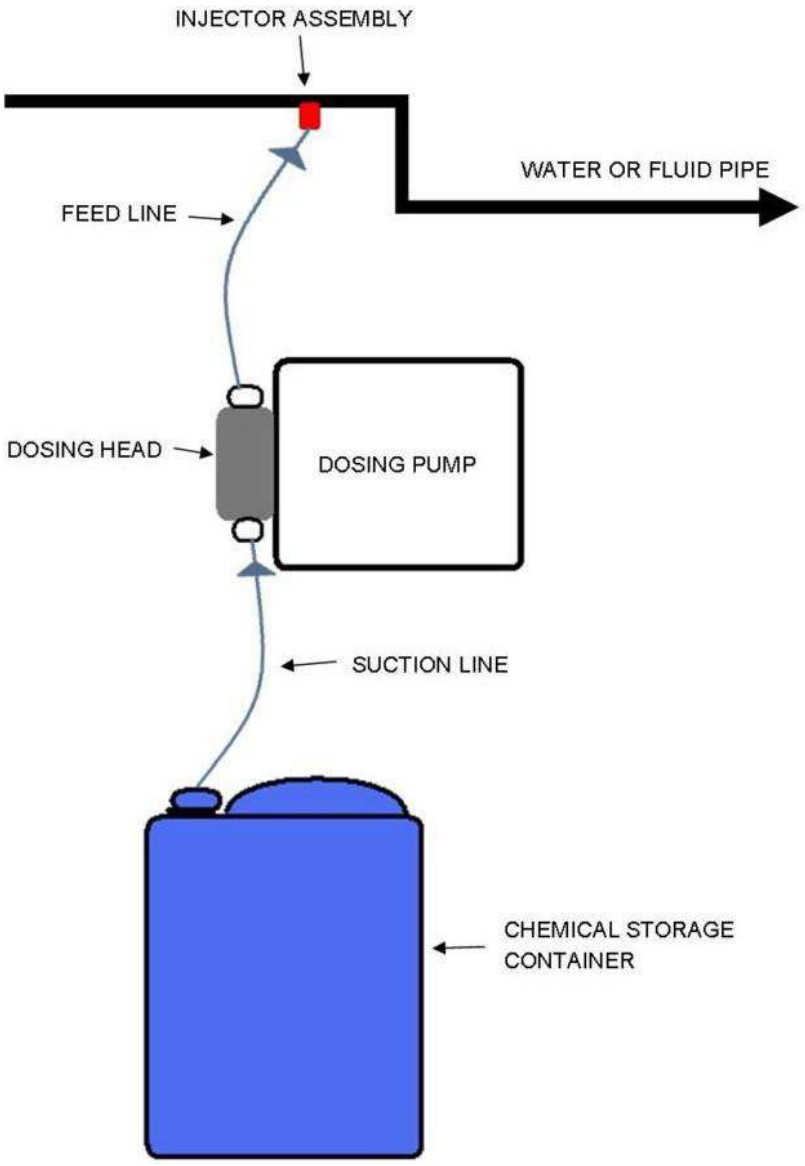


Figure 15: Working of the Dosing pump

Construction-

Parts of Dosing Pump-

The main components of a dosing pump include-

- Chemical Container or Tank – holds the product to be dosed.
- Pump – varies in materials and size; includes inlet, suction line and dosing line.
- Injector – one-way valve where chemical is injected into product; overcomes pressure in pipe and allows chemical into liquid flow.
- Foot Valve – one-way valve attached to suction line; placed into product drum and keeps pump primed.
- Dosing Line – rigid tube or reinforced hose; can be PE, PVC or stainless steel for high pressure use.
- Control System – Ensures accuracy; turns on and off at specific times. Can be simple flow switch or timer, up to a SCADA central control system for various sensors and ability to integrate into a larger system.

Types of Dosing Pumps-

- These four dosing pump types are designed for different pressures,chemicals and applications.They vary by pumping action and mechanism.
- Diaphragm (constant injection) pumps use a diaphragm, piston and valves on both the inlet and outlet to fill and empty its chamber.Drawing in the piston fills the chamber and a specific amount of chemical is injected at a preset speed, usually a percentage of the maximum flow rate.Certain pump models are capable of variable dosing rates.
- Diaphragm (pulse injection) pumps also uses the diaphragm mechanism,but instead of a constant flow rate,a solenoid coil takes in the chemical and injects it in pulses.The flow rate is the length of time between pulses.It is less accurate than the constant injection pump but is simple in design and inexpensive.
- Lobe pumps let a certain volume of fluid through meshing gear impellors. It is not as accurate as a diaphragm pump and it is only suitable for high viscosity fluids that will self-lubricate to minimize wear.They're not made for low flow rates,as it is difficult to ensure accuracy.
- Peristaltic pumps are highly accurate for dosing.A flexible bent tube lets the fluid pass,and the flow is controlled by a roller that moves by way of a me- chanical arm on the outside.This pushes product in the tube into the dosing tube and main fluid stream.

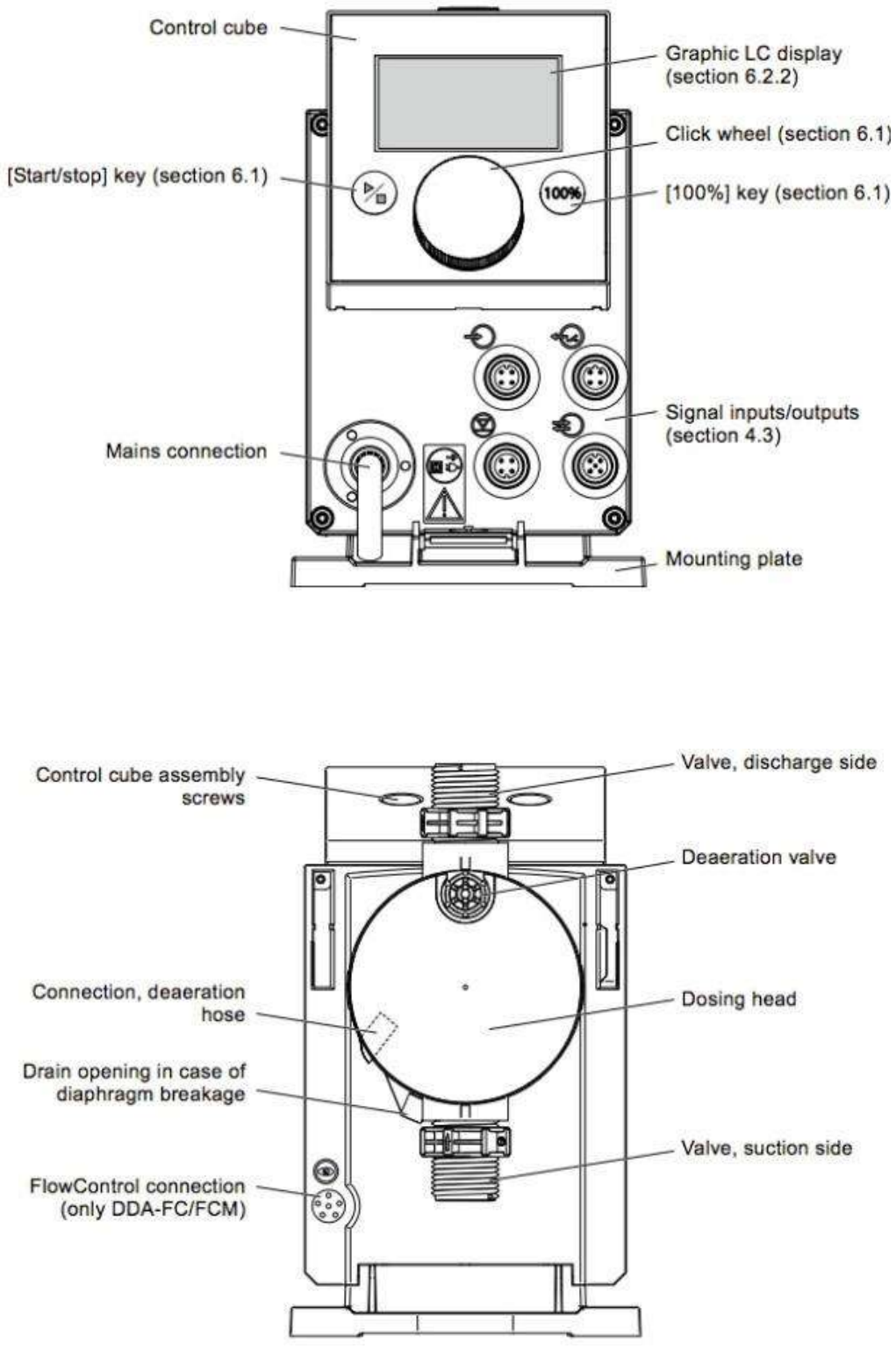


Figure 16: Front and Rear View of Dosing pump

2.2.8 Diagramatic Layout Of Fertilization Plant

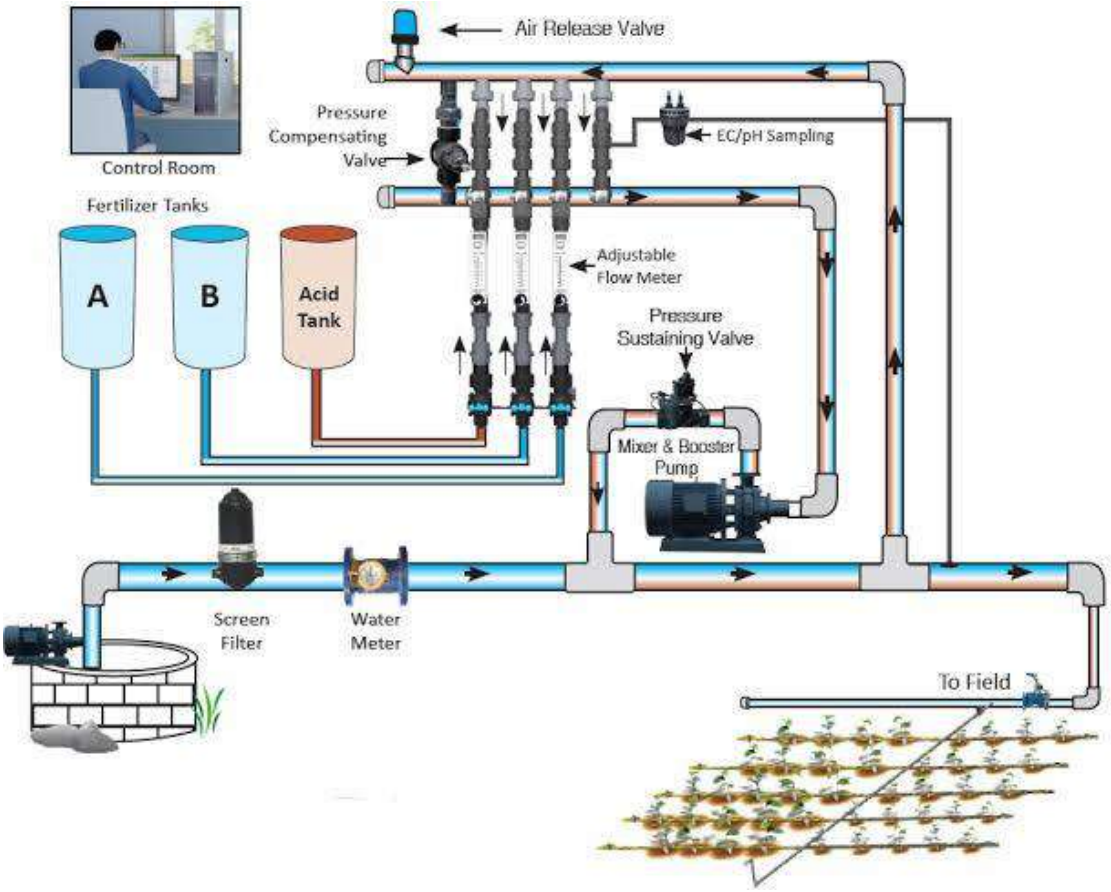


Figure 17: Layout Of Fertilization Plant

Fertigation is the process of delivering plants nutrients and water to produce a quality crop with higher yields. Employing an automated fertigation system can help growers make informed decisions that can significantly impact water and nutrient usage as well as contribute to reducing disease.

Some automated systems only manage the nutrient dosing equipment while other systems are capable of integrating irrigation scheduling with nutrient dosing activ- ities.

An automated fertigation system can be integrated with the facility's environ- mental control system where it can be monitored and managed from a centralized user interface along with all the other controlled processes within the grow op- eration.Fertigation systems vary with each application and should be capable of adapting to the design and operation of the overall facility.

This may include controls and monitoring for

- Tank levels
- EC
- pH
- Acid/base dosing equipment
- Soil moisture levels
- Pump controls
- Water treatment equipment (filters, pasteurizers, ozone, UV, etc.)

Figure 18: Single Element Nutrient Dosing System

Types of Dosing System

1) Dilute Tank Control (Batch method)

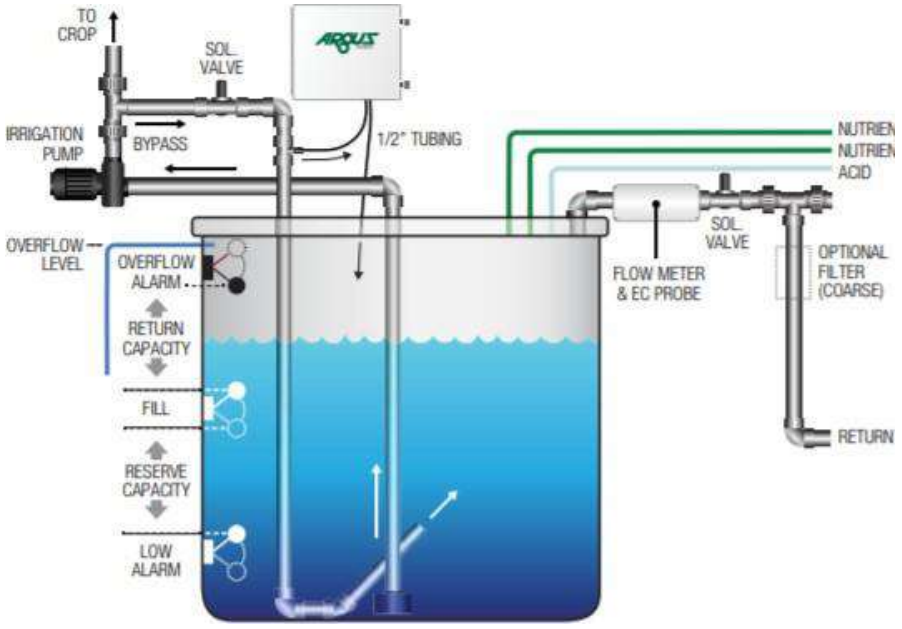


Figure 19: Dilute Tank control Dosing System

Using the dilute tank control method, fertilizers are premixed at the final feed strength concentration for the crop and stored in a tank or reservoir until used.

Dilute tanks are not as popular as in-line injection systems, particularly for larger operations. Large, costly storage tanks are required and each combination of fertilizer formulation and concentration requires its own tank. It is generally only practical to adjust the fertilizer strength and formulation when refilling a tank from empty A re-pressurizing irrigation pump is also required to deliver the dilute solution to the irrigation system.

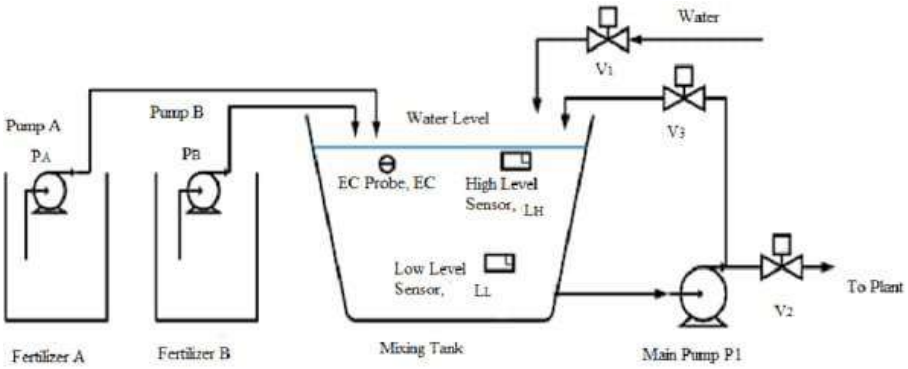


Figure 20: Working of Dilute Tank System

2) In-Line Injection (Continuous method)

Figure 21: In-Line Injection Dosing System

In-line injection equipment can range from simple mechanical injectors driven by water flow to fully automated nutrient control systems. Pressurized in-line systems preserve the pressure and flow characteristics of the water supply system, eliminat- ing the need for a re-pressurizing pump. In contrast, atmospheric injection systems blend the fertilizer and water in a non-pressurized tank and require a re-pressurizing pump.

Injection volumes are based on system flow rates, electrical conductivity (EC) sensor feedback or a combination of the two.

3) Multi-Feed Injectors

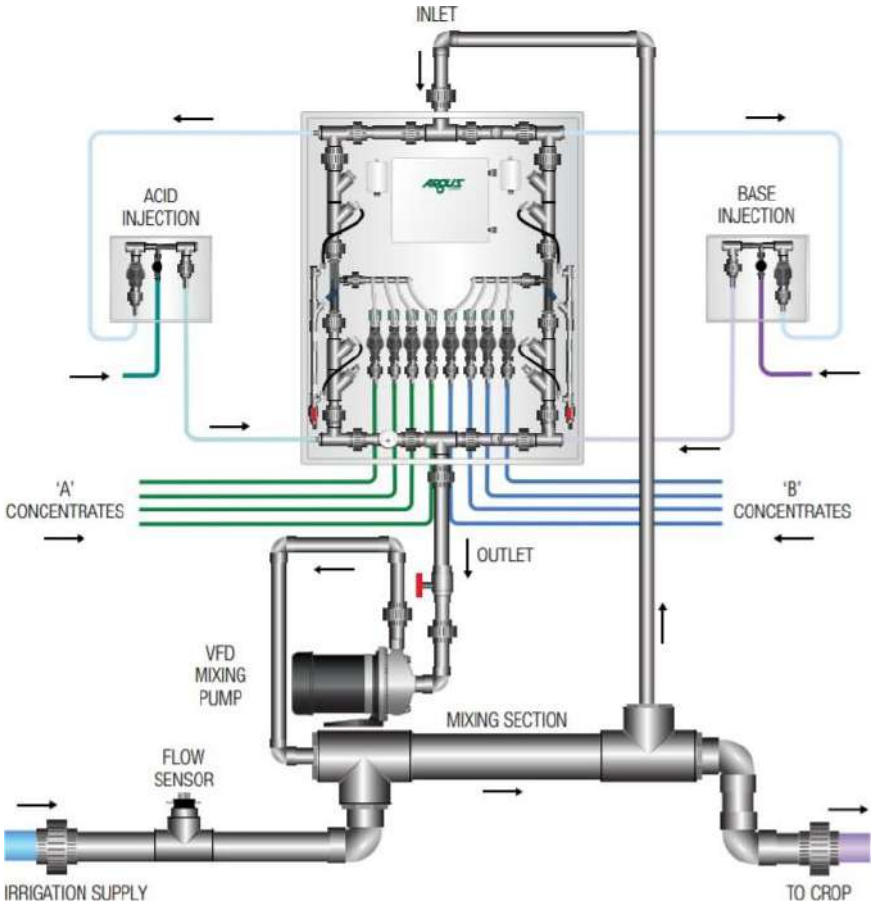


Figure 22: Multi-Feed Injector panels and Flow Schematic

- Supports up to 64 recipes on a single irrigation system.
- Set target values in parts per million for each recipe element System locates the required elements,calculates the amounts to inject and automatically delivers each recipe ‘on the-fly’.
- EC and pH targets for each recipe are tracked to ensure accuracy and provide a basis for automatic feed strength correction.
- Precision dosing is achieved at all design flow rates.
- Simple venturi injectors are used to draw the fertilizer concentrates into the mixing line to achieve a desired concentration or recipe.
- Metering valves are used to provide precise amounts of concentrate for the current recipe and flow rate.

2.2.9 Components of Fertilization Unit-

1) Rotameter-

Rotameter is variable area flowmeter used to measure fluid flow.It works on the principle of upthrust force exerted by fluid and force of gravity.The buoyant force exerted on an immersed object is equal to the weight of liquid displaced by the object.Under this principle, the rotameter works with float-tapered tube system.

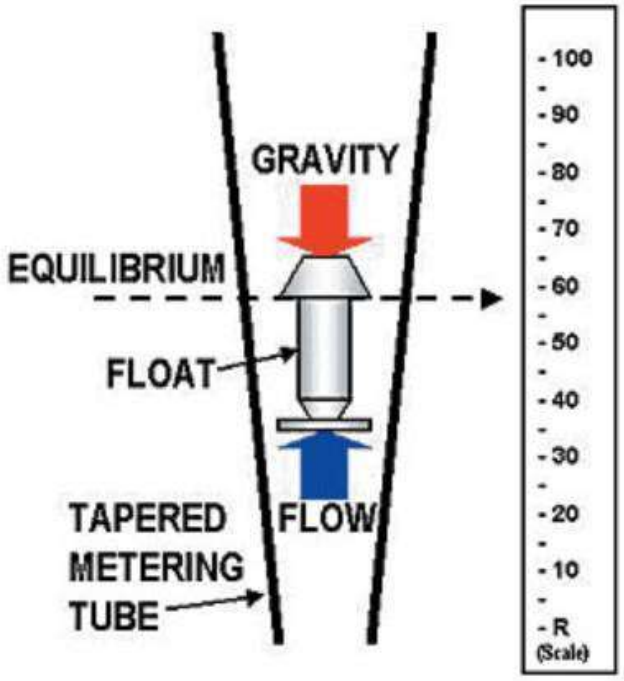
Figure 23: Rotameter

Working of Rotameter-

- Fluid enters in the tapered tube, some of the fluids strikes directly the float.
- Some of the fluid passes from sides.

Two forces are acting in this cases-

- Upthrust force (Buoyancy).
- Weight of the float.
- Annual space increases due to increase in area of the tube.
- When equilibrium establishes the float comes to the rest.



variable area flow meter

Figure 24: Types of Rotameter

2) Water Flow Meter-

A water flow meter is an instrument capable of measuring the amount of wa- ter passing through a pipe.Several water flow meter technologies are available for selection depending on the water measurement applications, budgetary terms, and maintenance requirements.

Figure 25: (a) Water Flow Meter

Installment-

Installation of flow meters in accordance with the manufacturer's written specifications is necessary for a flow-meter to be accurate as it claims. Every design has a certain tolerance to non-stable velocity conditions in the pipe, but all units require proper piping configurations to operate efficiently. Proper piping provides a normal flow pattern for the device, ensuring specified accuracy and performance.

Figure 26: (b) Installment of water flow meter

3) Electroconductivity meter-

The meter is equipped with a probe, usually handheld, for field or on-site measurements. After the probe is placed in the liquid to be measured, the meter applies voltage between two electrodes inside the probe. Electrical resistance from the so- lution causes a drop in voltage, which is read by the meter. The meter converts this reading to milli- or micromhos or milli- or microSiemens per centimeter. This value indicates the total dissolved solids. Total dissolved solids is the amount of solids that can pass through a glass-fiber filter.

Figure 27: Electroconductivity meter

4) Venturimeter-

A venturi creates a constriction within a pipe (classically an hourglass shape) that varies the flow characteristics of a fluid (either liquid or gas) travelling through the tube.

It is a device used to measure the speed and flow rate or discharge of fluid through a pipe, venturimeter is work on Bernoulli's equation.

Figure 28: Venturimeter installment

Working-

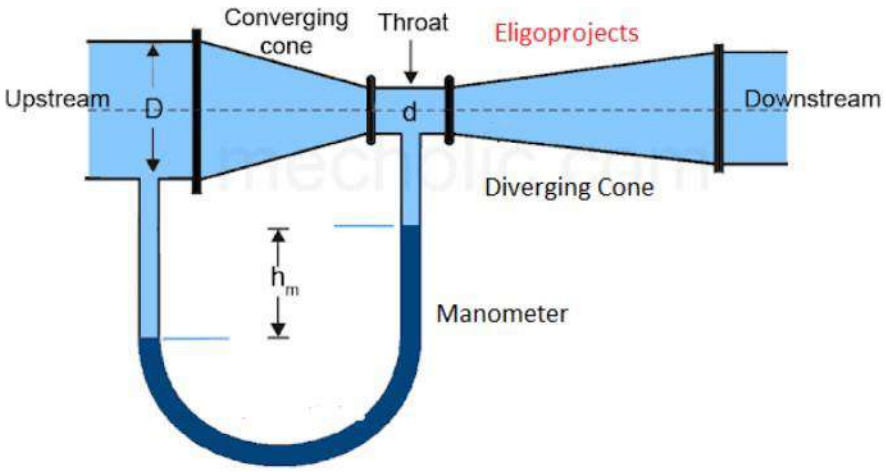


Figure 29: Working of Venturimeter

Venturimeter is work on Bernoulli's equation and its simple principle is when velocity increases pressure decreases. Cross sectional area of throat section is smaller than inlet section due to this the velocity of flow at throat section is higher than velocity at inlet section, this happen according to continuity equation. The increases in velocity at the throat result in decreases in pressure at this section, due to this pressure difference is developed between inlet valve and throat of the venturimeter. This difference in pressure is measured by manometer by placing this between the inlet section and throat. Using pressure difference value we can easily calculate flow rate through the pipe.

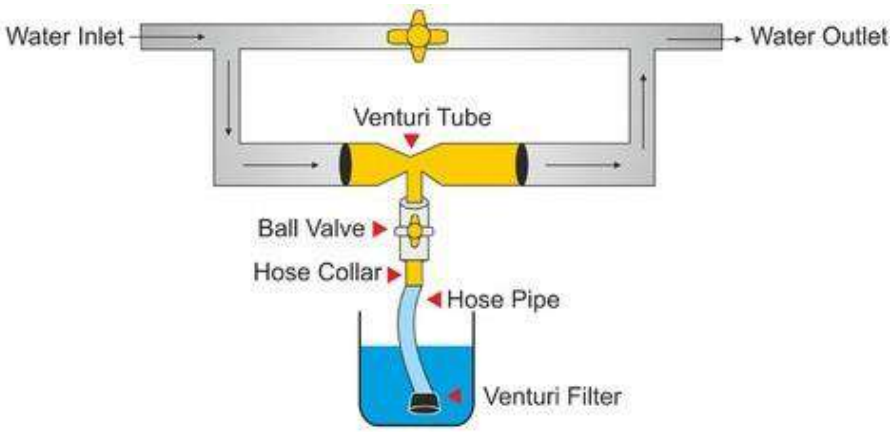


Figure 30: Working of Venturimeter

2.3 Software Description

2.3.1 RS Logix Link 500

The RS Logix Link 500 is the software produced by Rockwell Automation, used to program the Programmable Logic Controller (PLC). The RS Logix family of IEC-1131-compliant ladder logic programming packages helps you maximize per- formance, save project development time, and improve productivity. This family of products has been developed to operate on Microsoft Windows operating systems. Supporting the Allen-Bradley SLC 500 and MicroLogix families of processors, RS Logix 500 was the first PLC programming software to offer unbeatable productivity with an industry-leading user interface.

RS Logix 500 programming package is compatible with programs created with Rock-well Software DOS-based programming packages for the SLC 500 and Mi- croLogix families of processors, making program maintenance across hardware plat- forms convenient and easy.

Benefits of RS Logix 500

- Cross-reference information.
- Drag-and-drop editing.
- Diagnostics.
- Dependable communications.
- Database editing.
- Reporting

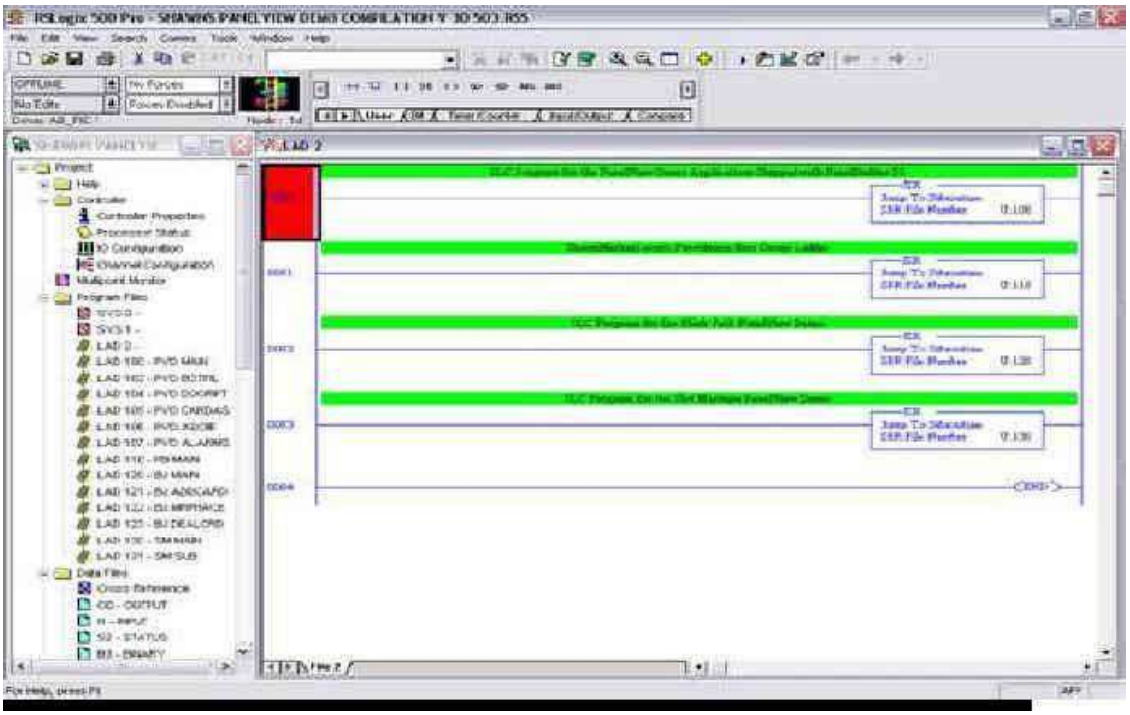


Figure 31: RS Logix 500 Software

2.3.2 Software Designed Layout Of The Fertilizer Unit

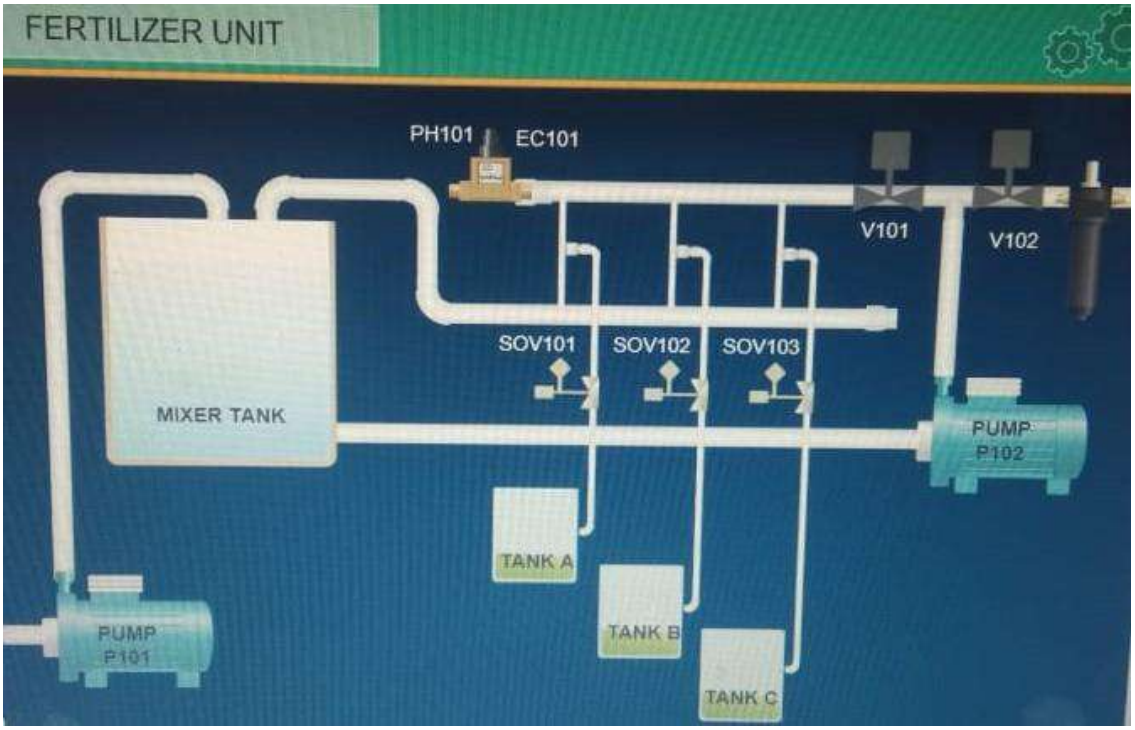


Figure 32: Intouch software designed fertigation plant

The SCADA system is used to control and monitor physical processes, examples of which include electricity transmission, gas transportation and pipelines in oil, water distribution, traffic lights, and other systems used based on modern society Use.SCADA is merely a software whereas HMI is a hardware. The advantage of SCADA is we can use a computer, install the SCADA software and can work it like an HMI as well.

SCASA-SCADA stands for supervisory control and data acquisition. This pro- cess is a type of software application program for control. SCADA is a central control system that includes controller network interfaces, input / output, commu- nication equipment and software.

Wonderware ”In Touch” provides a unified integrated view of all your controls and information resources.Wonderware software is used in various industries, in- cluding: automotive assemblies, facilities management, food and beverage, CPG, mining and metals, electricity, oil and gas, chemical, energy, and water and waste water. After doing this course, you can easily work on the other InTouch version. This software is used to Communicate with all the PLC series. And the instructions and properties remaining the same.

3 Block Diagram and Description

3.1 Block diagram of the project

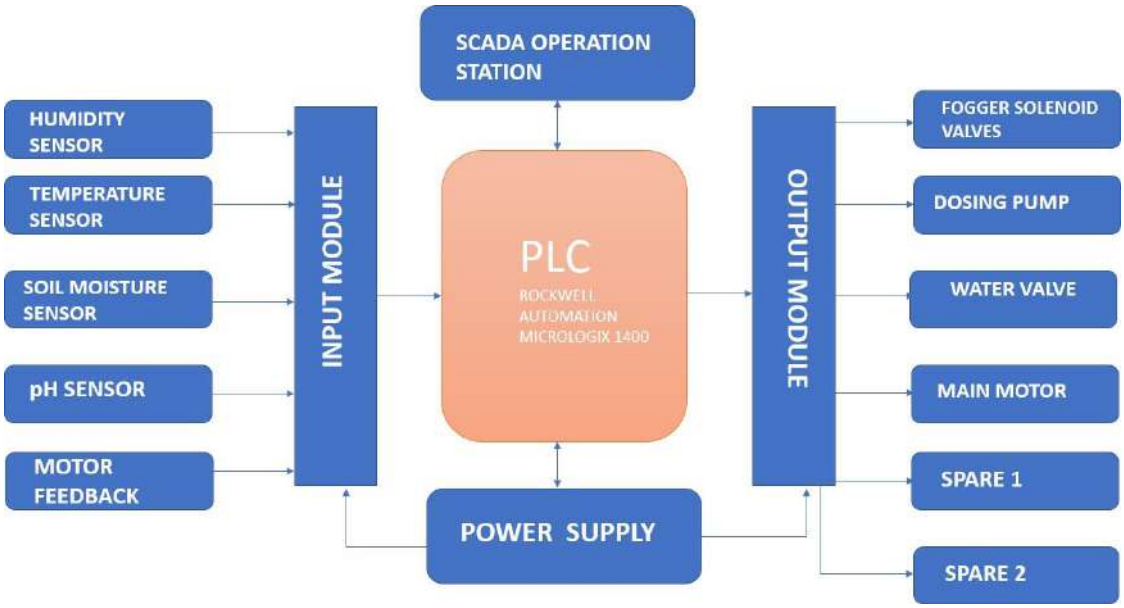


Figure 33: Block diagram of Polyhouse Automation

The workings of the sensors are given below-

- NPK sensor- To detect the NPK fertilizer requirement
- pH transmitter - To detect the pH level of the water.
- Temperature and humidity sensor - To detect the temperature and humidity in polyhouse.

  The output of the above mentioned sensors was given to the control unit through PLC.

The control unit contain-

- Fogger valve - To maintain the temperature and humidity in polyhouse.
- Dosing Pump - To maintain the pH level of the water.
- Solenoid valve - To regulate the fertilizer level.

3.2 PLC Block Diagram

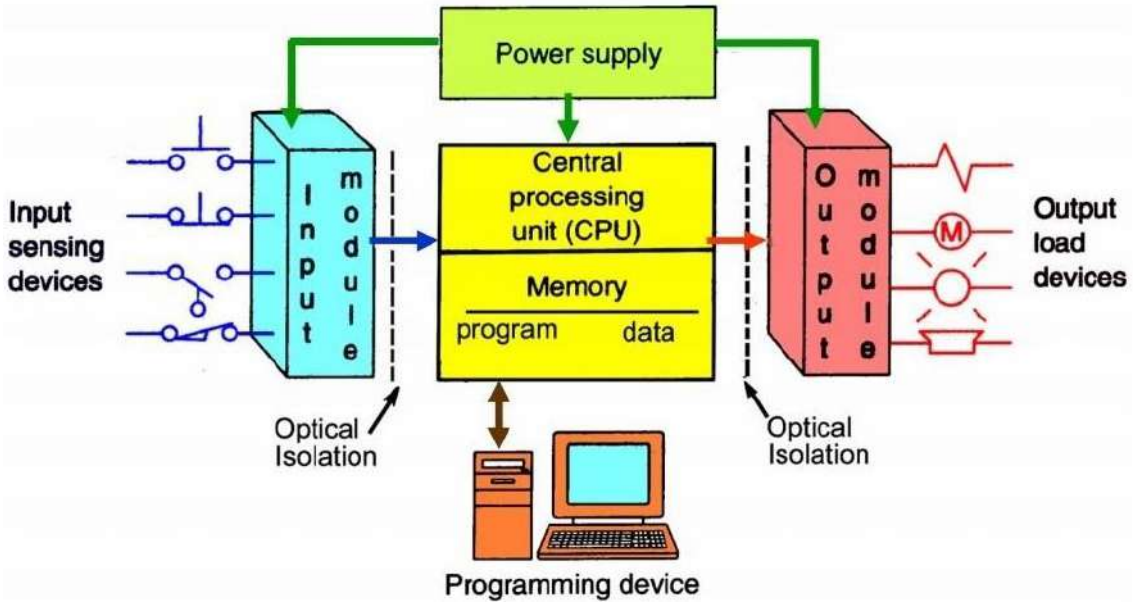


Figure 34: Block diagram of PLC

Regular programmable logic controller consists of:

- A processor unit (CPU) which interprets inputs, executes the control program stored in memory and sends output signals,
- A power supply unit which converts AC voltage to DC,
- A memory unit storing data from inputs and program to be executed by the processor,
- An input and output interfaces, where the controller receives and sends data from/to external devices,
- A communications interface to receive and transmit data on communication networks from/to remote PLCs
- PLCs require programming device which is used to develop and later download the created program into the memory of the controller.
- Modern PLCs generally contain a real-time operating system, such as OS-9 or VxWorks

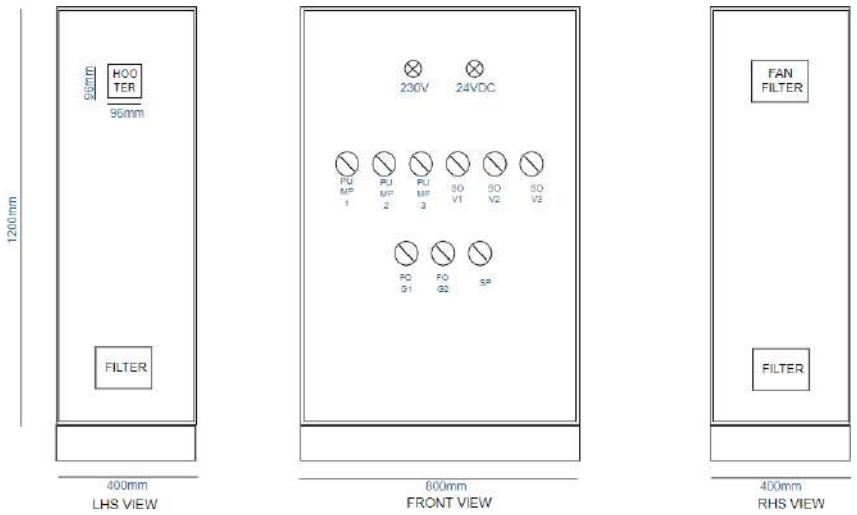


Figure 35: PLC external layout

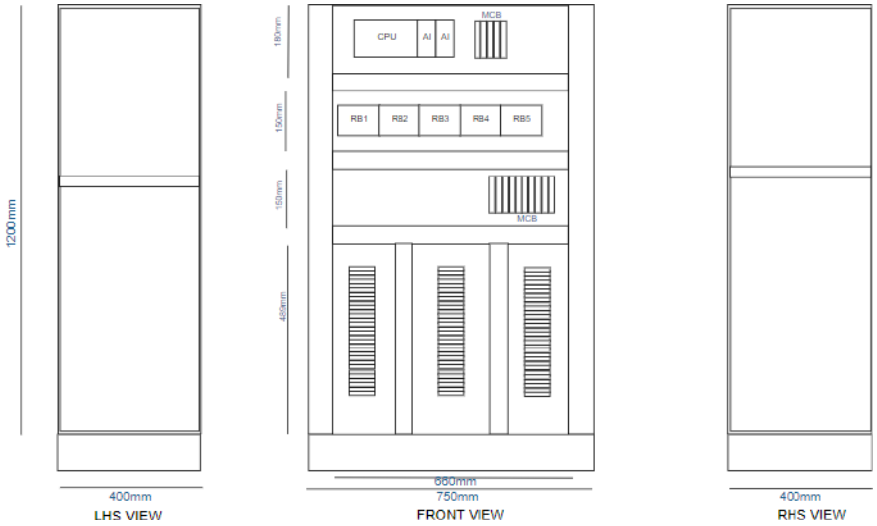


Figure 36: PLC internal layout

3.3 Flow Chart of Automation

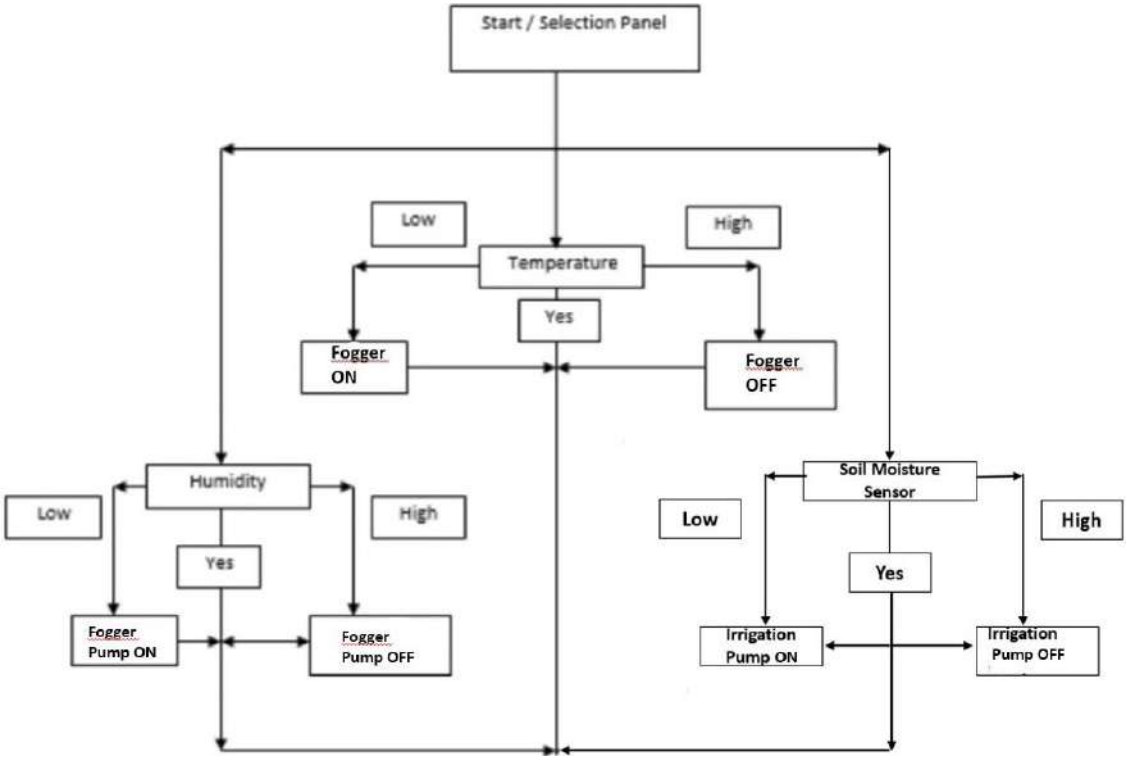


Figure 37: Initialization

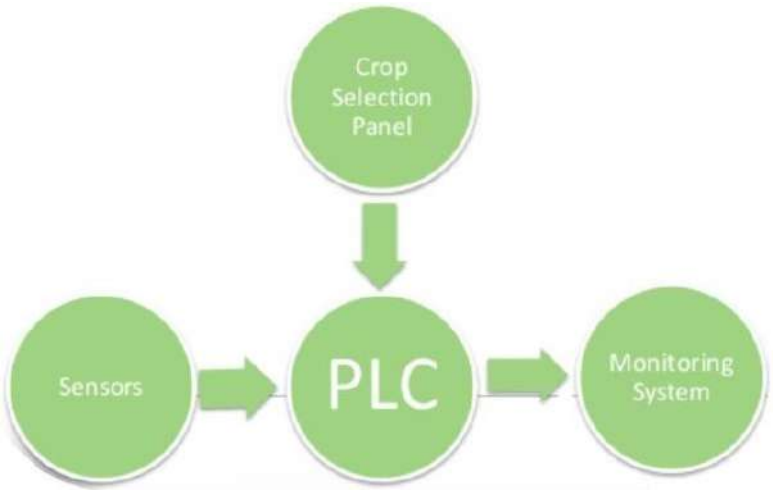


Figure 38: PLC Automation

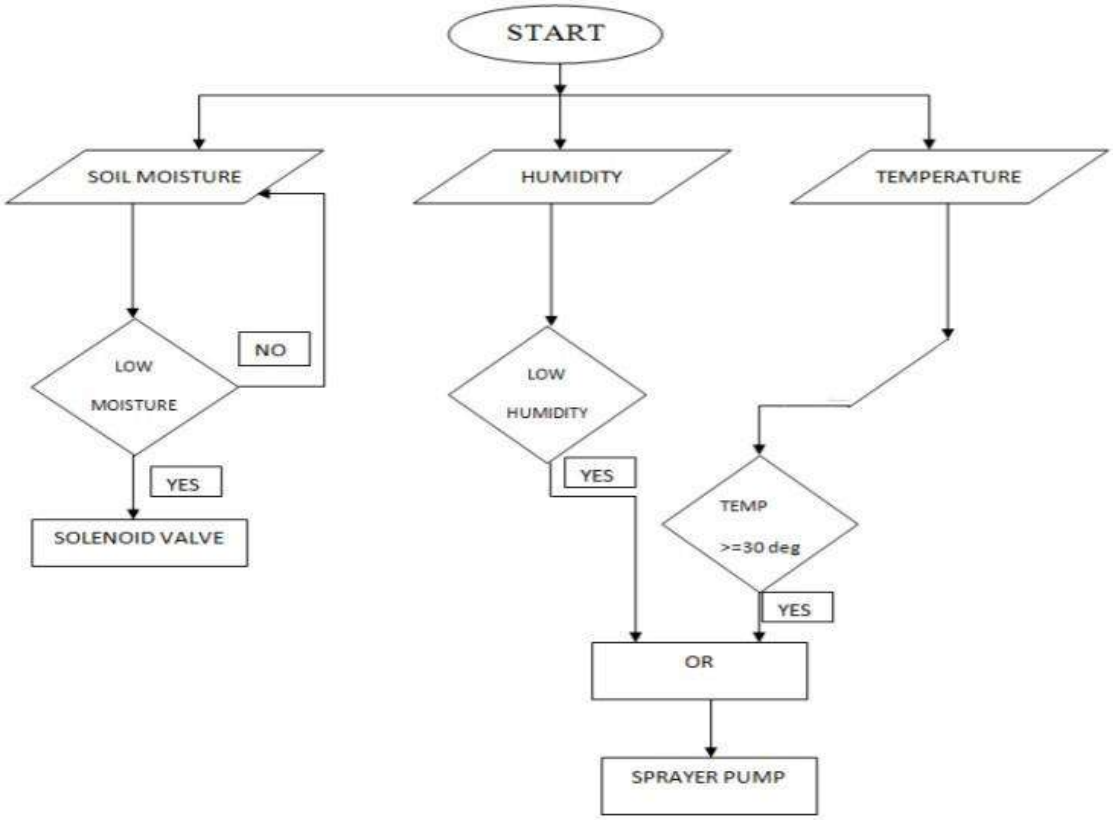


Figure 39: Flow Layout

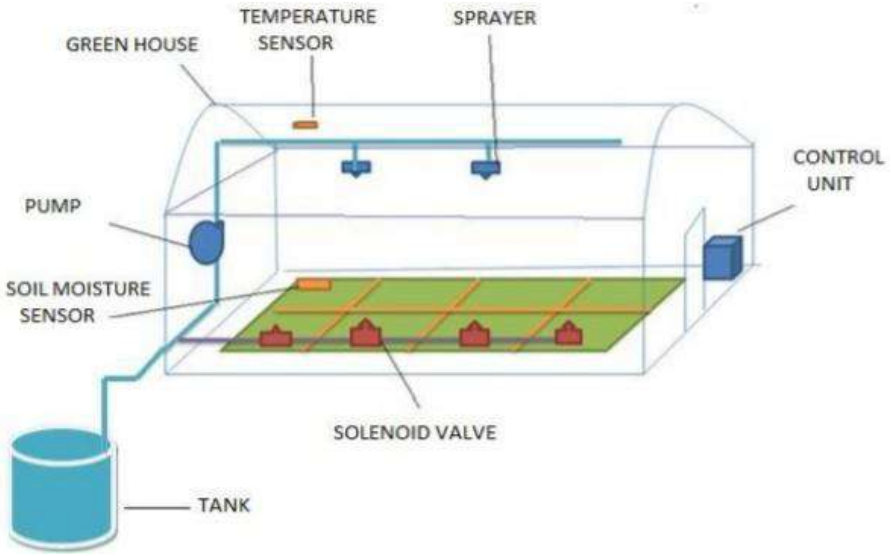


Figure 40: Structural Initialization

4 Proposed Performance Analysis

4.1 Analysis Parameters

In this project the performance analysis is done by the various sensors such as Tem- perature and Humidity sensor, Soil Moisture sensor, pH transmitter.

1) Test point Soil Moisture sensor

The working of this sensor can be done by inserting this sensor into the earth and the status of the water content in the soil can be reported in the form of a percent. This sensor mainly utilizes capacitance to gauge the water content of the soil (dielectric permittivity).

2) Test point Temperature/ Humidity sensor

Temperature/ Humidity sensor detects the amount of temperature and humidity variations in the polyhouse environment. According to the amount of the variations occurred sensor sends signals to the microcontroller in form of electrical signals. De- pending upon the amount of the humidity present in the polyhouse the fogger valve operates as per the given instant of time.

3) Test point pH Transmitter

pH transmitter detects the pH level of water present in the tank. According to the detected pH level the dosing pump operates on adding the corresponding acidic and basic solution.

4.1.1 Fertigation according to respective Crops

Cabbage

- pH level- 6.5 to 7
- EC- 2.5 to 3
- Optimum Temperature- 150C to 180C
- Minimum temp.-50C
- Maximum temp.- 240C
- Relative humidity-80 to 90 percent

Capsicum

- pH level- 6 to 6.5
- EC- 1.8 to 2.2
- Optimum Temperature- 210C to 240C
- Minimum temp.-180C
- Maximum temp.- 270C
- Relative humidity-80 to 90 percent

French Bean

- pH level- 6 to 6.5
- EC- 1.8 to 2.4
- Optimum Temperature- 150C to 210C
- Minimum temp.-100C
- Maximum temp.- 270C
- Relative humidity-80 to 90 percent

4.1.2 Project Instruments

Sr. No.	Description	Made by	Quantity(Nos.)
1	PLC Controller Panel Micrologix 1400	Rockwell Automation	1
2	4 Channel AI Module IF4	Rockwell Automation	1
3	Temperature Sensor with Display	Wika/Ambetronics/Std	1
4	Humidity Sensor with Display	Wika/Ambetronics/Std	1
5	Soil Moisture Sensor	Std	1
6	pH Meter	Wika/Std	1
7	Dosing pump for fertilizer feeding	Std	3
8	Electrical and communication Cable(Ethernet)	Std	350mtr.

Table 1: Project Instruments Summary

4.1.3 Cost of Project

Sr. No.	Description	Price
1	PLC with Control Panel	65,000
2	Sensors (Temperature,Humidity,,Soil Moisture,pH) and pH meter tank	60,000
3	Dosing pump connected with 3 tanks,pipes and fittings	27,000
4	Electrical and communication Cable (Ethernet)	25,000
5	Total	1,77,000

Table 2: Cost Of Required Instruments For The Project

4.2 Proposed Results

Several experiments were done step by step and following results were obtained. Soil moisture sensor is use for NPK level and soil moisture level in the soil varies.Soil moisture sensor senses the change and sends it to microcontroller in the form of electrical signal. Depending upon the amount of the component in fertilizer the color of solution changes.

Later the pH transmitter designed. pH transmitter detects the pH level of water present in the tank. According to the detected pH level the dosing pump operates on adding the corresponding acidic and basic solution.

After the designing both the sensor, temperature/humidity sensor was then de- signed. In the above, as the temperature/humidity will vary the output of the temperature/humidity sensor will vary. The control unit was interfaced using the PLC (Ladder,Logic). The chemical solution is connected to valve via PLC. As the NPK and soil moisture level is low; the valve will open until the solution reaches upto its limit. As soon as the solution content of NPK reaches to its set points the valve it closed.

The pH transmitter is connected to a water tank via PLC. When water pH level is not neutral on the pH transmitter,the PLC activates the dosing pump and a basic or acidic solution is supplied to the water tank. Similarly when the pH level of water is neutral, the PLC deactivates the dosing pump. The temperature/humidity sensor is connected to fogger valve via PLC. When temperature will reduce below the critical temperature,the fogger valve will switched OFF. Thus a working model of the project was obtained and found working.

Fertigation is the process of delivering plants nutrients and water to produce a quality crop with higher yields. Employing an automated fertigation system can help growers make informed decisions that can significantly impact water and nutrient usage as well as contribute to reducing disease.

Some automated systems only manage the nutrient dosing equipment while other systems are capable of integrating irrigation scheduling with nutrient dosing activ- ities.

5 Conclusion

5.1 Conclusion

- From this project, we came to the conclusion that for controlling theenviron- ment parameters we should have a firm understanding or knowledge of the control processes so that we can operate the whole process precisely and in controlled manner.
- We can automate the whole poly-house using PLC only. As we know very well that growth of crop is very important, so in the same way increase number of poly-houses is one of the better options.
- This project will result in greatly profitable for farmers and even for those who are not from the farming field due to the use of new techniques.
- Polyhouse cultivation provides proper irrigation system and reduces the wastage of water.
- The main advantage is that the system's action can be controlled according to different atmospheric conditions for various types of crops.

  This will also increase the knowledge of farmers regarding farming using latest system.

5.2 Future scopes

This project "Polyhouse Automation Using PLC" is very helpful idea in the mod- ernized way of agriculture. Here, most of the environmental parameters such as a soil moisture, rain, temperature were successfully monitored and were handled in a such way that they don't effect the cultivation adeversly. By this method, we could efficiently utilize the resources so that no wastage occurs. Further wireless model and solar power supply can be provided to the project for cost saving.

Further enhancement can be done in the proposed system by controlling different factors which affect the growth of crops such as CO2 level inside the polyhouse, pH of the soil. These factors can be monitored by using different sensors. According to the readings of the sensors changes can be done inside the polyhouse

Indoor agriculture in a controlled setting also needs much less water than outdoor farming as it involves recycling the graywater and lowering the evaporation.Together with the regulation of temperature and humidity, it can also decrease or omit the effects of seasonality.Freshwater is increased through the evaporation of black and graywater in order to preserve water resources.

5.3 Advantages

- The yield may be 10-12 times higher than that of outdoor cultivation depending upon the type of polyhouse, type of crop, environmental control facilities.
- Reliability of crop increases under polyhouse cultivation.
- Ideally suited for vegetables and flower crops.
- Year round production of floricultural crops.
- Off-season production of vegetable and fruit crops.
- Disease-free and genetically superior transplants can be produced continuously.
- Efficient utilization of chemicals, pesticides to control pest and diseases. Water requirement of crops very limited and easy to control.

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"IOT BASED PREPAID ENERGY METER BILLING SYSTEM USING ARDUINO"

A Project submitted to the

Savitribai Phule Pune University

In partial fulfillment of the requirement for

Final Year Electrical Engineering

By:

KALE TUKARAM MAHADEO(71602904K)

MUNGASE SANDIP BAPURAO(71602885K)

VARE DIPAK ANNASAHEB(71603084F)

Under Guidance of

Prof. K.D. VIDHATE

Department of Electrical Engineering

Dr. Vithalrao Vikhe Patil, College of Engineering, Ahmednagar.

2019-20

Dr.VITHALRAO VIKHE PATIL COLLEGE OF

ENGINEERING, AHMEDNAGAR

C E R T I F I C A T E

A Report on

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Submitted by:

KALE TUKARAM MAHADEO (71602904K)

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VARE DIPAK ANNASAHEB(71603084F)

Have satisfactorily co mpleted t he bonafied work under my guidance and supervision in partial fulfillment of curriculum at Final year Electrical Engineering of Savitribai Phule Pune University, Pune.

Prof. K.D. Vidhate
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Prof. G. K. Shirsat
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Prof. S.A. Markad
(HOD)

Dr. Uday P. Naik
(Principal)

Examiner's Name &Sign

DEPARTMENT OF ELECTRICAL ENGINEERING
2019-20

CHAPTER 1

INTRODUCTION

Introduction:-

The internet of thing allows object to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration between the physical world and computer based systems, and resulting in improved efficiency, accuracy and economic benefit. The increasing generation needs empowered gadgets by wireless technology which includes Bluetooth, Radio Frequency Identification, Embedded sensors and many more. In that IOT technology has grown from its beginning and now presently widely using it. The electricity plays an important role in our life. Now-a-days as the consumers are increasing rapidly it became very hard to handle the electricity requirements. Without electricity it‟s impossible to survive and also it is important to save the electricity loss. As the generation is increases the consumer‟s requirements also increasing so in accordance with it the technology improvement is needed. So we developed the system with faster and improved technology i.e. IOT. The electricity also contains some issues like power theft.

Power theft is a measure crime and it also directly affects the economy of our country. Transmission, generation and distribution of electricity include the loss of electricity. To avoid the losses we need to monitor the power consumption and losses, so that we can efficiently utilize the generated power. Meter tempering is part of power theft and also illegal crime which we can minimize. Billing is a process in general the human operator goes to every consumer‟s home then providing bill it will take lot of time. To resolve these issues we developed system on the base of IOT energy meter reading. IOT based energy meter reading consists of three parts: Controller, Theft detection and WIFI part. Controller part plays a major role in the system. Where all the information can send through this controller to the other part of the system and it also stores the information in it. WIFI part performs IOT operation in accordance with the Arduino controller. The energy meter connected with theft detection part if any temper happens it will send the information to the company as well as it will take automatic action by making power off.

Necessity:-

This can help in reducing energy consumption in house as the owner is continuously being notified about the number of units that are consumed. It objective is to generate bill automatically by checking the electricity unit‟s consumption in a house and in a way to reduce the manual labor. The calculations are performed automatically and the bill is updated on the internet by using a network of Internet of Things.

The bill amount can be checked by the owner anywhere globally. Design and implementation of project is mainly based on Arduino using IOT concept. In electricity transmission human involvement is not required. Consumer pays the electricity bill for the consumed power.

If in case consumer fails to pay the bill on time then electricity transmission can automatically turned off. Also power theft can be detected if any tampering happens it will send the information to the server as well as it will cut the electricity automatically. WIFI performs the IOT operation where and through which the information is sent to the Web server.

Objectives:-

1. Studying about Electricity units
2. Learning Arduino programming
3. Studying about IOT
4. Study about Web application communication using IOT

Theme:-

1. Electric Energy detection and Processing
2. Machine Learning
3. Deep Learning

CHAPTER 2 LITERATURE SURVEY

Literature survey

In the year of 2011, the authors "carmine Landi, Pietro Merola, Giacomo Lanniello" presented a paper titled "ARM-based energy management system using smart meter and Web server", in this paper they explain a low cost ARM-based energy management system. It is a part of distributed system that measures the main power system quantities. It also handle the whole power. An Web Server collecting the statistics of power consumptions and power quality. It is able to interface devices for load movement. The device easily access the information and local access the combination of a smart meter and data communication. In the year of 2012, the authors " Ben Abdallah; Garrab, A.; Bouallegue; " presented a paper titled "A AMR approach for energy saving in Smart Grids using Smart Meter and partial Power Line Communication", in this paper they described such as the increasing demand of energy, one-way communication and the limitations of energy management .The aim of this project is to identify a real time pricing thanks to the proposed communication system. This result is with great interest in economical and low carbon society point of view. In the year of 2012, the authors "B. S. Koay, Y. H. Sng, P. H. Chong, P. Shum, X. Y. Wang, and H. W. Kuek" presented a paper titled "Design and implementation of Bluetooth energy meter", in this paper they described such as electronics energy measurement is continuously replacing a new technology of electro mechanical meter instead of existing technology. A study based on context-aware computing, learning, and big data in Internet of Things was provided by Sezer. This architecture assures several advantages with respect to traditional energy meters, such as easy development of new applications making cost and simple adjustments to change in the relevant standards. To improve its performances without increasing its costs, two online digital compensation procedures have been realized and are shown: one increases the spectral purity of test signals and one corrects the transducer frequency response

Advantages

1. It provides accuracy in meter reading and Checks theft status hence improves security.
2. This system Helps in effectively controlling energy consumption and also avoids Energy wastage.
3. Meter reading can be accessed from anywhere on the globe at any time.
4. This system eliminates the human involvement in energy management.

Disadvantages

1. Installation of Wi-Fi enabled meters at consumer end will not be possible over a certain period.
2. It takes a lot time to do.
3. Man power requirement will be high at the time of installation and initialization.
4. The cost of implementation will be high.

Applications

1. Residential and commercial building in a public energy supply system
2. Municipal corporation
3. Public power sources
4. MSEB
5. Govt. Energy plant

Component List

1. Arduino Uno
2. ESP12/NodeMCU
3. ACS712-30Amp Current sensor
4. Any AC Appliance
5. Male-Female Wires

CHAPTER 3 SYSTEM

DEVELOPMENT

Working:-

Measuring current especially AC current is always a tough task due to the noise coupled with it improper isolation problem etc. But, with the help of this ACS712 module which was engineered by Allegro thing have become a lot easier.

This module works on the principle of Hall-effect, which was discovered by Dr. Edwin Hall. According his principle, when a current carrying conductor is placed into a magnetic field, a voltage is generated across its edges perpendicular to the directions of both the current and the magnetic field. Let us not get too deep into the concept but, simply put we use a hall sensor to measure the magnetic field around a current carrying conductor. This measurement will be in terms of millivolts which we called as the hall-voltage. This measured hall-voltage is proportional to the current that was flowing through the conductor.

The module work on +5V so the Vcc should be powered by 5V and the ground should be connected to Ground of the system. The Vout pin has an offset voltage of 2500mV, meaning when there is no current flowing through the wire then the output voltage will be 2500mV and when current flowing is positive, the voltage will be greater than 2500mV and when the current flowing is negative, the voltage will be less than 2500mV.

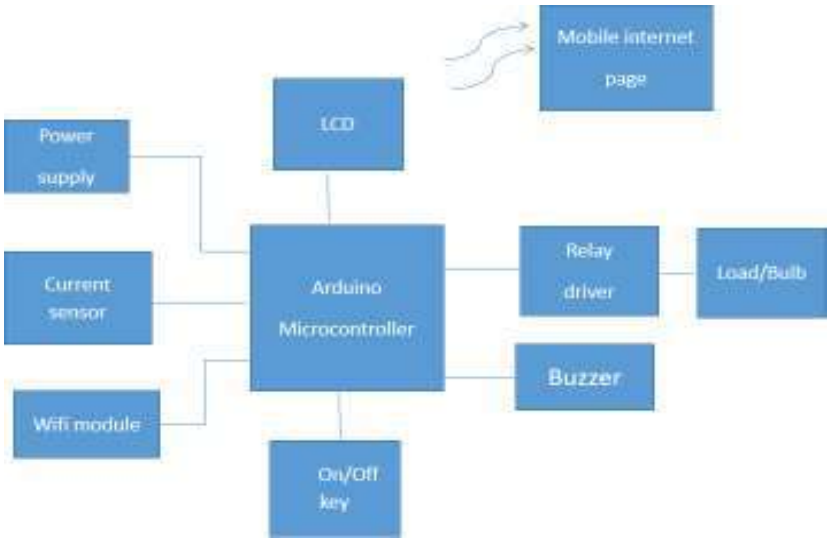


Fig 3.1.1: Block diagram of IOT Based Energy meter

We will be using the Analog pin of Arduino to read the output voltage (Vout) of the module, which will be 512(2500mV) when there is no current flowing through the wire. This value will reduce as the current flows in negative direction and will increase as the current flows in positive direction. The below table will help you understand how the output voltage and ADC value varies based on the current flowing through the wire.

Table 3.1.1: ADC values of output voltage and current

Analog Value	Vout(mV)	Current Thorugh the Wires (A)
1023	5000	13.51351351
800	3910.068426	7.621991493
700	3421.309873	4.980053367
512	2502.443793	0.013209691
300	1466.27566	-5.587699136
301	1471.163245	-5.561279755
0	0	-13.51351351

These values were calculated based on the information given in the Datasheet of ACS712. You can also calculate them using the below formulae:

Vout Voltage(mV) = (ADC Value/ 1023)*5000

Current Through the Wire (A) = (Vout(mv)-2500)/185

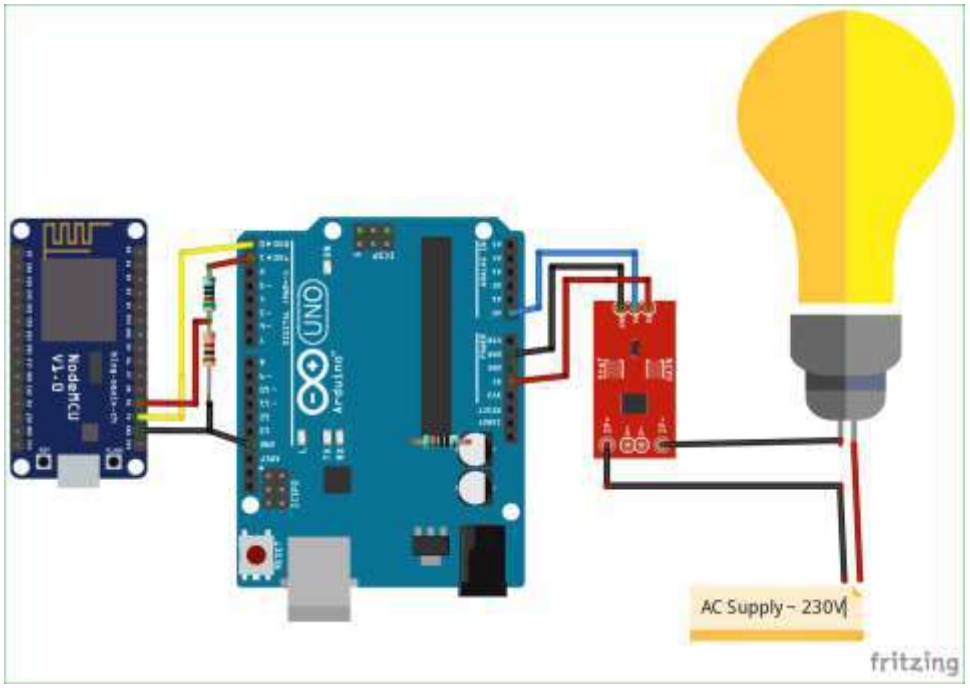


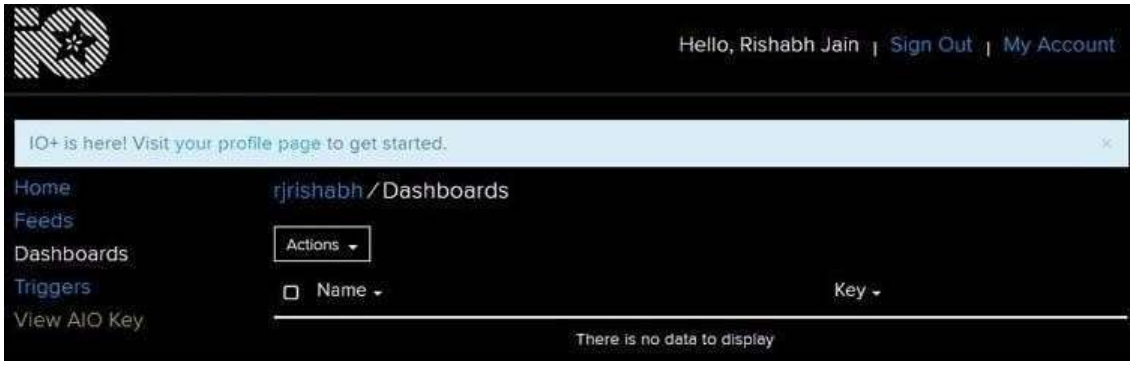
Fig 3.1.2: Glimpses of IOT Based energy meter

Setting up an AdaFruit account for communication:

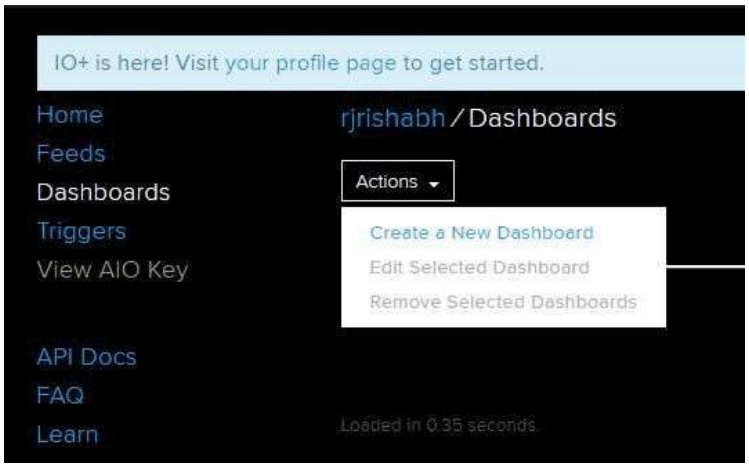
First, we will make a feed in AdaFruit IO. Feed stores the data sent by IFTTT. To make feed follow these steps:

Step 1:- Login to Adafruit IO with your credentials or Sign up if you don‟t have an account.

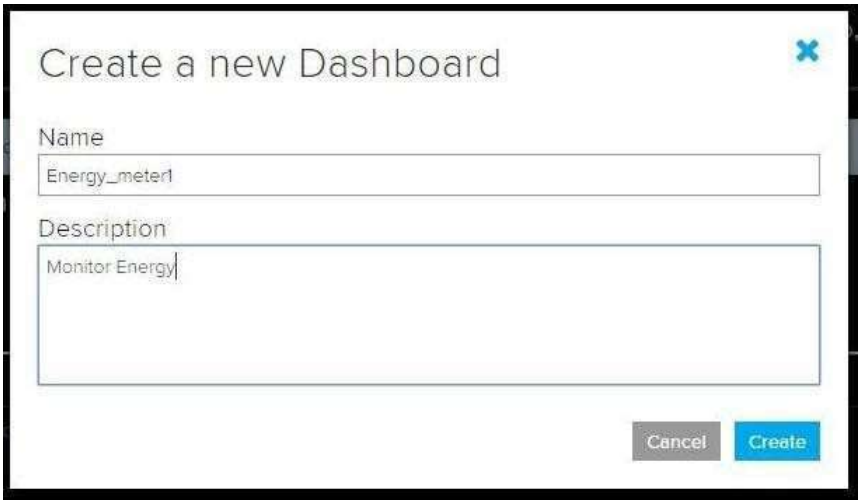
Step 2:-Click on My account -> Dashboard



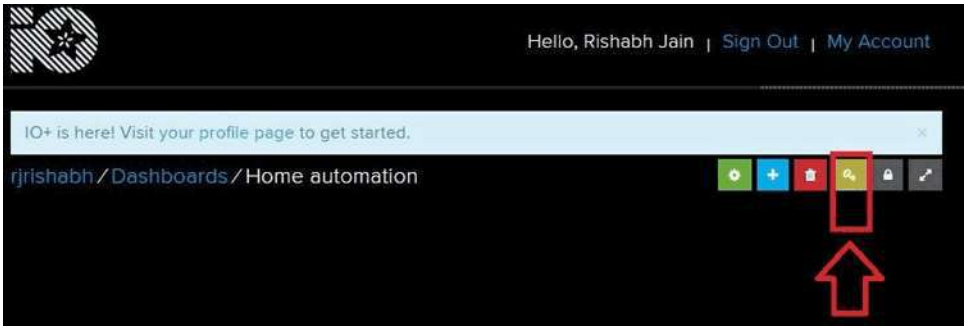
Step 3:-Click on Actions and Create a New Dashboard.

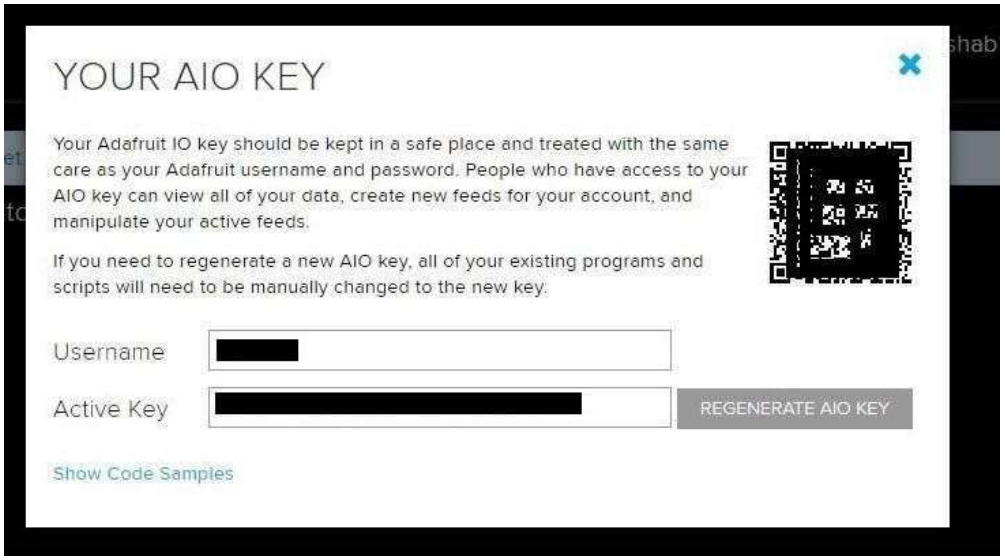


Step 4: Give name and description to your feed and click on Create.

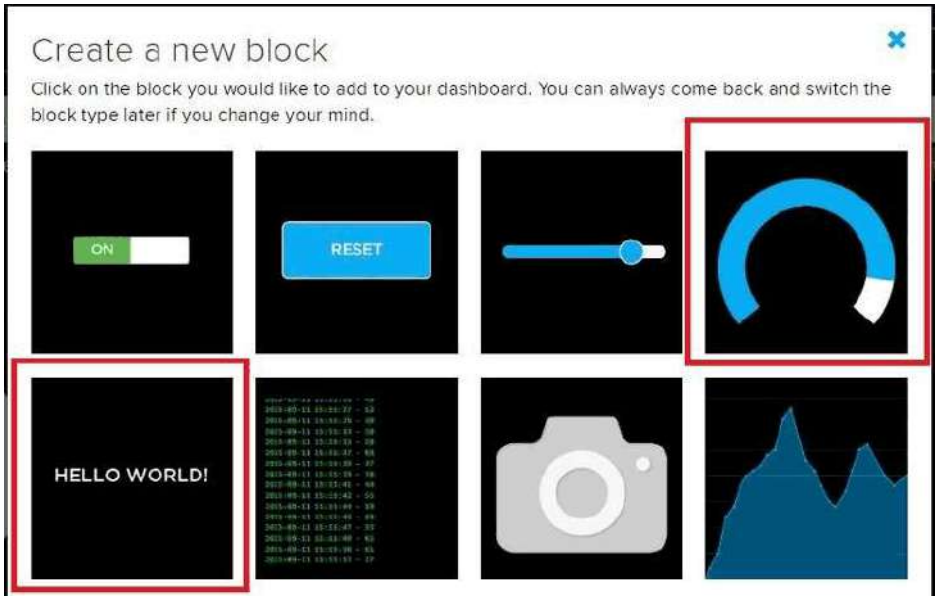


Step 5: Click on Key button and note down the AIO Keys, we will use this key in our code.

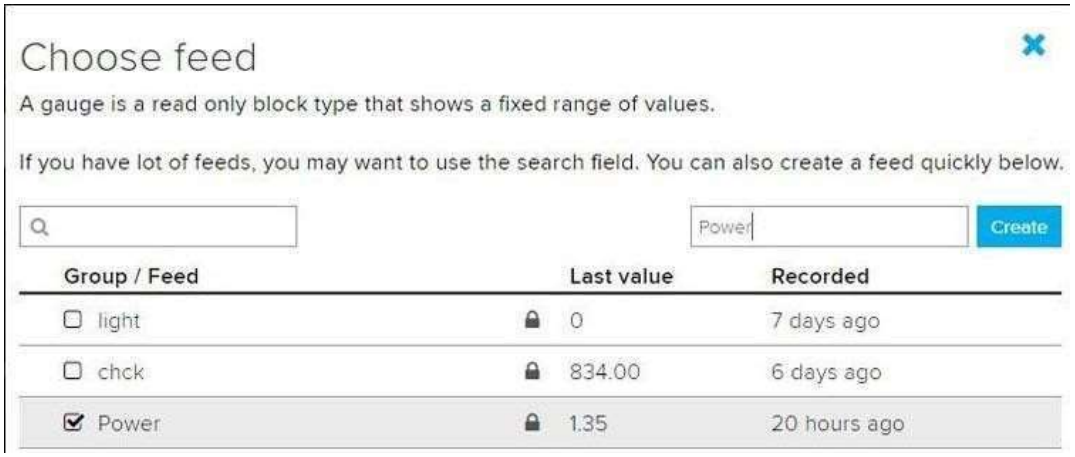




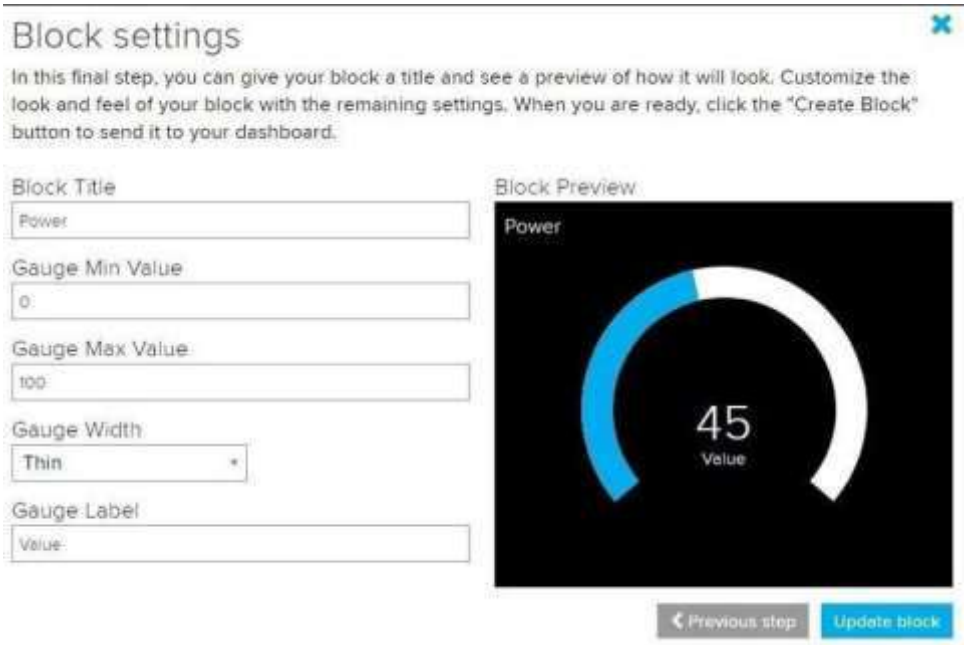
Step 6: Click on „+" button to create a new block and click on Gauge to display Energy uses level. You can also use simple text box to display energy.



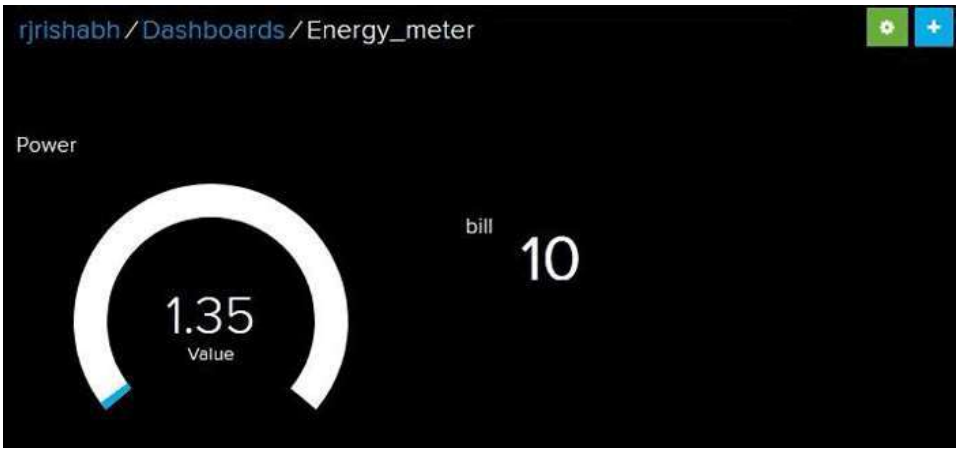
Step 7: Now, Enter Name of Feed and click on Create. Then Select the feed and click on Next step.



Step 8: In block settings, fill the min. and max values as 0 and 100 respectively or you can modify as you want.



Step 9: Your Power feed is successfully created. Now, create feed to display Bill by clicking on "+" sign.

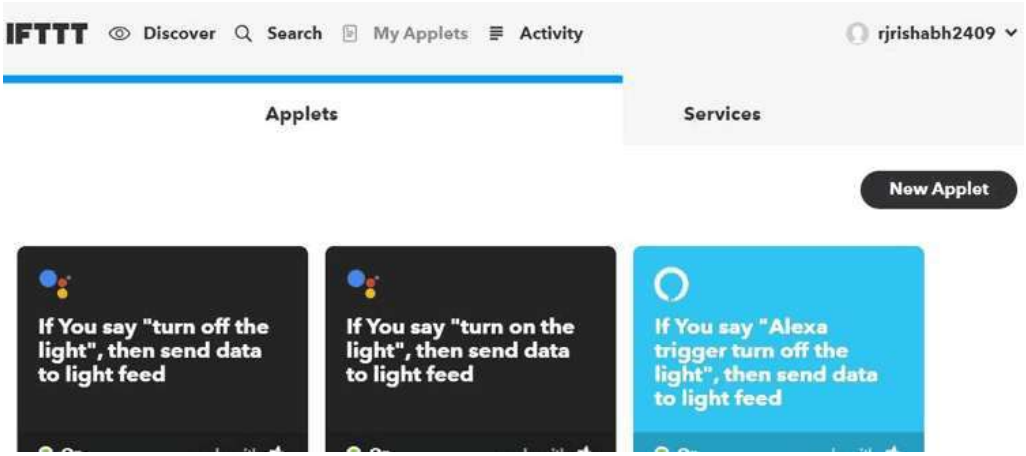


Now, we have to link AdaFruit IO to SMS/E-mail using IFTTT.

Create Applet in IFTTT for Triggering SMS/Email for Energy

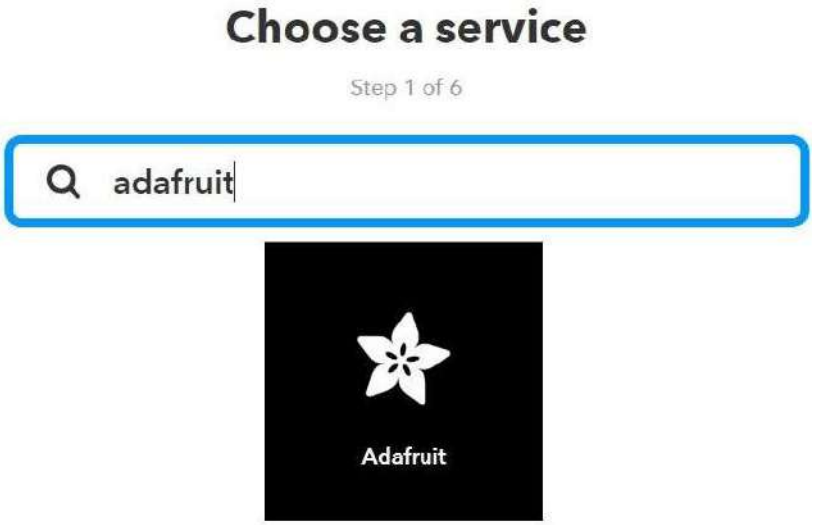
Meter: Step 1: Login to IFTTT with your credentials.

Step 2: On My Applets, Click on **New Applet**



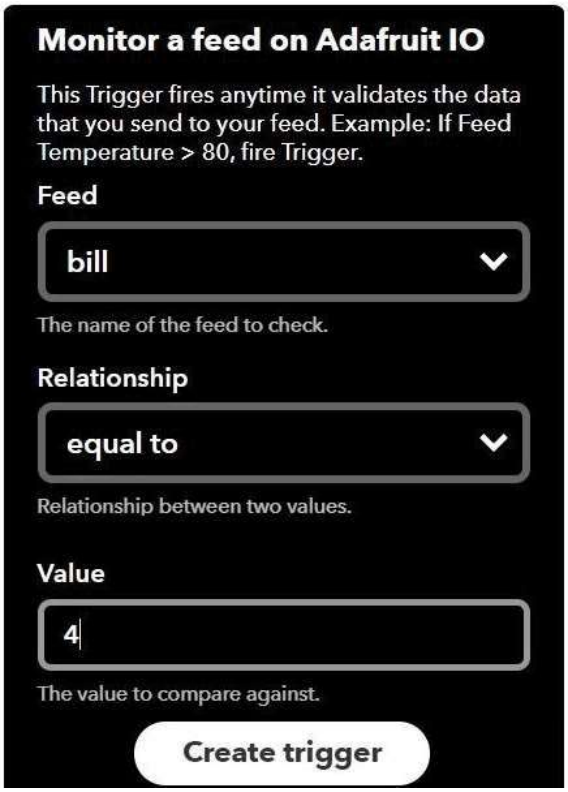
Step 3: Click on +**this**

Step 4: Search AdaFruit and click on it.



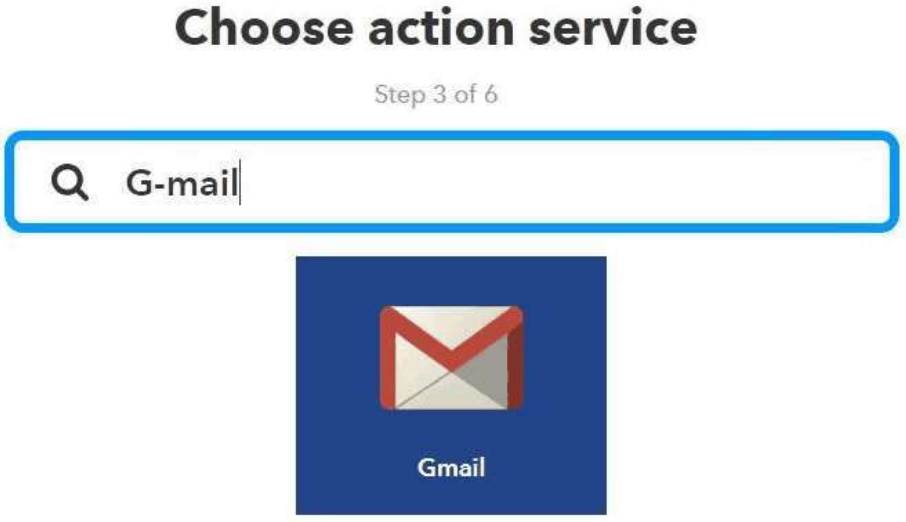
Step 5: Click on Monitor a feed on AdaFruit IO.

Step 6: Choose Feed as bill, Relationship as „equal to" and the threshold value at which you want an E-mail. Click on Create action. I have used 4 as my threshold



trigger value.

Step 7: Click on +that**.** Search for G-mail and click on it and Login with your g-mail credentials.



Step 8: Click on **send yourself an email**.

Step 9: Write your subject and body as shown and click to create.

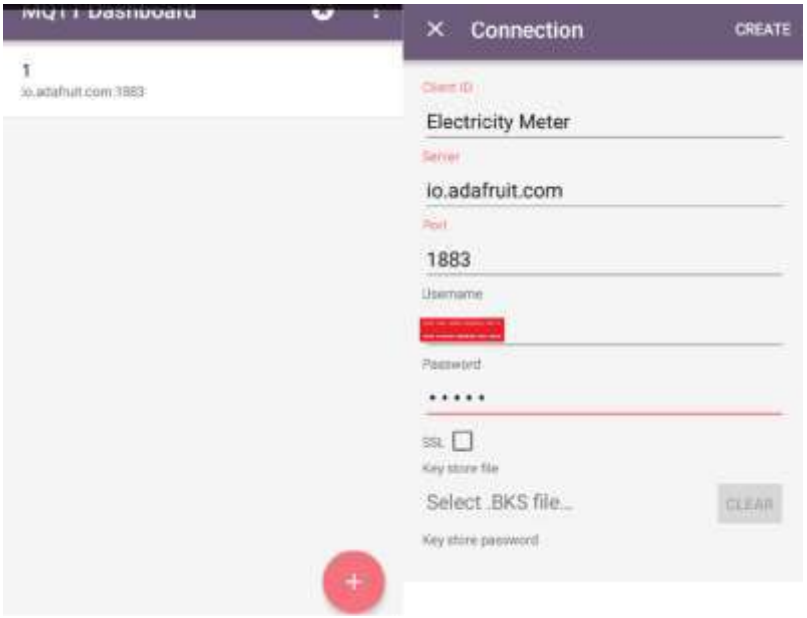
Step 10: Your „recipe" is ready. Review it and click on finish.

Android App for Monitoring Electricity Consumption:

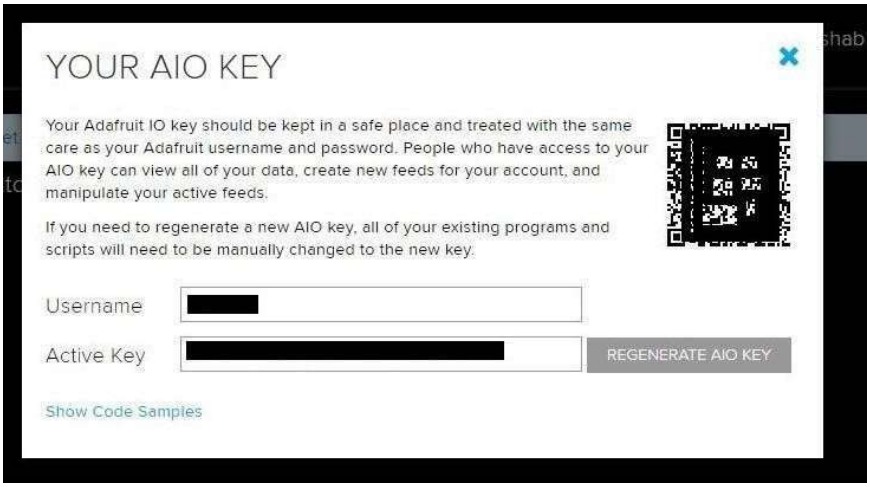
You can use Android App for monitoring the values. For this download the MQTT Dashboard android app from the Play store or from this Link.

To setup connection with the io.adafruit.com follow these steps:

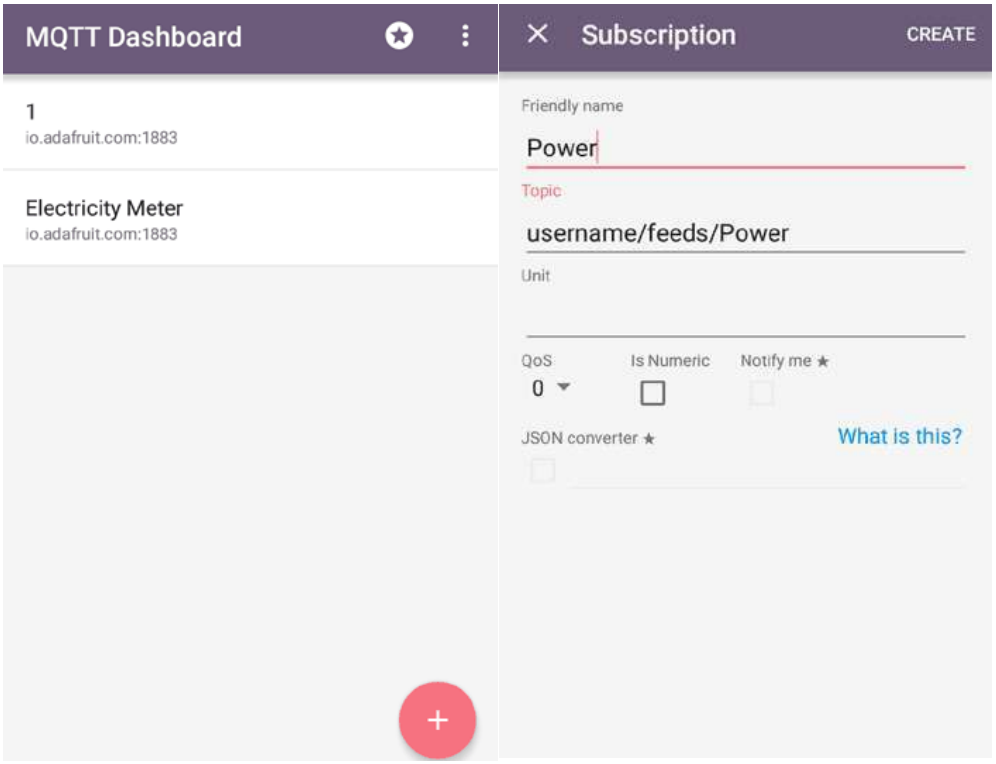
Step 1: Open the App and click on "+" sign. Fill Client Id anything you want. Server and port remain same as shown in the screenshot. You will get Username and password (Active key) from the AdaFruit IO dashboard as shown below.



Active Key is your password.



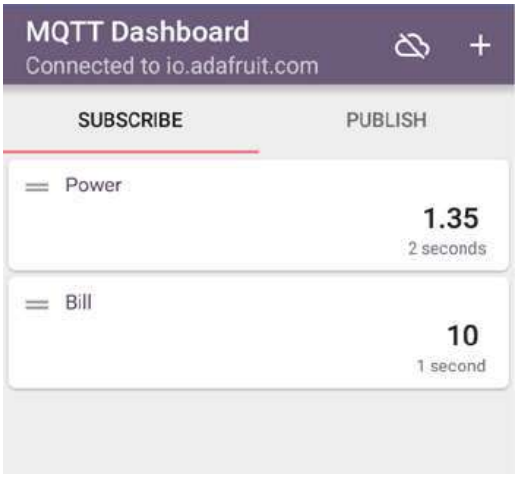
Step 2: Select Electricity Meter and select Subscribe. In subscription, give friendly name and topic. Topic format is „yourusername"/feeds/"feedname" and click on



create.

Step 3: In the same way, make subscription for bill feed.

Step 4: As your appliances consuming energy, updated values will be displayed under the Power and Bill.



This is how you can create a Smart Electricity Energy Meter, which can be not only monitored from anywhere in the world but also trigger Email when you have high Electricity consumption.

Component Description:-

Arduino Uno :-

Fig 3.5.1.1: Arduino Uno

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo.

The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE)
1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform.

Arduino Uno is a microcontroller board based on 8-bit ATmega328P microcontroller. Along with ATmega328P, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller. Arduino Uno has 14 digital input/output pins (out of which 6 can be used as PWM outputs), 6 analog input pins, a USB connection, A Power barrel jack, an ICSP header and a reset button.

Arduino Uno Pin Diagram: -

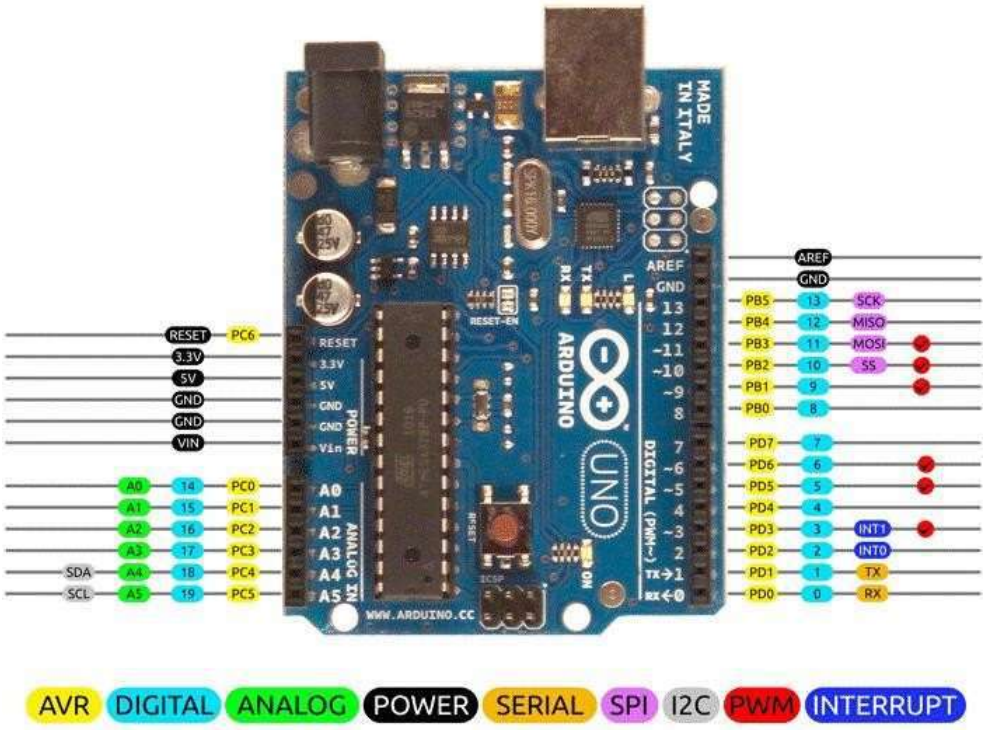


Fig 3.5.2.1: Arduino Uno Pin diagram

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo.

The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE)
1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases.

Pin Description: -

Table 3.5.2.1: Pin

Description

Pin Category	Pin Name	Details
Power	Vin, 3.3V, 5V, GND	Vin: Input voltage to Arduino when using an external power source. 5V: Regulated power supply 3.3V: 3.3V supply generated by on-board voltage regulator. Maximum current draw is 50mA. GND: ground pins.
Reset	Reset	Resets the microcontroller.
Analog Pins	A0 – A5	Used to provide analog input in the range of 0-5V
Input/output Pins	Digital Pins 0 – 13	Can be used as input or output pins.
Serial	0(Rx), 1(Tx)	Used to receive and transmit TTL serial data.
External Interrupts	2, 3	To trigger an interrupt.
PWM	3, 5, 6, 9, 11	Provides 8-bit PWM output.
SPI	10 (SS), 11 (MOSI), 12 (MISO) and 13 (SCK)	Used for SPI communication.
Inbuilt LED	13	To turn on the inbuilt LED.
TWI	A4 (SDA), A5 (SCA)	Used for TWI communication.
AREF	AREF	To provide reference voltage for input voltage.

Table 3.5.2.2 Arduino Uno Technical Specifications

Microcontroller	ATmega328P – 8-bit AVR
Operating Voltage	5V
Recommended Input Voltage	7-12V
Input Voltage Limits	6-20V
Analog Input Pins	6 (A0 – A5)
Digital I/O Pins	14 (Out of which 6 provide PWM output)
DC Current on I/O Pins	40 mA
DC Current on 3.3V Pin	50 mA
Flash Memory	32 KB (0.5 KB is used for Bootloader)
SRAM	2 KB
EEPROM	1 KB
Frequency (Clock Speed)	16 MHz

The 14 digital input/output pins can be used as input or output pins by using pin Mode(), digital Read() and digital Write() functions in arduino programming. Each pin operates at 5V and can provide or receive a maximum of 40mA current, and has an internal pull-up resistor of 20-50 K Ohms which are disconnected by default. Out of these 14 pins, some pins have specific functions as listed below:

1. Serial Pins 0 (Rx) and 1 (Tx): Rx and Tx pins are used to receive and transmit TTL serial data. They are connected with the corresponding ATmega328P USB to TTL serial chip.

2. External Interrupt Pins 2 and 3: These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value.
3. PWM Pins 3, 5, 6, 9 and 11: These pins provide an 8-bit PWM output by using analog Write() function.
4. SPI Pins 10 (SS), 11 (MOSI), 12 (MISO) and 13 (SCK): These pins are used for SPI communication.
5. In-built LED Pin 13: This pin is connected with a built-in LED, when pin 13 is HIGH – LED is on and when pin 13 is LOW, its off.
6. Along with 14 Digital pins, there are 6 analog input pins, each of which provide 10 bits of resolution, i.e. 1024 different values. They measure from 0 to 5 volts but this limit can be increased by using AREF pin with analog Reference() function.
7. Analog pin 4 (SDA) and pin 5 (SCA) also used for TWI communication using Wire library.
8. Arduino Uno has a couple of other pins as explained below:
9. AREF: Used to provide reference voltage for analog inputs with analog Reference() function.
10. Reset Pin: Making this pin LOW, resets the microcontroller.

3.5.3 ESP12 Wi-Fi Module

Fig 3.5.3.1: ESP12 Wi-Fi Module

ESP12 is an UART-WiFi transparent transmission module with ultralow power consumption, specially designed for the needs of a new connected world. It offers a complete and self-contained Wi-Fi networking solution, allowing it to either host the application or to offload all Wi-Fi networking functions from another application processor.

ESP12 has powerful on-board processing and storage capabilities that allow it to be integrated with the sensors and other application specific devices through its GPIOs with

minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, and the entire solution, including front-end module, is designed to occupy minimal PCB area. ESP12 Serial Wifi Wireless Transceiver Module is suitable for Uno, Mega 2560 and Nano.

The ESP12 is a very user friendly and low cost device to provide internet connectivity to your projects. The module can work both as a Access point (can create hotspot) and as a station (can connect to Wi-Fi), hence it can easily fetch data and upload it to the internet making Internet of Things as easy as possible. It can also fetch data from internet using API‟s hence your project could access any information that is available in the internet, thus making it smarter. Another exciting feature of this module is that it can be programmed using the Arduino IDE which makes it a lot more user friendly. However this version of the module has only 2 GPIO pins (you can hack it to use upto 4) so you have to use it along with another microcontroller like Arduino,

Pin Diagram

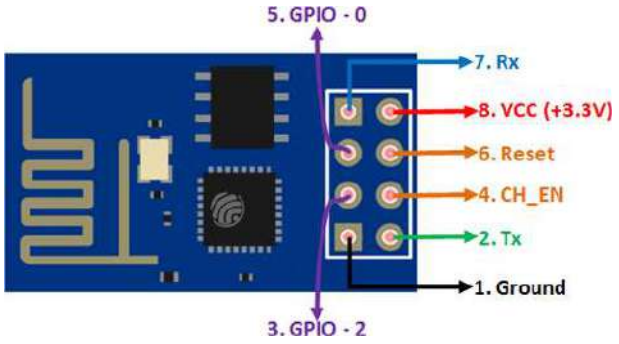


Fig 3.5.4.1: Pin Diagram

ESP12 Pin Configuration

Table 3.5.4.1: ESP12 Pin Configuration

Pin Number	Pin Name	Alternate Name	Normally used for	Alternate purpose
1	**Ground**	-	Connected to the ground of the circuit	-
2	**TX**	GPIO – 1	Connected to Rx pin of programmer/uC to upload program	Can act as a General purpose Input/output pin when not used as TX
3	**GPIO-2**	-	General purpose Input/output pin	-
4	**CH_EN**	-	Chip Enable – Active high	-
5	**GPIO – 0**	Flash	General purpose Input/output pin	Takes module into serial programming when held low during start up
6	**Reset**	-	Resets the module	-
7	**RX**	GPIO – 3	General purpose Input/output pin	Can act as a General purpose Input/output pin when not used as RX
8	**Vcc**	-	Connect to +3.3V only	

Applications

1. IOT Projects
2. Access Point Portals
3. Wireless Data logging
4. Smart Home Automation

5. Learn basics of networking
6. Portable Electronics
7. Smart bulbs and Sockets

ESP12 Features

1. Low cost, compact and powerful Wi-Fi Module
2. Power Supply: +3.3V only
3. Current Consumption: 100mA
4. I/O Voltage: 3.6V (max)
5. I/O source current: 12mA (max)
6. Built-in low power 32-bit MCU @ 80MHz
7. 512kB Flash Memory
8. Can be used as Station or Access Point or both combined
9. Supports Deep sleep (<10uA)
10. Supports serial communication hence compatible with many development platform like Arduino
11. Can be programmed using Arduino IDE or AT-commands or Lua Script

ACS712 Current Sensor Module

The ACS712 Module uses the famous ACS712 IC to measure current using the Hall Effect principle. The module gets its name from the IC (ACS712) used in the module, so for you final products use the IC directly instead of the module.

These ACS712 module can measure current AC or DC current ranging from +5A to -5A, +20A to -20A and +30A to -30A. You have to select the right range for your project since you have to trade off accuracy for higher range modules. This modules outputs Analog voltage (0-5V) based on the current flowing through the wire; hence it is very easy to interface this module with any microcontroller. So if you are looking for a module to measure current using a microcontroller for you project then this module might be the right choice for you.

Pin Configuration

Table 3.5.5.1: Pin Configuration

Pin Number	Pin Name	Description
1	Vcc	Input voltage is +5V for typical applications
2	Output	Outputs Analog voltage proportional to current
3	Ground	Connected to ground of circuit
T1	Wire In	The wire through current has to be measured is connected here
T2	Wire Out	

ESP12 is an UART-WiFi transparent transmission module with ultralow power consumption, specially designed for the needs of a new connected world. It offers a complete and self-contained Wi-Fi networking solution, allowing it to either host the application or to offload all Wi-Fi networking functions from another application processor.

ESP12 has powerful on-board processing and storage capabilities that allow it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, and the entire solution, including front-end module, is designed to occupy minimal PCB area.

Specifications

1. Measures both AC and DC current
2. Available as 5A, 20A and 30A module
3. Provides isolation from the load
4. Easy to integrate with MCU, since it outputs analog voltage
5. Scale Factor

CHAPTER 4 PERFORMANCE

ANALYSIS

Process of data acquisition:-

The Atmega324p Microcontroller Consists Of 6x10-Bit ADC Channels, With The Voltage And Current Sampled At Every 30 Second Interval On The ADC. Each Power Measurement Channel Requires Two Analog Channels, One For Voltage And One For Current, Thus Our Energy Meter Can Measure The Power Of 3 Individual Loads. An ACS712 Hall Effect Current Sensor Has Been Used For Sampling The Current Values Of The Load, It Can Measure Currents Up To 10 Amperes And A PEVMAC2C Voltage Sensor Break Outboard Has Been Used To Measure The AC Voltage. Instantaneous Power Has Been Calculated Using The Following Formula P= V*I .

The Designed Iot Energy Meter Consists Of A Voltage Sensor, Current Sensor, An Atmel Atmega328PAVR Microcontroller, A W5500 Ethernet Controller. The Project Has Been Built Using Arduino IDE Using C++ As The Source Code Language.

The smart meter will monitor by using Arduino nano microcontroller that is ATMEGA328. It maintains 8bit data size, operating range will be 3.3v to 5v. Wi-Fi module (ESP8266) works under six AT commands. First is “AT+CWMOD=3” to set the Wi-Fi module. Second is “AT+CIPMUX=1” to make enable multiple connections. The third is “AT+CIFSR” to get an IP address from the router. Fourth is “AT+CIPSERVER=1, 80” to set up the server. Last is “AT+CIPSENT=0, 1754” to set date length which could send. The last one is “AT+CWJAP” is to plus access point which requires SSID and password to join the access point.

Interfacing the Wi-Fi module, liquid crystal display, buzzer, and meter pulse by using C language on Arduino ID1.6.9. LCD is 2line 16 characters, here providing 5v to activate and then it displays the IP address which needs to connect the Wi-Fi module to send the data to processor. The crystal oscillator is used to convert the digital current signals to alternate current signal which requires maintaining the entire module of energy monitoring system. Load takes 5v power from the power transformer. Energy meter will read the pulse to calculate the amount of consumed power.

Estimation of energy consumed

The Amount Of Energy Consumed Has Been Determined From The Measured Instantaneous Power By Performing Integration.

□□□□□□ = ∫

The Discrete Integration Has Been Performed Using Trapezoidal Integration Method.

For A Data Buffer For Power Of Length N:

Energy= ∫ ( ) ∑ ( ) (□)

Where Δ Is The Sampling Time, I.E. 30 Seconds

Webpage (HTML):-

We have designed a webpage for operating Arduino and Energy Meter by making use of HTML. HTML basically stands for Hypertext Markup Language. It is a standard markup language which is used for creating web pages and web applications using Cascading Style Sheets (CSS) and JAVA scripts. It forms a triad of cornerstone technologies for the World Wide Web. The web browser receives HTML documents from the corresponding Webserver or from local storage and renders them into the multimedia web pages. HTML describes the structure of web page originally and semantically and includes cues for the appearance of the documents and files. The elements of HTML are the building blocks of HTML pages.

CHAPTER 5

CONCLUSIO N

Expected Conclusion:-

The project is mainly concentrate on IOT network. When we discusse about the project there are certain points to be notify. First point is we converting conventional energy meter which is electromagnetic into a digital meter. We are doing automatic reading and also connection and disconnection of meters using WIFI module. Then meter reading has come faster. It is publically available for the customers as well as for the KPTCL. Both the peoples will be using the information as per their requirements and they will be having freedom to check the bill, tampering, when the meter has been connected and disconnected before the due date.

All the information will be displaying by using smart app. Finally concluding our project that we are successfully monitored the tampering i.e. seal tampering and we have read the meter bills which also be uploaded on the website using IOT concept. Overall the new things we are working with in our project are ARM controller coupled with Arduino controller and the IOT model.

Future Scope

The project mainly aims at providing overall infrastructure of the energy meter presently used for the smart city concept. The main improvement for the future is going to make energy meter readings, tampering identification techniques, and connection and disconnection and also the pre information providing to the users all is going to happen on wifi internet.

Where we are going to develop some wifi hotspots in each area through which all the energy meters are get connected and set 4 to 5 parameters which is also going to be monitored. And the overall improvement information will be providing to the energy meter i.e. KPTCL will be easy for them to handle the things. Also in future we can go with some standard apps or standard tools, where in which it makes work easy for KPTCL people by reading the meter readings faster than the fastest method. And connect and disconnect of every meters on the on – payment and non – payment that will be fast as compared to the present

method.

REFRENCES

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CERTIFICATE

This is to certify that the Project report entitled

"Solenoid Relay Testing Jig Using Microcontroller"

Sponsored by: Supriya Electromech Pvt. Ltd., Nashik

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A Project Stage-II Report on

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A Project Report on

"SIMULATION OF TRANSIENT RECOVERY VOLTAGE OF HIGH VOLTAGE CIRCUIT BREAKER"

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2018-19

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OF ENGINEERING, AHMEDNAGAR

CERTIFICATE

A Report (Project) on

"PLC BASED SEWAGE WATER TREATMENT PLANT"

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DEPARTMENT OF ELECTRICAL ENGINEERING

2018-19

"Study, Design And Estimation Of Solar Power Grid"

Project Stage-1 submitted to the
Savitribai Phule Pune University

In partial fulfillment of the requirement for
Final Year Electrical Engineering
By:

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2020-2021

DR.VITHALRAO VIKHE PATIL COLLEGE OF ENGINEERING, AHMEDNAGAR

C E R T I F I C A T E

A Report Project Stage - I on

"Study, Design And Estimation Of Solar Power Grid"

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DEPARTMENT OF ELECTRICAL ENGINEERING
2019-20

ABSTRACT

This project proposes the modeling and simulation model of 100 kW grid connected PV based solar power plant on Matlab Simulink R2018b. In today's world where pollution is also a big problem along with the energy crisis, we need to find ways to meet the energy requirements and at the same tie keeping the environment pollution free and clean. Energy from the sun if harvested with proper techniques can help in meeting energy requirement without causing any pollution.

In this project the development of PV array model, their integration & Simulink implementation are described. MPPT i.e. Maximum Power Point Technique control is beneficial to ensure the output of PV power generation system at the maximum possible power output level. This system consist solar array, inverter and transformer for connecting it to the grid. The performance of power plant is also described with graph as obtained.

Use of electricity is increasing day by day. The electricity finds its application in all the domains. Converting solar energy into electrical energy is one of the best ways to reduce fossil fuel consumption. Owing to the cost and efficiency of the solar cells, it is not used in most of the electrical applications. By detailed analysis of plant we could determine the various performance aspects and make or recommends changes accordingly to improve the efficiency and utilization of plant optimally.

Solar farm has the potential to increase biodiversity value of site if land was previously intensively managed. This project presents the strategy of pv system about designing and while designing components required during installation of system.

Keywords-MPPT; Photo voltaic Array; IGRT Inverter; Scope; Transformer; Grid

CONTENTS

ABBREVIATIONS

MPPT Maximum power point tracking FF Fill Factor

P&O Perturb And
Observation MPP Maximum
Power Point
PF Power Factor
CT Current Transformer

CHAPTER ONE

INTRODUCTION

1.1 General background

Solar energy is clean and available in abundance. Solar technologies use the sun for provision of heat, light and electricity. These are for industrial and domestic applications. With the alarming rate of depletion of depletion of major conventional energy sources like petroleum, coal and natural gas, coupled with environmental caused by the process of harnessing these energy sources, it has become an urgent necessity to invest in renewable energy sources that can power the future sufficiently. The energy potential of the sun is immense. Despite the unlimited resource however, harvesting it presents a challenge because of the limited efficiency of the array cells.

When it comes to the development of any nation, energy is the main driving factor. There is an enormous quantity of energy that gets extracted, distributed, converted and consumed every single day in the global society. Fossil fuels account for around 85 percent of energy that is produced. Fossil fuel resources are limited and using them is known to cause global warming because of emission of greenhouse gases. There is a growing need for energy from such sources as solar, wind, ocean tidal waves and geothermal for the provision of sustainable and power.

Solar panels directly convert radiation from the sun into electrical energy. The panels are mainly manufactured from semiconductor materials, notably silicon. Their efficiency is 24.5% on the higher side. Three ways of increasing the efficiency of the solar panels are through increase of cell efficiency, maximizing the power output and the use of a tracking system.

Maximum power point tracking (MPPT) is the process of maximizing the power output from the solar panel by keeping its operation on the knee point of P-V characteristics. MPPT technology will only offer maximum power which can be received from stationary arrays of solar panels at

any given time. The technology cannot however increase generation of power when the sun is not aligned with the system.

1.2 Literature Review

The renewable energies have been experimented a great development in recent

years. More and more countries want to reduce fossil fuel dependence and increase the energy from green energy sources. Solar is energy in constantly growing. Solar farms are large areas of land where large amount of solar panels are connected together. Adding intelligence to control systems in solar farms allows monitoring and managing tasks, therefore is possible to detect malfunctions in the equipment and solves it. This paper presents a multi-agent monitoring system for a solar farm, that allows controlling the main indicators of solar panels such as power, current, voltage and position, with the aim of early fault detection in the panels and bring out actions for better performance.

The use of multi-agents systems are widely used in multiple science fields because provide modelling abstraction and intelligence. In this paper they proposed a multi-agents system for monitoring a solar power plant using multiple artificial intelligences in order to mimic the reasoning process in human operators. For the design of the agent platform we choose the BDI (Belief, Desires and Intentions) model. The proposed monitoring system in this paper is a low-cost monitoring system, therefore it justifies that it's installed in all solar panels. in which agents continuously monitors the environment and act in order to change it.(**Low-Cost Monitoring System For Solar Farm Using Agent Technology ,M. Moranchel, S. Fernandez, I. Sanz, F. J. Rodriguez, J. Pérez, Milwakuee, USA 19-22 Oct 2014**)

The energy demand is increasing day by day with ever growing increment of population. This article represents an intelligent and cost effective grid tied controller which integrates solar PV system with instant power supply (IPS) module to support continuous electrical power flow and supply access power to grid. Here, solar panels are connected to IPS, an electrical device that provides power to the load and battery during the unavailability of grid, through a microcontroller which determines the direction of power flows. In this project an intelligent system has been designed to support the continuous power flow at household by integrating the Instant Power Supply (IPS) and solar power technologies. Another benefit of this system is that it can provide surplus energy to the grid. So this system assures the best use of additional power by providing it to the grid.(**Design, Simulation and Implementation of a Grid Tied Solar Power Controller Integrated with Instant Power Supply Technology , Masum Billah1, Sanjoy Kumar Das2**)

Solar photovoltaic (PV) energy generation is considered as one of the important renewable energy type in future development of energy environment. This paper gives a representation of an automatized PVI interconnection test system based on IEEE 1547 standard. Photovoltaic inverter is responsible for energy conversion on the application of solar photovoltaic power system. In order to assure the quality and reliability of the generation system, it is important to estimate the performance of PV inverter used in the field. This paper proposes a interconnection test system for PV inverter performance tests based on the technical requirements indicated in IEEE1547 standard.(**Grid-Connected PV Inverter Test System for Solar Photovoltaic Power System Certification, Yu-Jen Liu, Member IEEE, Pei-Hsiu Lan**)

1.3 Problem statement

As country development is decided by how much electricity is used. As the electricity generation by conventional sources is risky and it causes pollution, here we are using solar energy to generate electricity using solar power grid.

1.4 Objectives

The project was carried out to satisfy two main objectives:

- Design a solar power grid the solar.
- To ultimately contribute to reduction of dependence on foreign and sources of energy.

1.5 Scope of the project

Generation of solar energy has tremendous scope in India. The geographical location of the country stands to its benefit for generating solar energy. The reason being India is a tropical country and it receives solar radiation almost throughout the year, which amounts to 3,000 hours of sunshine. This is equal to more than 5,000 trillion kWh. Almost, all parts of India receive 4-7 kWh of solar radiation per sq metres.. Since majority of the population live in rural areas, there is much scope for solar energy being promoted in these areas. Use of solar energy can reduce the use of firewood and dung cakes by rural household. Many large projects have been proposed in India, some of them are: i).Thar Desert of India has best solar power projects, estimated to generate 700 to 2,100 GW,

iii).Gujarat's pioneering solar power policy aims at 1,000 MW of solar energy generation, and Rs. 130 billion solar power plan was unveiled in July 2009, which projected to produce 20 GW of solar power by 2020. Apart from above, about 66 MW is installed for various applications in the rural area, amounting to be used in solar lanterns, street lighting systems and solar water pumps, etc. Thus, India has massive

plan for Solar Energy generation that may not only fulfill the deficit of power generation but also contribute largely in Green Energy Production to help to reduce the Climatic Changes globally.

1.6 Project report organization

The project is divided into 4 chapters;

Chapter 1: This is the introduction to the project report that describes the justification for doing the project. The objectives and scope of the work are also described.

Chapter 2: This has the literature review that is based on the background of the problem. The chapter also includes material studied and which is pertinent to the study

Chapter 3: The chapter involves the components of the project.

Chapter 4: Power Quality issues

Chapter 5: This chapter has the discussion, conclusion about

this project. **Keywords:** Solar Energy, MPPT, Efficiency.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

A grid-connected photovoltaic system, or grid-connected PV system is an electricity generating solar PV power system that is connected to the utility grid. A grid connected PV system consists of solar panels, one or several inverters, a power conditioning unit and grid connection equipment. They range from small residential and commercial rooftop systems to large utility-scale solar power stations. Unlike standalone powers systems, a grid connected system rarely includes an integrated battery solution, as they are still very expensive. When conditions are right, the grid-connected PV system supplies the excess power, beyond consumption by the connected load, to the utility grid. Systems such as Net Metering and Feed-in Tariff which are offered by some system operators can offset a customers electricity usage costs. In some locations though, grid technologies cannot cope with distributed generation feeding into the grid, so the export of surplus electricity is not possible

and that surplus is earthed.

Grid-connected PV systems are comparatively easier to install as they do not require a battery system

Figure 2.1: Solar Cell

2.2 The Earth: Rotation and Revolution

The earth is a planet of the sun and revolves around it. Besides that, it also rotates around its own axis. There are thus two motions of the earth, rotation and revolution. The earth rotates on its axis from west to east. The axis of the earth is an imaginary line that passes through the northern and southern poles of the earth. The earth completes its rotation in 24 hours. This motion is responsible for occurrence of day and night. The solar day is a time period of 24 hours and the duration of a sidereal is 23 hours and 56 minutes. The difference of 4 minutes is because of the fact that the earth's position keeps changing with reference to the sun.

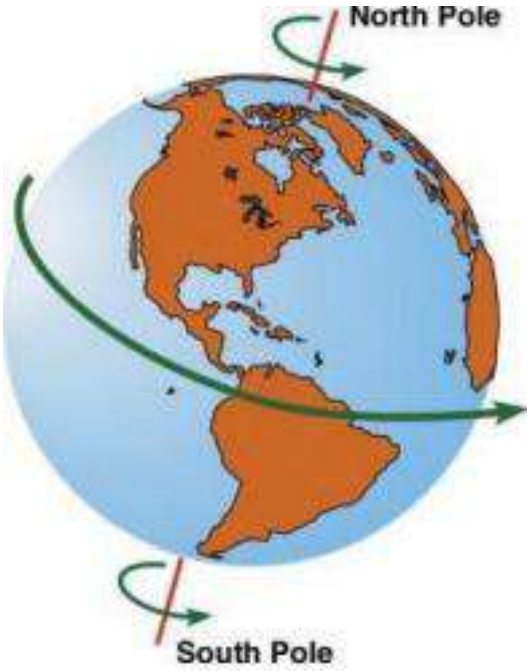


Figure 2.2: Earth's rotation

The movement of the earth round the sun is known as revolution. It also happens from west to east and takes a period of 365 days. The orbit of the earth is elliptical. Because of this the distance between the earth and the sun keeps changing. The apparent annual track of the sun via the fixed stars in the celestial sphere is known as the ecliptic. The earth's axis makes an angle of 66.5 degrees to the ecliptic plane. Because of this, the earth attains four critical positions with reference to the sun .

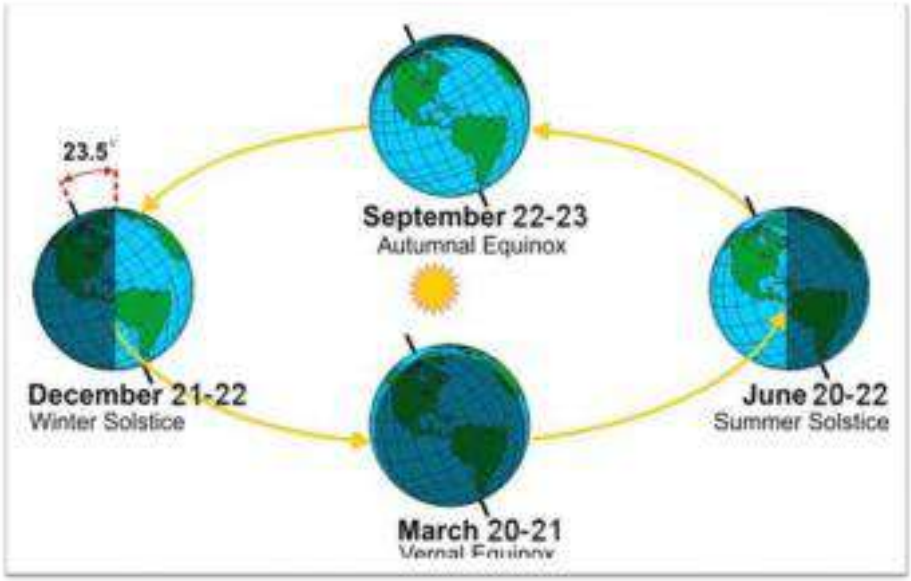


Figure 2.3: Revolution and rotation

2.3 Solar Irradiation: Sunlight and the Solar Constant

The sun delivers energy by means of electromagnetic radiation. There is solar fusion that results from the intense temperature and pressure at the core of the sun. Protons get converted into helium atoms at 600 million tons per second. Because the output of the process has lower energy than the protons which began, fusion gives rise to lots of energy in form of gamma rays that are absorbed by particles in the sun and re-emitted.

The total power of the sun can be estimated by the law of Stefan

and Boltzmann. $P=4\pi r^2 \sigma\epsilon T^4$ W [1]

T is the temperature that is about 5800K, r is the radius of the sun which is 695800 km and **σ** is the Boltzmann constant which is $1.3806488 \times 10^{-23}$ $m^2kg\ s^{-2}\ K^{-1}$. The emissivity of the surface is denoted by **ϵ.** Because of Einstein's famous law $E=mc^2$about millions of tons of matter are converted to energy each second. The solar energy that is irradiated to the earth is 5.10^{24} Joules per year. This is 10000 times the present worldwide energy consumption per year.

Solar radiation from the sun is received in three ways: direct, diffuse and reflected. Direct radiation**:** is also referred to as beam radiation and is the solar radiation which travels on a straight line from the sun to the surface of the earth.

Diffuse radiation: is the description of the sunlight which has been scattered by particles and molecules in the atmosphere but still manage to reach the earth's surface. Diffuse radiation has no definite direction, unlike direct versions.

Reflected radiation describes sunlight which has been reflected off from non-atmospheric surfaces like the ground .

2.4 Sunlight

Photometry enables us to determine the amount of light given off by the Sun in terms of brightness perceived by the human eye. In photometry, a luminosity function is used for the radiant power at each wavelength to give a different weight to a particular wavelength that models human brightness sensitivity. Photometric measurements began as early as the end of the 18^{th} century resulting in many different units of measurement, some of which cannot even be converted owing to the relative meaning of brightness. However, the luminous flux (or lux) is commonly used and is the measure of the perceived power of light. Its unit, the lumen, is concisely defined as the luminous flux of light produced by a light source that emits one candela of luminous intensity over a solid angle of one steradian. The candela is the SI unit of luminous intensity and it is the power emitted by a light source in a particular direction, weighted by a luminosity function whereas a steradian is the SI unit for a solid angle; the two-dimensional angle in three-dimensional space that an object subtends at a point.

One lux is equivalent to one lumen per square meter;

$1\ lx = 1lm \cdot m = 1\ cd \cdot sr \cdot m$ **(1)**

i.e. a flux of 10 lumen, concentrated over an area of 1 square meter, lights up that area with illuminance of 10 lux .

Sunlight ranges between 400 lux and approximately 130000 lux, as summarized in the table below

Time of day Luminious flux

Sunrise or sunset on a clear day 400

Overcast day 1000

Full day (not direct sun) 10000 – 25000

Direct sunlight 32000 – 130000

Table 2.1: Range of the brightness of sunlight (lux)

2.4.1 Tilt Angles

Solar modules should be installed so that as much radiation as possible is collected. Ideally the solar modules should be tilted at an angle to the horizontal (β°) as shown, facing true south (if installed in the northern hemisphere such that there is 90 degrees between the sun (at solar noon) and the solar module. To have a module face directly towards the sun at all times would require a solar tracking frame to be installed. This can be expensive, so it is not common practice for most PV applications.

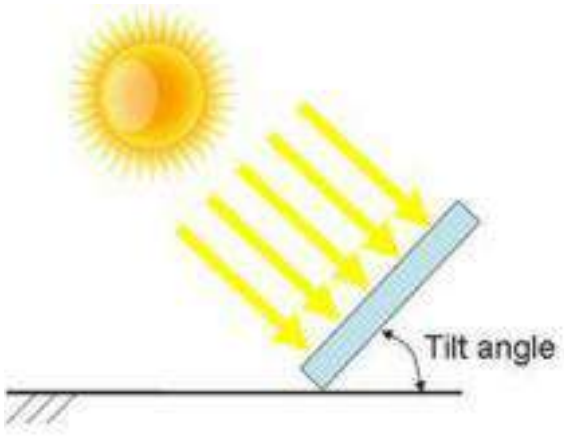


Figure 2.4: Tilt angle

2.4.2 Solar Array Location

For a solar photovoltaic system, it is crucial that the solar array is installed at a location that is free from any shading throughout the day. Finding a shadow free location for placement of array is usually not an issue for remote sites, where ample space and

options for locating maybe available. Shadow during winter season is much longer that the shadow during summer season due to change in earth's altitude. There may be shadow from nearby trees and houses or even shadow from mountains, which is not very far from the site. Sometime shadow in the early morning and late afternoon cannot be avoided due to very low altitude of sun. In such situation arrays must be placed in such a way that there is no shading between the hours of best insolation, usually from 8 a.m. to 4 p.m., on the day with the longest shadows, December21 in the Northern Hemisphere.

Figure 2.5:Position of sun

2.4.3:Geometric Effect

The direction that a solar panel faces is referred to as its orientation. The orientation of the solar array is very important as it affects the amount of sunlight hitting the array and hence the amount of power the array will produce. The orientation generally includes the direction the solar module is facing (i.e. due south) and the tilt angle which is the angle between the base of the solar panel and the horizontal. The amount

of sunlight hitting the array also varies with the time of day because of the sun's movement across the sky. Picture shows a flat plate collector having an area, A, of 1 m2 tilted at an angle, β, from the horizontal and is perpendicular to the incoming radiation. At some time during the day, there are 12 "rays" of the sun's beam coming from an altitude angle, denoted γ (gamma), that strike the collector at this position.

2.4.4:Peak Sun Hour

In solar PV system design practice, the average daily solar insolation in units of kWh/m2/day is referred to as "peak sun hours". Since the peak solar radiation is 1kW/m2, the number ofpeak sun hours is numerically identical to the average daily solar insolation. For example, alocation that receives 5kWh/m2 per day can be said to have received 5hours of sun per day at1kW/m2.This helps to calculate energy generation from a PV power plant as PV modules arerated at an input rating of 1kW/m2

Solar energy available in a given location is expressed as kWh/m2/day. This is commonly referred as Peak Sun Hours (PSH).

• For example, if solar radiation for a particular location is 5kWh/m2/day then PSH for that location will be 5 hours.• Now, if you install 1kW solar panel on that location, it will produce

1kW x 5h = 5kWh energy per day without considering any losses.

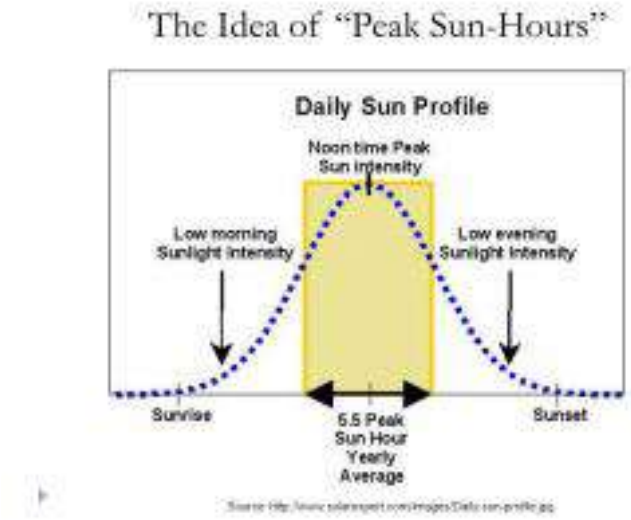


Fig 2.6: Sun peak hours

CHAPTER THREE

BLOCK DIAGRAM AND COMPONENTS

3.1 Block Diagram :

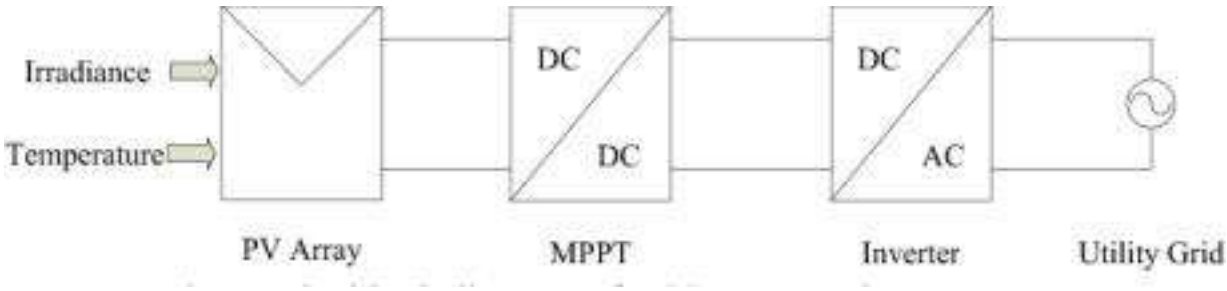


Fig 3.1: Block Diagram

In this block diagram PV array , MPPT and Inverter are used , in this irradiance are captured by pv array and given it to the maximum power point tracking. The major principle of MPPT is to extract the maximum available power from PV module by making them operate at the most efficient voltage (maximum power point). A solar

inverter or PV inverter, is a type of electrical converter which converts the variable direct current output of photovoltaic (PV) solar panel into a utility frequency alternating current (AC) that can be fed into a commercial electrical grid.

3.2 Components of solar power grid:

- Solar module
- Solar generator box
- Solar power inverter
- Maximum power point tracking
- PV meter
- Bi-Directional Meter

Fig 3.2: components

3.2.1 Solar module:

A single solar cell cannot provide required useful output. So to increase output power level of a PV system, it is required to connect number of such **PV solar cells**. A solar module is normally series connected sufficient number of solar cells to provide

required standard output voltage and power. One solar module can be rated from 3 watts to 300 watts.

The solar modules or PV modules are commercially available basic building block of a solar electric power generation system. Actually a single solar PV cell generates very tiny amount that is around 0.1 watt to 2 watts. But it is not practical to use such low power unit as building block of a system. So required number of such cells are combined together to form a practical commercially available solar unit which is known as **solar module or PV module**. In a solar module the solar cells are connected in same fashion as the battery cell units in a battery bank system. That means positive terminals of one cell connected to negative terminal voltage of solar module is simple sum of the voltage of individual cells connected in series in the module.

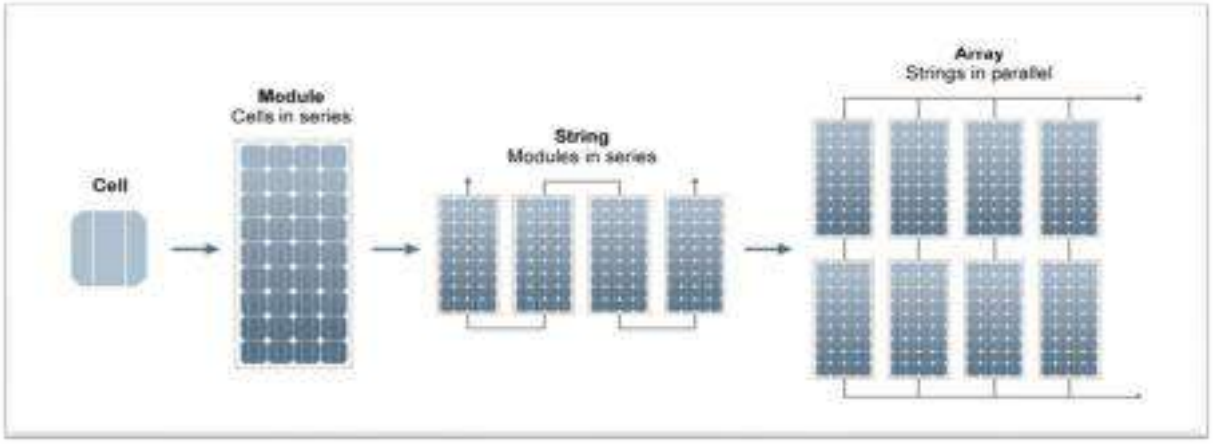
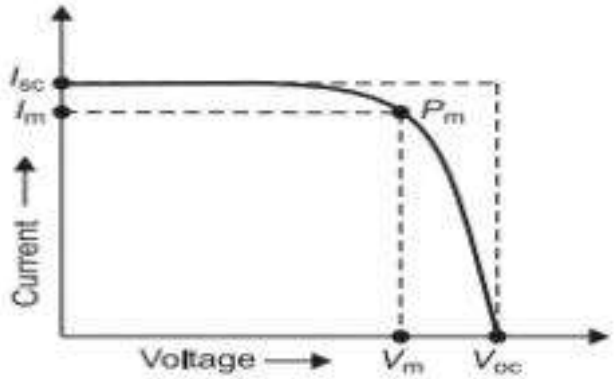


Fig 3.3:solar module

V-I Characteristic of Solar Module

If we draw a graph by taking X-axis as voltage axis and Y-axis as currents of a solar module, then the graph will represent V-I characteristic of a solar module.



- **Open circuit voltage of solar cell**

Solar Cell Types	**Open Circuit Voltage at STC**
Mono Crystalline Silicon Solar Cell	0.55 to 0.68 V
Poly Crystalline Silicon Solar Cell	0.55 to 0.65 V
Amorphous Silicon Solar Cell	0.7 to 1.1 V
Cadmium Telluride Solar Cell	0.8 to 1.0 V
Copper Indium Gallium Selenide Solar Cell	0.5 to 0.7 V
Gallium Indium Phosphide/ Gallium Arsenide / Gallium Solar Cell	1 to 2.5 V

Table 3.1:Open circuit voltage of solar cell.

3.2.2 Generator connection box:

Generator Tap Box and Boxes, Generator Connection Boxes and Generator Connection Panels are intended for use as a temporary service connection point between portable power units and the facility service entrance. When normal utility power is interrupted for long periods of time (natural disaster, utility system failure, etc.), tap boxes may become necessary to bring in portable generators to provide power or augment emergency generator sets.

Fig 3.4:Generator connection Box

3.2.3: Solar power inverter:

A solar inverter or PV inverter, is a type of electrical converter which converts the variable direct current (DC) output of a photovoltaic (PV) solar panel into a utility frequ ency alternating current (AC) that can be fed into a commercial electrical grid or used by a local, off-grid electrical network. It is a critical balance of system (BOS)–component in a photovoltaic system, allowing the use of ordinary AC -powered equipment. Solar power inverters have special functions adapted for use with photovoltaic arrays, including maximum power point tracking and anti-islanding protection.

Classification :

1. Stand-alone inverters:

This is used in isolated systems where the inverter draws its DC energy from batteries charged by photovoltaic arrays. Many stand-alone inverters also incorporate integral battery chargers to replenish the battery from an AC source, when available. Normally these do not

interface in any way with the utility grid, and as such, are not required to have anti-islanding protection.

2. Grid-tie inverters:

This match phase with a utility-supplied sine wave. Grid-tie inverters are designed to shut down automatically upon loss of utility supply, for safety reasons. They do not provide backup power during utility outages.

3. Battery backup inverters:

These are special inverters which are designed to draw energy from a battery, manage the battery charge via an onboard charger, and export excess energy to the utility grid. These inverters are capable of supplying AC energy to selected loads during a utility outage, and are required to have anti-islanding protection.

4. Intelligent hybrid inverters:

This manages photovoltaic array, battery storage and utility grid, which are all coupled directly to the unit. These modern all-in-one systems are usually highly versatile and can be used for grid-tie, stand-alone or backup applications but their primary function is self consumption with the use of storage.

3.2.4: Maximum power point tracking

Solar inverters use maximum power point tracking (MPPT) to get the maximum possible power from the PV array. Solar cells have a complex relationship between solar irradiation, temperature and total resistance that produces a non-linear output efficiency known as the *I-V* curve. It is the purpose of the MPPT system to sample the output of the cells and determine a resistance (load) to obtain maximum power for any given environmental conditions.

The fill factor, more commonly known by its abbreviation *FF*, is a parameter which, in conjunction with the open circuit voltage (V_{oc}) and short circuit current (I_{sc}) of the panel, determines the maximum power from a solar cell. Fill factor is defined as the ratio of the maximum power from the solar cell to the product of V_{oc} and I_{sc}. The major principle of MPPT is to extract the maximum available power from PV module by making them operate at the most efficient voltage (maximum power point).

There are three main types of MPPT algorithms: perturb-and-observe, incremental conductance and constant voltage. The first two methods are often referred to as hill climbing methods; they rely on the curve of power plotted against voltage rising to the left of the maximum power point, and falling on the right.

. PERTURB AND OBSERVE METHOD The concept behind the "perturb and observe" (P&O) method is to modify the operating voltage or current of the

photovoltaic panel until you obtain maximum power from it. For example, if increasing the voltage to a panel increases the power output of the panel, the system continues increasing the operating voltage until the power output begins to decrease. Once this happens, the voltage is decreased to get back towards the maximum power point. This perturbance continues indefinitely. Thus, the power output value oscillates around a maximum power point and never stabilizes [9]. In this method, the sign of the last perturbation and the sign of the last increment in the power are used to decide what thenext perturbation should be. As can be seen in Fig. 1, on the left of the MPP incrementing the voltage increases the power whereas on the right decrementing the voltage increases the power.

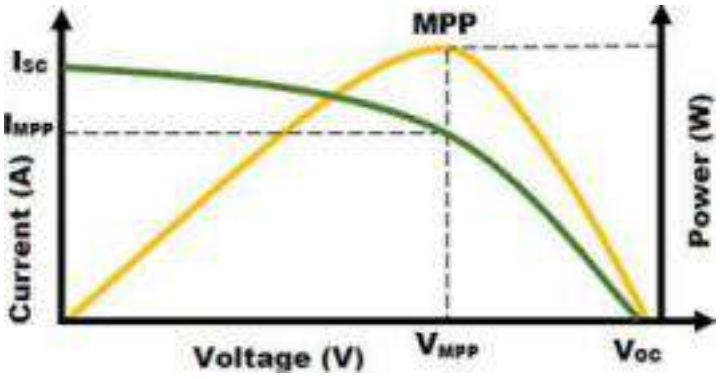
1. 

Fig. 3.5 PV panel characteristics curves

2. If there is an increment in the power, the perturbation should be kept in the same direction and if the power decreases, then the next perturbation should be in the opposite direction. Based on these facts, the algorithm is implemented. The process is repeated until the MPP is reached. Then the operating point oscillates around the MPP.

3. The major drawbacks of the P&O method are that the power obtained oscillates around the maximum power point in steady state operation, it can track in the wrong direction under rapidly varying irradiance levels and load levels, and the step size (the magnitude of the change in the operating voltage) determines both the speed of convergence to the MPP and the range of oscillation around the MPP at steady state operation .

III. INCREMENTAL CONDUCTANCE METHOD This method uses the PV array's incremental conductance / to compute the sign of /. When /is equal and opposite to the value of I/V (where /=0) the algorithm knows that the maximum power point is reached and thus it terminates and returns the corresponding value of operating voltage for MPP. This method tracks rapidly changing

irradiation conditions more accurately than P&O method. One complexity in this method is that it requires many sensors to operate and hence is economically less effective

Fig. 3.7:Flow Chart of Incremental Conductance Method

4. The drawbacks of these techniques are mainly two. The first and main one is that they can easily lose track of the MPP if the irradiation changes rapidly . In case of step changes they track the MPP very well, because the change is

instantaneous and the curve does not keep on changing. However, when the irradiation changes following a slope, the curve in which the algorithms are based changes continuously with the irradiation, so the changes in the voltage and current are not only due to the perturbation of the voltage. As a consequence it is not possible for the algorithms to determine whether the change in the power is due to its own voltage increment or due to the change in the irradiation.

3.2.5: Solar meters:

"Solar Meters can be cellular enabled, which allows for a dependable communication from the plant to the monitoring platform, where the installer and customer can view performance remotely via the web." To measure electrical power (kW) the rate of production two aspects are measured: current and voltage, according to John Browne, applications engineer at Continental Control Systems. The current represents the amount of electricity (electrons) flowing through a conductor. Voltage represents the pressure pushing the electricity through the conductor. Current is typically measured by sensing the strength of the magnetic field produced when electricity flows through a conductor. A current sensor installed around a conductor is the current transformer (CT). The voltage is measured directly by the meter via two or more connections to the electrical service. The meter multiplies the current by the voltage to calculate apparent power (VA), and compares the current and voltage signals to calculate power factor (Pf). The apparent power is multiplied by the power factor to calculated real power (P). Real power is integrated over time to calculate real energy (kWh).

3.2.6: Bi-directional meter:

An electric meter in your home senses the current flowing through it and store the value of total consumption according to the net flow of current. They are not directional sensitive meter. So, it will run forward irrespective of whether an export is happening or import is happening. It eventually increases the meter reading for the export as well. This means, not making any savings in your electricity bill and charging extra for your export.

Bi-Directional meter senses the direction of flow of current and stores the data in a separate register. In the daytime, most of the loads are in off-stage and excess energy generating by solar system will send back to the grid (Export). At this point, direction of flow of current is backward and meter saves the data in export register. In night time, there is no solar generation and electricity is imported from the grid to run the load. Now, the direction of flow of current is forward and meter saves the data in import register

3.2.6.1: Net-Metering:

In this system, you have a single new bi-directional meter. When you consume electricity from the grid (or your electricity supply), the meter readings will move forward; but, when you produce electricity and send it to the grid, the meter readings shall move backward. Suppose you use 10 units of electricity in a day and produce 8 units, your meter will show a reading of 2 units. And if you use 10 units of electricity and produce 12 units, then your meter will show -2 units. Your bill at the end of month will be based on net units consumed/produced. If you generate extra electricity in any month, the surplus is carried over to the next month and netted. At the end of a year, if your total production is more that what you consumed, then you will get paid for the next surplus electricity produced at the cost decided by your state's electricity regulatory commission.

CHAPTER FOUR

POWER QUALITY ISSUES

4.1 Power quality issues related with grid connected solar system

Power quality is the possibility of measuring and quantifying the performance of the power system and not related to the performance of equipment‖. Different organizations like the Institute of Electrical and Electronics Engineers (IEEE) dictionary, the definition in the International Electrotechnical Commission (IEC) standard IEC 61000-4-30 have given various definitions of power quality. In the ―power quality issue‖ is defined as ―any power problem manifested in voltage, current, or frequency deviations that results in failure or malfunction of customer equipment‖. Sometimes power quality problems may not show the effect immediately, for e.g. the harmonic distortion may increase the aging of electrical components; without causing any immediately failure or malfunction. The differing influences of harmonics in power system networks can have serious long-term consequences, of which the most important ones are:

Overloading of consumer‘s electrical installations and power system elements by higher order frequencies of currents and voltages;

Increased heating of neutral conductors caused by triple current harmonics (frequency multiplier of number3). The increased level of the triple harmonics in the neutral conductor can cause serious damage and even leads to fires because the neutral conductor is not usually overload protected;

Increased transformer heating caused by higher (order and magnitude) harmonics, as well as saturation effects in the core;

Higher harmonics the power system can cause interference to telecommunication lines;

Overstressing and resonant condition on the capacitors bank. For eg. A capacitor bank switching inside the MV circuit of a power plant can create impulses that can cause damage to other components on that circuit.

Power quality issues mentioned above have the potential to seriously impact plant economics, Optimization is really the key to success for any PV installation, but the formula for it will be different for each facility. The ability to use intelligent control solutions along with the technology is crucial in achieving an optimized system.

CHAPTER FIVE

5.1 CALCULATIONS

PV array delivering a maximum of 100 kW at 1000 W/m^2 sun irradiance.

- **5-kHz DC-DC boost converter** increasing voltage from PV natural voltage (273 V DC at maximum power) to 500 V DC.
- **1980-Hz 3-level 3-phase VSC**. The VSC converts the 500 V DC link voltage to 260 V AC and keeps unity power factor.
- **10-kvar capacitor bank** filtering harmonics produced by VSC.
- **100-kVA 260V/25kV three-phase coupling transformer**.
- **Utility grid** (25-kV distribution feeder + 120 kV equivalent transmission system). The 100-kW PV array uses 330 SunPower modules (SPR-305E-WHT-D). The array consists of 66 strings of 5 series-connected modules connected in parallel

66*5*305.2 W= 100.7 kW

- Number of series-connected cells : 96
- Open-circuit voltage: Voc= 64.2 V
- Short-circuit current: Isc = 5.96 A
- Voltage and current at maximum power : Vmp =54.7 V, Imp= 5.58 A
    - From t=0 sec to t= 0.05 sec

    pulses to Boost and VSC converters are blocked. PV voltage corresponds to open-circuit voltage Nser*Voc=5*64.2=321 V

    At t=0.05 sec, Boost and VSC converters are de-blocked. DC link voltage is regulated at Vdc=500V. Duty cycle of boost converter is fixed (D= 0.5 as shown on PV scope).

    - Steady state is reached at t=0.25 sec. Resulting PV voltage

    is therefore V_PV = (1-D)*Vdc= (1-0.5)*500=250 V

    - At t=0.4 sec MPPT is enabled. The MPPT regulator starts regulating PV voltage by varying duty cycle in order to extract maximum power. Maximum power (100.4 kW) is obtained when duty cycle is D=0.454.

- At t=0.6 sec, PV array mean voltage =274 V as expected from PV module specifications (Nser*Vmp=5*54.7= 273.5 V).
- From t=0.6 sec to t=1.1 sec, sun irradiance is ramped down from 1000 W/m^2 to 250 W/m^2. MPPT continues tracking maximum power.
- At t=1.2 sec when irradiance has decreased to 250 W/m^2, duty cycle is D=0.461. Corresponding PV voltage and power are Vmean= 268 V and Pmean=24.3 kW. Note that the MMPT continues tracking maximum power during this fast irradiance change.
- From t=1.2 sec to t=2.5 sec sun irradiance is restored back to 1000 W/m^2 and then temperature is increased to 50 deg. C. in order to observe impact of temperature

increase. Note that when temperature increases from 25 deg. C to 50 deg. C, the array output power decreases from 100.7 kW to 93 kW.

5.2 Simulink Model

Waveforms:

1.Irradiance and Temperature

2.Power Output

CHAPTER SIX

HARDWARE IMPLEMENTATION

6.1 Circuit Diagrams

Fig.6.1.1 Block diagram

In the above Fig.6.1.1 we have used the solar panel of 10W which has output voltage 20V and current 500mA.For solar charge storing we have used voltage regulator IC LM317.the battery sends output to signal conditioning unit and power supply. signal conditioning unit is used as potential divider circuit. The pic microcontroller 16F877A we used in our circuit to take reading of CT current and voltage. It also makes decision of inverter ON/OFF condition and

shows power consumption through GSM.LCD display is used for showing the power. MAX 232 is communication protocol that converts signal from RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits.

Fig.6.1.2 I to V Circuit Diagram

Above Fig.6.1.2 shows I to V converter.A current to voltage converter or I to V converter is an electronic circuit that takes current as the input and produces voltage as the output. This is the op-amp based current to voltage converter.An op -amp based current to voltage converter produces an output voltage when current is applied to its inverting terminal. The circuit diagram of an op-amp based current to voltage converter is shown in the following figure.In the circuit shown above, the non-inverting input terminal of the op-amp is connected to the CT coil. And through the second op-amp Vout is taken.

Fig.6.1.3 Main unit Circuit Diagram

In the above fig.6.1.3 input to this circuit is taken from CT and given to pin number 3 of microcontroller, and potential divider circuit is connected to the pin number 2 of microcontroller. Also for the clock pulse generation crystal oscillator is connected to pin number 13 and 14.To turn on the inverter transistor relay drive is used which is connected to pin number 13.Pin number 25 and 26 are connected to pin number 11 and 12 of MAX232, pin number 13 and 14 are given to the GSM, and LCD is connected to pin number 33,34,35,36,37,38,39,40 of microcontroller.

Pin configuration and Description of PIC 16F877A microcontroller.

- **Pin 1: MCLR:** The first pin is the master clear pin of this IC. It resets the microcontroller and is active low, meaning that it should constantly be given a voltage of 5V and if 0 V are given then the controller is reset. Resetting the controller will bring it back to the first line of the program that has been burned into the IC.
  A push button and a resistor is connected to the pin. The pin is already being supplied by constant 5V. When we want to reset the IC we just have to push the button which will bring the MCLR pin to 0 potential thereby resetting the controller.
- **Pin 2:RA0/RA1:** PORTA consists of 6 pins, from pin 2 to pin 7, all of these are bidirectional input/output pins. Pin 2 is the first pin of this port. This pin can also be used as an analog pin AN0. It is built in analog to digital converter.

- **Pin 3: RA1/AN1:** This can be the analog input 1.
- **Pin 4:RA2/AN2/Vref-:** It can also act as the analog input2. Or negative analog reference voltage can be given to it.

- **Pin 5:RA3/AN3/Vref+:** It can act as the analog input 3. Or can act as the analog positive reference voltage.
- **Pin 6: RA0/T0CKI:** To timer0 this pin can act as the clock input pin, the type of output is open drain.
- **Pin 7: RA5/SS/AN4:** This can be the analog input 4. There is synchronous serial port in the controller also and this pin can be used as the slave select for that port. • **PIN 8: RE0/RD/AN5:** PORTE starts from pin 8 to pin 10 and this is also a bidirectional input output port. It can be the analog input 5 or for parallel slave port it can act as a 'read control' pin which will be active low.
- **PIN 9: RE1/WR/AN6:** It can be the analog input 6. And for the parallel slave port it can act as the 'write control' which will be active low.
- **PIN 10: RE2/CS/A7:** It can be the analog input 7, or for the parallel slave port it can act as the 'control select' which will also be active low just like read and write control pins.
- **PIN 11 and 32: VDD:** These two pins are the positive supply for the input/output and logic pins. Both of them should be connected to 5V.
- **PIN 12 and 31: VSS:** These pins are the ground reference for input/output and logic pins. They should be connected to 0 potential.
- **PIN 13: OSC1/CLKIN:** This is the oscillator input or the external clock input pin. • **PIN 14: OSC2/CLKOUT:** This is the oscillator output pin. A crystal resonator is connected between pin 13 and 14 to provide external clock to the microcontroller. ¼ of the frequency of OSC1 is outputted by OSC2 in case of RC mode. This indicates the instruction cycle rate.

- **PIN 15: RC0/T1OCO/T1CKI:** PORTC consists of 8 pins. It is also a bidirectional input output port. Of them, pin 15 is the first. It can be the clock input of timer 1 or the oscillator output of timer 2.
- **PIN 16: RC1/T1OSI/CCP2:** It can be the oscillator input of timer 1 or the capture 2 input/compare 2 output/ PWM 2 output.
- **PIN 17: RC2/CCP1:** It can be the capture 1 input/ compare 1 output/ PWM 1 output. • **PIN 18: RC3/SCK/SCL:** It can be the output for SPI or I2C modes and can be the input/output for synchronous serial clock.
- **PIN 23: RC4/SDI/SDA:** It can be the SPI data in pin. Or in I2C mode it can be data input/output pin.
- **PIN 24: RC5/SDO:** It can be the data out of SPI in the SPI mode. • **PIN 25: RC6/TX/CK:** It can be the synchronous clock or USART Asynchronous transmit pin.
- **PIN 26: RC7/RX/DT:** It can be the synchronous data pin or the USART receive pin. • **PIN 19,20,21,22,27,28,29,30:** All of these pins belong to PORTD which is again a bidirectional input and output port. When the microprocessor bus is to be interfaced, it can act as the parallel slave port.
- **PIN 33-40: PORT B:** All these pins belong to PORTB. Out of which RB0 can be used as the external interrupt pin and RB6 and RB7 can be used as in-circuit debugger pins.

Fig.6.1.4 Power Supply

In the Fig.6.1.4 of power supply circuit the solar panel is connected to voltage regulator. We are using one AC step down transformer for backup when solar panel is not available in rainy season. Output of transformer is given to bridge rectifier. Transformer voltage we can not send directly to panel so we have connected one 20V freewheeling diode and filter capacitor of 100μF between panel and regulator.10K potentiometer is used to vary pin 2 voltage of IC. The range of voltage will vary between (0-20V) and 1.2V drop occurs in it. R220 is the current limiting resistor. Output voltage of pin 2 is given to freewheeling diode for purpose of battery charge. again that battery output is carry forward to voltage regulator IC 7805 which has minimum input voltage of 7V and Maximum input voltage of 35V. For constant voltage we have regulate it to 5V.

Fig.6.1.5 Signal Conditioning Unit

The output of the current transformer is Current. Which is then given to a Current to voltage convertor i.e. basically it is given across a resistor(R1) so the voltage generated is V= I x R1.The two diodes D1 & D2 are used to make sure the voltage does not get above +0.7 & -0.7v. This is done for circuit protection i.e. to make sure the output of the circuit doesn't go above 5v.This AC signal is then given to an active rectifier circuit. A rectifier converts ac signal to dc. Normally diodes are used to create a rectifier. But the voltage drop across a diode is 0.7v so we cannot rectifier signals led than 0.7v. For this purpose active rectifier is used. The active rectifier circuit consists of R2, U1 & D3. The output of the rectifier circuit is a pulsating DC signal. So this signal is then applied to a filter circuit conisting of R3, C1 & R7. Basically this circuit converts the pulsating DC signal into fixed DC signal. Then the signal is then given to an amplifer circuit (R4, R5, R6, U2). We are using opamp in non inverting mode. The o/p of this signal is then given to ADC.

6.2 Code

```
Device 16F877A
Xtal 20
&#39;Config hs_osc,pwrte_on,wdt_off,boden_off,lvp_off,debug_off
&#39;-----------------------------------------------
Declare LCD_DTPin PORTB.4
Declare LCD_ENPin PORTB.3
Declare LCD_RSPin PORTB.2
Declare LCD_Lines 4
Declare LCD_Type alpha
```

```
Declare LCD_Interface 4
&#39;----------------------------------------------------------------
Declare Hserial_Baud = 9600 &#39; Set baud rate to 9600
Declare Hserial_RCSTA = %10010000 &#39; Enable serial port and continuous
receive Declare Hserial_TXSTA = %00100100 &#39; Enable transmit and
asynchronous mode Declare Hserial_Clear = On &#39; Enable Error clearing on
received characters &#39;-------------------------------------------------------------------------
&#39; Define ADC parameters
TRISA = %11111111
PORTA = 0

Adin_Res = 10 &#39; 10-bit result required
Adin_Tad = FRC &#39; RC OSC chosen
Adin_Stime = 50
ADCON1 = %10000000

&#39;-------------------------------------------------------------------------
- TRISB = %00000000
TRISC = %10000000
TRISD = %00000000
TRISE = %00000000
PORTB = %00000000
PORTC = %10000000
PORTD = %00000000

DelayMS 50
Declare All_Digital = True
&#39;-------------------------------------------------
DelayMS 100
Dim volt As Word
Dim volt1 As Word
volt=0
volt1=0
```



```
    DelayMS 100
    Print At 1,1,&quot; &quot;
    Print At 2,1,&quot; &quot;
    Print At 1,1,&quot; INITIAL
    GSM &quot; DelayMS 5000
    DelayMS 5000
```

```
HSerOut [&quot;ATE0&quot;,13]
DelayMS 1000
HSerOut
[&quot;AT+CMGF=1&quot;,
13] DelayMS 1000
MAIN:

main1:
volt= ADIn 0 &#39; Place the conversion
of channel 0 volt=volt*5
volt=volt/2000
Print At 1,1,&quot; &quot;
Print At 2,1,&quot; &quot;
Print At 1,1,&quot;volt:&quot;,Dec volt
DelayMS 3000
If volt &gt; 10 Then
GoTo ld0
Else

Print At 1,1,&quot; BATT LOW &quot;
Print At 2,1,&quot; PLEASE
CHARGE &quot; DelayMS 1000
PORTD.0 = 0
DelayMS 1000
GoTo main1
EndIf
ld0:
Print At 1,1,&quot; &quot;
Print At 2,1,&quot; &quot;
Print At
1,1,&quot;INVERTER ON
&quot; DelayMS 3000
PORTD.0 = 1
DelayMS 1000
volt1= ADIn 1
volt1=volt*5
volt1=volt1*230
volt1=volt1/1000
Print At 1,1,&quot; &quot;
Print At 2,1,&quot; &quot;


Print At 1,1,&quot;POWER : &quot;,Dec volt1 , &quot;
```

```
WATT&amp;quot; DelayMS 3000
HSerOut
[&amp;quot;AT+CMGS=&amp;quot;,34,&amp;quot;+917744025449&amp;quot;,34,
13] DelayMS 3000
HSerOut [&amp;quot;POWER IS: &amp;quot;,Dec
volt1,&amp;quot;WATT&amp;quot;,13,10] DelayMS 300
HSerOut[&amp;quot; &amp;quot;,26]
DelayMS 5000
GoTo MAIN
```

6.3 Flowchart

Fig. 6.2 Flowchart

6.4 PCB LAYOUT

Fig.6.4.1 Main unit PCB Layout

Fig.6.4.2Relay Driver PCB Layout

Fig.6.4.3 I to V Circuit PCB Layout

Fig.6.4.4 Power supply PCB Layout

Fig.6.4.5 Inverter PCB Layout

Hardware Kit:

CHAPTER SEVEN

DISCUSSION AND CONCLUSION

7.1 Discussion

The objective of the project was to design a system which reduces use of conventional energy sources. This was achieved through using solar energy that can be fulfilled by using solar power grid. and This were achieved with the help of solar modules, solar inverter, generator box and MPPT and with the help of this we were able to achieve the objective.

And in this we will be designing a solar power grid and output will be matched through MATLAB simulation.

7.2 Conclusion

Solar energy is a resource that is not only sustainable for energy consumption , it is indefinitely renewable.

Solar panel also require little maintenance; after installation and optimization they are very reliable due to the fact that they actively create electricity in just few millimeter.

The option of Solar PV “Grid Connected” system looks quite lucrative for places with fairly regular and continuous supply of electricity. A majority of such places in the country are cities with higher tariffs and reliable electricity supply. It can be a great method to not only reduces electricity bills, but also the generated power can be routed to places which have a shortage of electricity.

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"AUTOMATIC STREET LIGHT USING LDR"

A Project Stage-I submitted to the

Savitribai Phule Pune University

In partial fulfillment of the requirement for

Final Year Electrical Engineering

By:

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2020-2021

Dr.VITHALRAO VIKHE PATIL COLLEGE

OF ENGINEERING, AHMEDNAGAR

CERTIFICATE

A Report (Project Stage- II)

On

"AUTOMATIC STREET LIGHT USING LDR"

Submitted by:

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Have satisfactorily co mpleted t he bonafied work under my guidance and supervision in partial fulfillment of curriculum at Final year Electrical Engineering of Savitribai Phule Pune University, Pune.

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Examiner's Name &Sign

DEPARTMENT OF ELECTRICAL ENGINEERING
2020-2021

Acknowledgement

We express our sincere thanks to our guide Prof. K D VIDHATE, for her constant encouragement and support throughout our B.E project, especially for the useful suggestion given during the course of the project period and having laid down the foundation for the success of this work.

We would like to thank our project coordinator for his assistance, genuine support and guidance from early stages of the project.

We would like to thank Dr. A. R. LAWRE, Head of Electrical Engineering Department for his unwavering support during the entire course of this project work.

We are very grateful to our principal Dr. UDAY P NAIK for providing us with a positive environment.

We also thank to our staff members of our college and technicians for their help in making this project a success. Finally, we take this opportunity to extend our deep appreciation to ourfamily and friends, for all they meet to us during the crucial times of the completion of our project.

ABSTRACT

Automatic Street Light Control System is a simple yet powerful concept, which uses transistor as a switch. By using this system manual works are 100% removed. It automatically switches ONlights when the sunlight goes below the visible region of our eyes. This is done by a sensor called Light Dependant Resistor (LDR) which senses the light actually like our eyes. It automatically switches OFF lights whenever the sunlight comes, visible to our eyes.

By using this system energy consumption is also reduced because nowadays the manually operated street lights are not switched off even the sunlight comes and also switched on earlier before sunset. In this project, no need of manual operation like ON time and OFF time setting.

This project clearly demonstrates the working of transistor in saturation region and cut-off region. The working of relay is also known.

1. INTRODUCTION-

Street light controllers are smarter versions of the mechanical or electronic timers previouslyused for street light ON-OFF operation. They come with energy conservation options like twilight saving, staggering or dimming. Also many street light controllers come with an astronomical clock for a particular location or a Global Positioning System (GPS) connection to give the best ON-OFF time and energy saving.

Automatic Street Light Control System is a simple and powerful concept, which uses transistor as a switch to switch ON and OFF the street light automatically. By using this system manual works are removed. It automatically switches ON lights when the sunlight goes below the visible region of our eyes. It automatically switches OFF lights under illumination by sunlight. This is done by a sensor called Light Dependant Resistor (LDR) which senses the light actually like our eyes

By using this system energy consumption is also reduced because now-a-days the manually operated street lights are not switched off properly even the sunlight comes and also not

switched on earlier before sunset. In sunny and rainy days, ON time and OFF time differ significantly which is one of the major disadvantage of using timer circuits or manual .

This project exploits the working of a transistor in saturation region and cut-off region to switch ON and switch OFF the lights at appropriate time with the help of an electromagnetically operated switch.

A **street light**, **lamppost**, **street lamp**, **light standard**, or **lamp standard** is a raised source of light on the edge of a road or walkway, which is turned on or lit at a certain time every night. Modern lamps may also have light-sensitive photocells to turn them on at dusk, off at dawn, or activate automatically in dark weather. In older lighting this function would have been performed with the aid of a solar dial. It is not uncommon for street lights to be on poles which have wires strung between them, or mounted on utility poles.

This project exploits the working of a transistor in saturation region and cut-off region to switch ON and switch OFF the lights at appropriate time with the help of an electromagnetically operated switch

Automatic Streetlight needs no manual operation of switching ON and OFF. The system itself detects whether there is need for light or not. When darkness rises to a certain value

2. BASIC PRINCIPLE-

The automatic streetlight control system operates on 12 V DC supply. The automatic streetlight controller has a photoconductive device whose resistance changes proportional to the extent of illumination, which switches ON or OFF the LED with the use of transistor as a switch.

Light dependent resistor, a photoconductive device has been used as the transducer to convert light energy into electrical energy.

The central dogma of the circuit is that the change in voltage drop across the light dependent resistor on illumination or darkness switches the transistor between cut-off region or saturation region and switches OFF or ON the LEDAs we know property of LDR that during the time of day resistance is low therefore voltage at the inverting input (IE pin 2) is higher than the voltage at the non-inverting input (pin3) hence the output at the pin6 is low so the transistor goes into the cut off state which means LED or bulb will not glow.

3. CIRCUIT DIAGRAM –

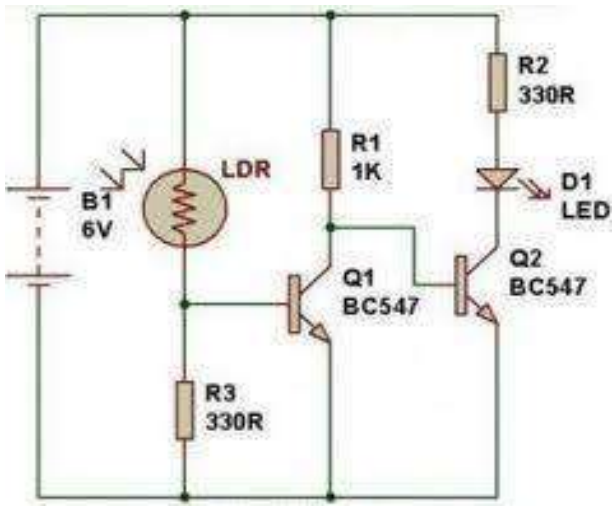

Figure – Circuit diagram of automatic street light controller.

4. LIST OF COMPONENTS-

S.NO.	PARTS	RANGE	QUANTITY
1.	LDR		1
2.	TRANSISTOR	BC -547 NPN	2
3.	RESISTOR	1K, 330 ohm	3
4.	LED		1
5.	PCB		1
6.	POWER SUPPLY	6V OR 9V	1

5. SPECIFICATION OF COMPONENTS-

1. LDR (LIGHT DEPENDENT RESISTER)

LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as 1000 000 ohms, but when they are illuminated with light resistance drops dramatically.

When the light level is low the resistance of the LDR is high. This prevents current from flowing to the base of the transistors. Consequently the LED does not light.

2. TRANSISTORS

BC547 is an NPN bi-pola junction transistor. A transistor, stands for transfer or resistance commonly used to amplify current. A small current at its base controls a larger current at collector & emitter terminals. **BC547** is mainly used for amplification and switching purposes. It has a maximum current gain of 800. Its equivalent transist

The transistor terminals require a fixed DC voltage to operate in the desired region of its characteristic curves. This is known as the biasing. For amplification applications, the transistor is biased such that it is partly on for all input conditions. The input signal at base is amplified and taken at the emitter. BC547 is used in common emitter configuration for amplifiers. The voltage divider is the commonly used biasing mode. For switching applications, transistor is biased so that it remains fully on if there is a signal at its base. In the absence of base signal, it gets completely off.

3. RESISTORS-

Resistor is an electrical component that reduces the electric current. The resistor's ability to reduce the current is called resistance and is measured in units of ohms (symbol: Ω).If we make an analogy to water flow through pipes, the resistor is a thin pipe that reduces the water flow.

4. LED (LIGHT EMITTING DIODE)

A **light-emitting diode** (**LED**) is a two-lead semiconductor light source that resembles a basic pn-junction diode, except that an LED also emits light. When an LED's anode lead has a voltage that is more positive than its cathode lead by at least the LED's forward voltage drop, current flows. Electrons are able to recombine with holes within the device, releasing energy in the form of photons. This effect is called electroluminescence, and the colour of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor.

5. PCB (PRINTED CIRCUIT BOARD)-

A printed circuit board (PCB) mechanically supports and electrically connects electronic components using conductive tracks, pads and other features etched from copper sheets laminated onto a non-conductive substrate. PCBs can be single sided (one copper layer), *double sided* (two copper layers) or *multi-layer*. Conductors on different layers are connected with plated-through holes called bias. Advanced PCBs may contain components - capacitors, resistors or active devices - embedded in the substrate.

5.6. POWER SUPPLY-

A **power supply** is a device that supplies electric power to an electrical load. The term is most commonly applied to electric power converters that convert one form of electrical energy to another, though it may also refer to devices that convert another form of energy (mechanical, chemical, solar) to electrical energy. A regulated power supply is one that controls the output voltage or current to a specific value; the controlled value is held nearly

5. WORKING

Circuit of a compact and true solid-state automatic lawn light is described here. The circuit can be used to switch on incandescent garden light bulbs at desk and switch off them at dawn. A 10 mm encapsulated light dependent resistor (LDR) here works as the twilight detector.

The whole circuit can be housed in a very small plastic cabinet. For powering the circuit AC household supply is needed. With a little skill and patience, you can easily modify this circuit to drive a number of white LED strings, instead of the incandescent bulb load at the output.

When ambient light is normal, transistor T1 is reverse biased by the low resistance of LDR. Multi-turn plastic trimpotP1 sets the detection sensitivity. If ambient light dims, transistor T1 turns on to drive the triac T2. Now the lamp load at the output of T2 energises. When the ambient light level restores, circuit returns to its idle state and light(s) switched off by the circuit.

Working voltage for the circuit is derived directly from the AC supply input through components R_1, R_2 and R_3. This obviates the requirement of a bulky.

If you wish to operate the, light bulb(s) on a little reduced power, just replace the triac T2 with a suitable silicon controlled rectifier (SCR). This may give a long life to the incandescent load. Finally, the LDR should not be mounted to receive direct sunlight. It may be mounted at the top of the enclosure, pointing to the sky say southwards.

LDR offers Very high Resistance in darkness. In this case the voltage drop across the LDR is more than 0.7V.This voltage is more sufficient to drive the transistor into saturation region. In saturation region, IC (Collector current) is very high. Because of this IC. The relay gets energized, and switches on the lamp.

LDR offers Very low Resistance in brightness. In this case the voltage drop across the LDR is less than 0.7V.

This voltage is not sufficient to drive the transistor into saturation region. Hence, the transistor will be in cut-off region. In cut-off region, IC (Collector current) is zero. Because of this IC, The relay will not be energized, and the lamp will be in ON state only. Diode is connected across the relay to neutralize the reverse EMF generated.

6. PROCEDURE-

1. Insert first transistor Q1-BC547 (NPN) on PCB board shown in the circuit diagram
2. Connect another transistor Q2-BC547 (NPN) on PCBboard shown in the circuit diagram.
3. Connect wires across emitter pin of both transistor and negative terminal of battery on the PCB board.
4. Connect a wire across collector pin of transistor Q1 and base pin of transistor Q2.
5. Connect a resistor 1k across positive terminal of battery on the PCB board and collector pin transistor Q1.
6. Connect LDR (Light Dependent Resistor) across positive terminal of the battery and base terminal of transistor Q1
7. Insert a transistor 330 ohm across base pin of transistor Q1 and negative terminal of battery.

8. Connect a resistor 330 ohm across positive terminal of battery and anode terminal of LED connect the cathode terminal of LED to collector pin of transistor Q2.

7. ADVANTAGES & DISADVANTAGES-

By using this automatic system for street light controlling ,we can reduce energy consumption because the manually operated street lights are not switch off properly even the sun light comes and

Also not switched on earlier before sunset

- Low cost
- Automated operation
- Low power consumption
- Very flexible
- Easy to manufactured

In sunny and rainy days, on and off time differ notice which is one of the major disadvantages of using timer circuit or manual operation for switching the street light system.

8. APPLICATION

1. Used in street light applications.
2. Used in Domestic applications.

9. CONCLUSION-

The Streetlight controller using ldr based Light intensity & traffic density, in the todays up growing countries will be more effective in case of cost, manpower and security as compare with today's running complicated and complex light controlling systems. Automatic Street Light Controlling System puts up a very user friendly approach and could increase the power

This paper elaborates the design and construction of automatic street control system circuit. Circuit works properly to turn street lamp ON/OFF. After designing the circuit which controls the light of the street as illustrated in the previous sections. LDR sensor and the photoelectric sensors are the two main conditions in working the circuit. If the two conditions have been satisfied the circuit will do the desired work according to specific program. Each sensor controls the turning ON or OFFthe lighting column. The street lights has been successfully controlled by microcontroller. With commands from the controller the lights will be ON in the places of the movement when it's dark. furthermore the drawback of the street light system using timer controller has been overcome, where the system depends on photoelectric sensor. Finally this control circuit can be used in a long roadways between th

10. FUTURE SCOPE-

We can save the energy for the future use and we can control the losses of the power . We can implemnted this project for the home lamp or night lamp of the room. This is also used for the signals.