iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** IV **Month of publication:** April 2018

DOI: http://doi.org/10.22214/ijraset.2018.4373

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue IV, April 2018- Available at www.ijraset.com

Automated Polyhouse for Optimum Growth of Plants

S. Likhita[1], Nilesh Kumar Prasad[2], Ashirwad Mahajan[3], Mosam Kumar[4], Vinita Meshram[5], Neetesh Kumar Kushwaha[6]
[1, 2, 3, 4, 5]*Student,Department of Electrical and Electronics Engineering, RSR Rungta College of Engineering and Technology, Bhilai (India)*
[6]*Assistant Professor, Department of Electrical and Electronics Engineering, RSR Rungta College of Engineering and Technology, Bhilai (India)*

Abstract: ***India is a vast area and it has vast agricultural methods. But then also at present India does not have advanced and good agricultural management and current methods are not sufficient to provide everything to the population which is problematic. This can be proved as a major issue and sooner or later we have to find out a solution. The solution is to practice a protective farming which is mostly polyhouse farming. It is similar to the greenhouse farming simply covered with polythene sheet is known as polyhouse. The main objective presented in this paper is controlling and monitoring of environmental parameters and continuously maintaining the favorable atmosphere for a crop. It is expandable to the internet based technology or GSM(Global System for Mobile) communications. The concept of polyhouse includes data acquisition of thermal parameters through sensor networks and incudes data storage, post processing and transmission of data to users mobile. Further controlling is done in accordance with the received parameters for example toggle on/off, control of pumps and other accessories, ventilators, air flow rate, sunlight management etc***
Keywords: MicrocontrollerATMEGA328, pH Sensors, LCD, SD card reader.

I. INTRODUCTION

Agriculture contributes 17% of the total GDP and also provides employment to many people. Several problems are faced by Indian farmers like small land holdings they only own 3% of the total land in India for farming, poor yields due to insufficient and poor farming methods, outdated technologies, unstable rain falls because Indian agriculture is too much inclined towards natural phenomena and lack of knowledge of modern methods of agriculture. In ordinary cultivation the crops are being cultivated in open fields under natural conditions. In open atmosphere there occurs sudden changes in the climate i.e., temperature, humidity, light intensity and other conditions, and crop gets affected by these sudden climatic changes due to which quality and yield of a particular crop can be decreased. Because of these it is important to practice protected farming which includes polyhouse farming. Polyhouse farming is covered with polythene sheet and maintains required conditions for the optimal growth of plants. This helps the farmer to grow crops without facing any external obstruction. Polyhouse mainly includes the monitoring of the parameters like temperature, humidity and light intensity of soil. This monitoring further includes controlling. This completes polyhouse automation system will refer to a network of sensors and controllers/actuators which in turn will detect the environmental changes of the polyhouse and take necessary action against predefined set of normal values.

II. LITERATURE REVIEW

The method of polyhouse using PLC and SCADA technology takes the conditioned input from the sensors and process according to the program and then actuates the output devices. Although it provides pest control like traditional methods of farming but then also complete automation in terms of pest and insect detection and eradication cannot be achieved, and it also requires uninterrupted power supply and requires more heatings in winter times which increases power consumption.[1]

Monitoring environmental parameter inside a polyhouse farm and ensuring proper and continuous maintainance of favourable crop using internet technology is not so suitable for farmers. The unaware farmers cannot implement this process in a proper way, it requires training of the farmers before using this internet based technology. And on other side of this on implementing internet based technology the cost of the process increases in a rapid w ay which is a major concern it cannot be used by small farmers.[2]

Polyhouse prevents the plants from the effects of climate, insects and etc, which makes the agricultural production easier using PLC technology for monitoring and insects cannot be attained efficiently, and using Zigbee technology with PLC will increase the more rapid way. Although Zigbee technology limits the use of wire connection system, but because it is based on the size of the land and

increases its cost with increasing the area of land which is a major concern and it can be used for small land productions can it becomes costly for large area of land productions.[3]

The monitoring of data is done using sensor nodes and logged using packet sniffer. These sniffers used in project needs additional hardware requirements and it also increases its software implementation due to whichit increases the cost more. The author established tree topology and packet data analysis was presented.[4]

Measurement of soil moisture at various spatial and temporal scales is studied for waater and carbon cycles, and at global scales satellite missions have been planned to measure the soil moisture. The signals are routinely recorded with global positioning system(GPS) receivers installed and geophysical studies can be used to provide global network of soil moisture sensor.

Zigbee technology is also used for building electrical safety. This technology can be constructed with protection mechanism in order to enhance the functions of traditional distribution system. This system can dynamically limit the overload effects and avoid the effect of other equipments at the same time.[5]

III. METHODOLOGY

Polyhouse system if agriculture is a type of system that helps the crops from sudden change in weather and also helps in regulating the weather inside the polyhouse according to the crop requirement . Like previously farmers have to face the external weather challenges this polyhouse system helps them to safeguard there crops from external natural destruction.

Thus monitoring of the basic parameters and then controlling them according to the requirement forms the core element of the polyhouse system.

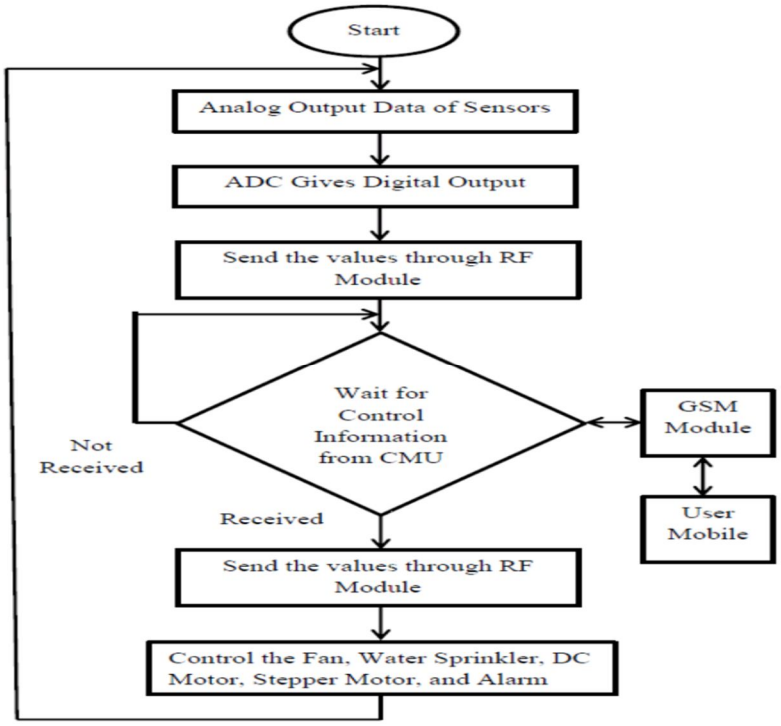
A polyhouse is rectangular framed structure and covered with UV stabilized low density polythene or with other polythene cover in which the crops can obtain required weather condition, so under polyhouse system the crops are grown under fully or partially maintained weather conditions. This maintaince reduces the requirement of a particular person to work on fields or checking the field conditions frequently, and covered structure of the polyhouse also makes the onfield work of farmers easy.

The main and important characteristics of polyhouse is that it reduces the dependency of the crop on rainfall because it makes the best use of land and water resources. Polyhouse enables the cultivation of unseasonal crops. The main polyhouse structure, used for testing is generally designed in the form of rectangular tunnel. The general and standard dimensions used are 60cm*50cm*80cm, which is of the area 3000 sq.cm. The system generally measures four parameters inside the polyhouse – temperature, humidity, light, intensity and soil moisture. Separate sensors are used in order to sense the parameters at the particular instant. The PLC connected to these sensors takes the conditioned input through these sensors, and then processing is done according to the program and it actuates the devices connected at the output – fans, heaters, exhaust fans, bulbs, and pumps. Not only real time monitoring of the measured these four parameters is done on the display which is also connected to the SD card which stores the time records of the field conditions.

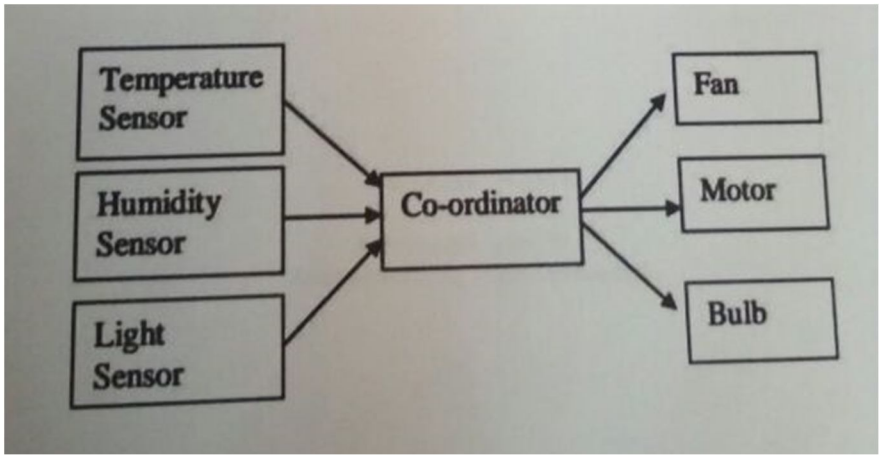
IV. HARDWARE COMPONENTS REQUIRED

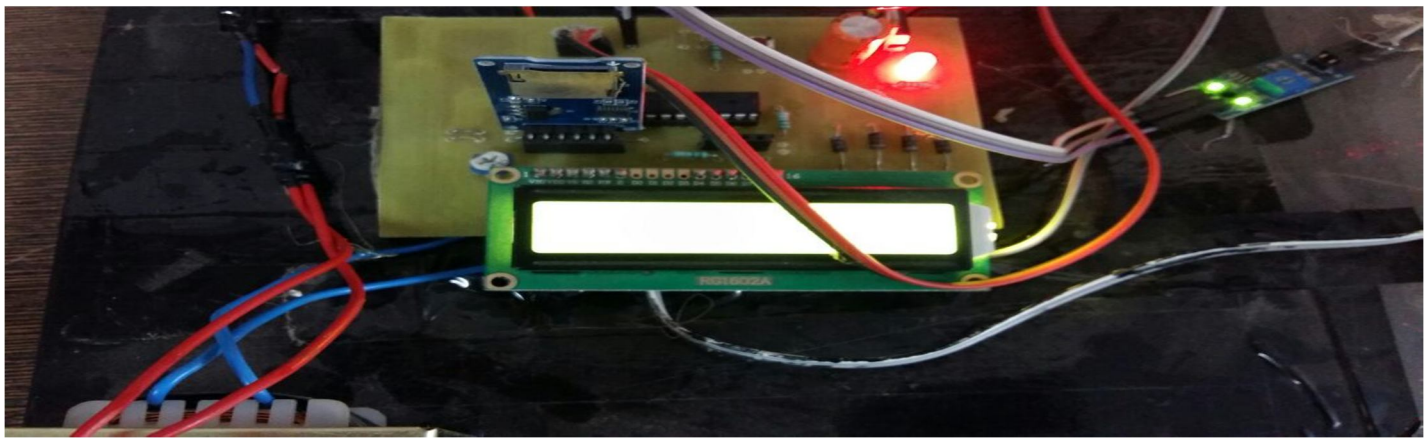
A. Diode – IN4007 which is used to convert AC supply to DC
B. Bridge Rectifier.
C. Controller – Atmega 328.
D. Crystal Oscillator – 16Mhz
E. Coupling Capacitor – 22pf
F. Push button.
G. Potentiometer
H. SD card – 6pin module
I. Voltage Regulator - +5vDC
J. Capacitor – 1000mf
K. Relay
L. ULN2003
M. Batteries and pump
N. PHP Sensors –
O. Humidity & Temperature Sensors
P. Soil Sensors
Q. pH Level Senors
R. Light Sensors

V. FLOWCHART OF POLYHOUSE SYSTEM



VI. POLYHOUSE SYSTEM WORKING





VII. REAL TIME ANALYSIS OF POLYHOUSE SYSTEM

	A	B	C	D	E
1					
2	Soil	Light	Ph	Temp	Humidity
3	Wet soil	485	ALKALINE	54	29
4	Wet soil	495	ALKALINE	54	29
5	Wet soil	511	ALKALINE	53	29
6	Wet soil	506	ALKALINE	53	29
7	Wet soil	500	ALKALINE	53	29
8	Wet soil	509	ALKALINE	53	29
9	Dry soil	511	ALKALINE	53	29
10	Dry soil	511	ALKALINE	52	29
11	Dry soil	493	ALKALINE	52	29
12	Dry soil	513	ALKALINE	52	29
13	Wet soil	508	ALKALINE	52	29
14	Wet soil	492	ALKALINE	52	29
15	Wet soil	492	ALKALINE	52	29
16	Dry soil	500	ALKALINE	52	29
17	Dry soil	514	ALKALINE	52	29
18	Dry soil	501	ALKALINE	52	29
19	Dry soil	498	ALKALINE	52	29
20	Dry soil	478	ALKALINE	53	29
21	Dry soil	514	ALKALINE	53	29
22	Dry soil	501	ALKALINE	53	29
23	Dry soil	779	ALKALINE	53	29
24	Dry soil	844	ALKALINE	53	29
25	Dry soil	922	ALKALINE	53	29
26	Dry soil	502	ALKALINE	53	29

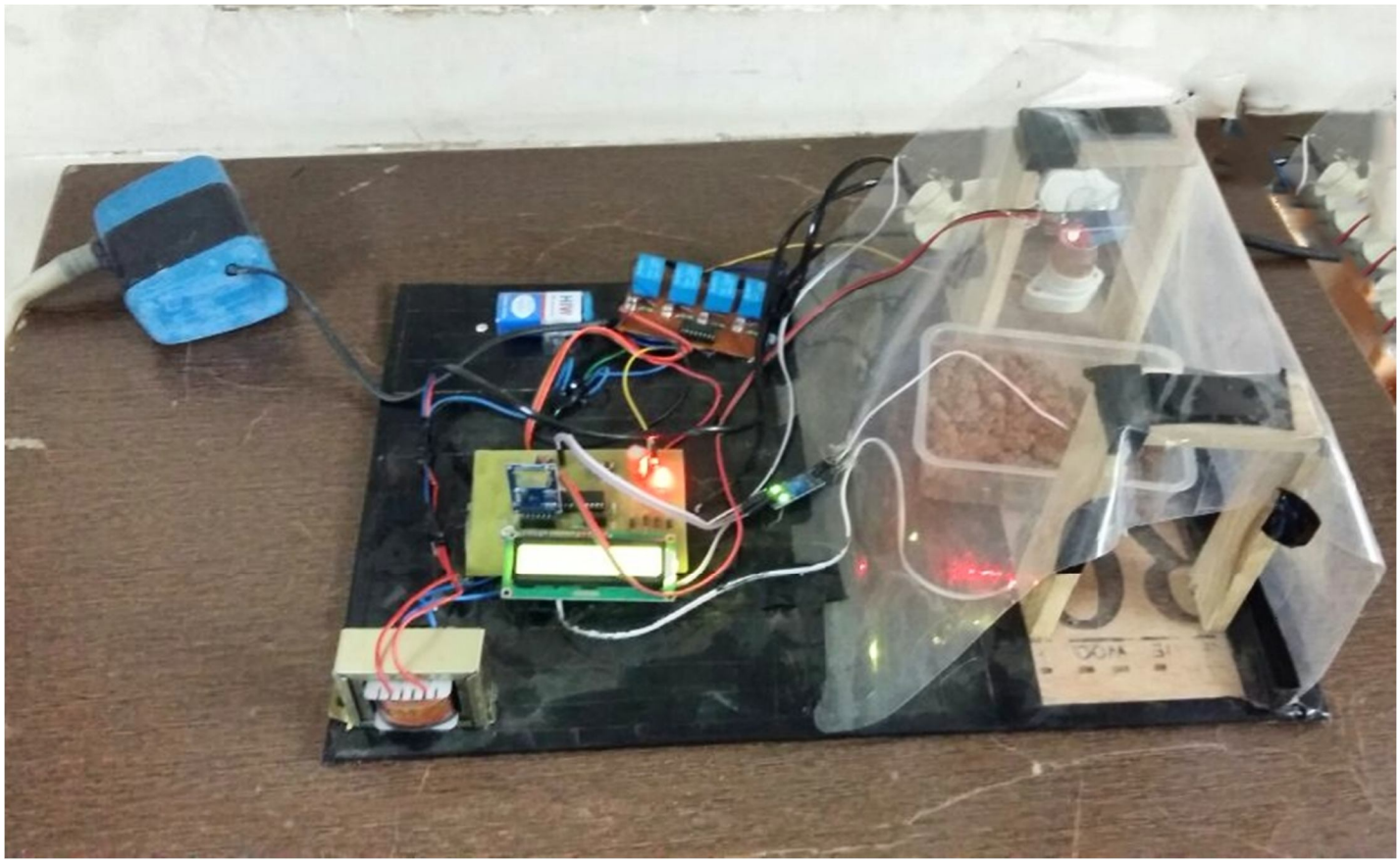


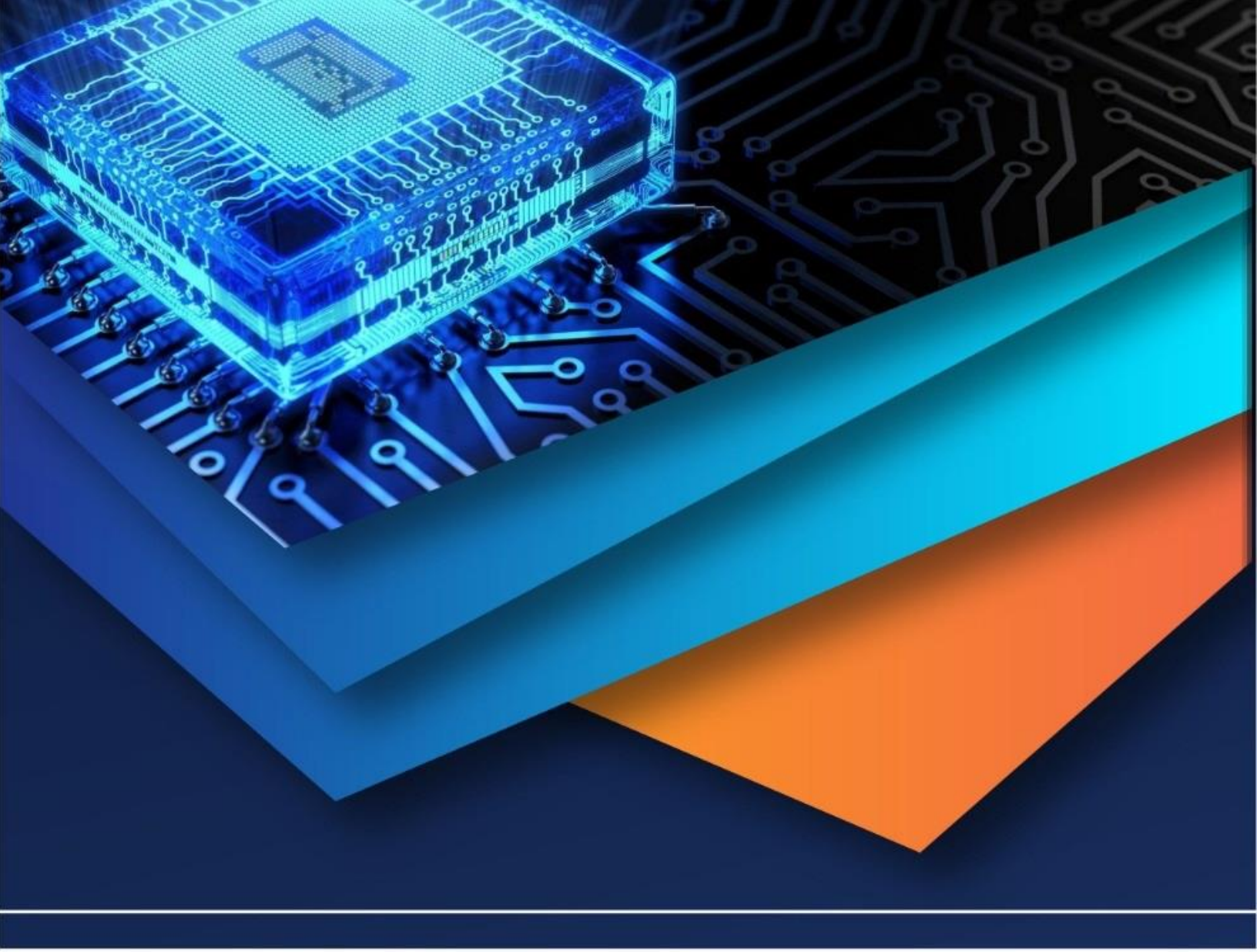
Fig. System in working condition

VIII. CONCLUSION

Polyhouse is a system that makes the complete prevention of plants from getting effected from climate which proves to be a great source for agricultural production. Therefore the system so developed have the full ability of monitoring and controlling the main parameters of the agricultural field i.e. temperature, light intensity, humidity and soil moisture within the required limits. That enable the farmers to easily gain the production and its result. Correct placement of sensors have to be done to get maximum climatic control and most success in any particular crop production. This system is a indoor crop production therefore it can be used to grow crops in extreme weather conditions also, since the indoor weather conditions are automatically controlled the only shortcomings of the system that has to be over commed is maintaining the balance between the cost of investment and its returns. And this project have a huge scope further, research and development work can be done successfully on this project further. Polyhouse farming technique in an emerging technique for todays era and it's a need to create awareness about its benefits and can be helped in making our country self sufficient.

REFERENCES

[1] Tanvir Manhotra., Nikhil Gaikwad., Rohit Dudi., Rohit Gupta., "Automated Polyhouse for Optimal Growth of Plants" International Journal of Emerging Technology and Advanced Engineering, Vol.4 (5), 2014, ISSN: 2250-2459.
[2] Kiran E Borade., C.S. Patil and R.R. Karhe., "Polyhouse Automation System" International Journal of Advanced Research in Computer Science and Software Engineering, Vol.3(8), 2013, ISSN:2277128X.
[3] Yofesh R. Sonawane, Sameer Khandekar and Bipin Kumar Mishra., "Environment Monitoring and Control of a Polyhouse Farm through Internet", Research Paper
[4] Mittal S, "IS: 10500:2012", Strengthening Indian Agriculture –Need for Reforms, ICRIER, 3-20.
[5] Straten G.V., Willigenburg G.V., Henten A.V.,Ooteghem R.V.., "Optimal Control of Greenhouse Cultivation", CRC press, 49-82
[6] WWW.SLIDESHARE.NET
[7] Anujkumar., "Prototype Polyhouse Environment Monitoring System" Proceedings of International Multiconference of Engineers and Computer Scientists, Vol.2, 2010, Page 1-5.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY