IOT USING SMART GARDEN WITH WEATHER MONITORING SYSTEM

Deepa Gowda N[1], Nadiveedi Sri Priya[2], Mamta Kumari.D[3], Priyanka Kumari[4], Sathvika GB[5]

[1]*Assistant Professor, Department of ECE, S.E.A. College of Engineering & Technology, Bangalore*
[2,3,4,5]*Students, Department of ECE, S.E.A. College of Engineering & Technology, Bangalore*

ABSTRACT

Internet of Things (IoT) consists of devices that connect to the internet and communicate with each other. It enables these devices to collect and exchange data with a consumer. This paper presents an IoT-based Smart Garden with Weather Station system, which can be used to monitor the growth of plant every day and predict the probability for raining. The Automated Gardening System can be used to monitor garden as well as automate the irrigation process with minimum usage of water, It is an Internet Of Things (IOT)based system which allows gardening by using sensors to determine soil moisture, soil pH level and light intensity. These data gives a clear-cut methodology for a controlled environment. 'The water moisture sensor which shows the moisture level. The pH level indicates the solubility of essential nutrients and the light intensity sensor tells us whether the plants are getting enough sunlight or not. The system sends data over the internet using a Wi-Fi module through which the user can monitor and decide the plant requirements.

Keyword *IoT, Smart Garden, Weather Station System, pH level.*

1. INTRODUCTION

In India Agriculture' has its own history. If we check the statistics of world's country we can say that India ranks second in farm output. 13.7% of the GDP (Gross Domestic Product) was accounted for agriculture and allied sectors in 2013; about 50% of the workforce depends on farming. The contribution of agriculture to India's GDP is steadily decreasing with the countries less attention over farmers. Still agriculture is the broadest sector and plays a significant role in the overall social fabric of India. Today automobile industries, mills and factories are expanding their areas in India. One side these are beneficial for us as it provides job and products and at the other side these are polluting our environment.

And have become a serious challenge for global warming. Global warming is affecting our climate and we face uncertain change in our environment which damages our agricultural crop. As told in above passage, In India about 50% of people depends on agriculture. And global warming is one of the major problems for them big drought in Vidarbha area of Maharashtra. The announced by government after one year was gone. Some of the farmers were suffered too much by this drought even some did suicide.

Some of the crops of specific season are not able to get required climatic conditions due to uncertain change in our environment due to greenhouse effect. Some of the Industries are polluting rivers by ejecting harmful chemicals in it. Some horticultural plants don't grow due to insufficient watering and some due to insufficient temperature and etc.

Green house is one and only solution against uncertain climate change or global warming. Green house helps our farmers to create an artificial environment for maintaining required temperature, humidity and light. Today Green house systems are available in market as user desires it to work like. But the problem is user has to observe it continuously to check whether it is working properly or not. There is no effective monitoring of green house systems to monitor the green house climate conditions at unbounded distance.

Green house systems need proper care. For example, we have to fill water manually or make water pump on at ourselves. Means systems are less automatic. They cannot be monitored from Rajkot at Ahmedabad. Or the installation of green house systems available in market is quite complex means customer cannot operate it as he wants. Here we are designing a green house system fully automatic and monitoring of it can be done from anywhere

in the world having net access. In our system we have used three main sensors needed to check climatic changes in our environment. The sensors we have used are light sensor, humidity sensor and temperature sensor. A microcontroller is used to operate on these sensors and to provide required light, water and heat when the environment has some change. Internet of things is interfaced through a computer system. Internet of things make monitoring of system accessible everywhere having net access on any device.

Aim and objectives of the project

Automatic monitoring and controlling of the climatic parameters will directly or indirectly govern the plant growth and hence their production. Green houses are used where climatic conditions are not as expected. At those places Green houses are used as an artificial environment to create required environmental conditions. Main aim of this project is to help farmers even in opposite environmental conditions like in overheat and less humidity conditions. Here controlling part will be handled by our microcontroller and monitoring part will be handled by the computer and the data will be sentto cloud through website created. So user will not need to go to their sight and observe the conditions. Through web interface our user will have comfort to monitor their system from their home or any place. No need to have specific application or Bluetooth devices to monitor the conditions.

Problem Specifications

Prior green house systems were not using microcontroller. Means the systems were not automatic. User checks the conditions and takes proper action. After sometime the green house systems were made automatic means system will work for the user and takes proper action to maintain climatic conditions. But monitoring was done by live presence of user. After some time monitoring was made easy and user was able to monitor the green house from his home. Here the distance from the system was limited.

2. LITERATURE SURVEY

Smart cities concepts and challenges bases for the assessment of smart city project Authors – A.Monzon Published in – 20 may 2015 internet of Things (IOT) has been widely researched over the past decade. Recently, many research results of IOT related to emergency system, smart building and medical system, etc. The key for IOT applications are the ability to interact with physical world through computation, communication, and machine control. However, each sensor device in IoT cannot conveniently communicate with other terminal devices through internet protocol. So, it is necessary to establish protocol translation stack or equipment between two WSN groups. That is very inefficient and high overhead cost of network construction. The development of micro-IP (uIP) solves this problem. The uIP reduce cost of protocol translation and it also realizes the machine to machine (M2M) concept in wireless sensor network.

Internet of things for smart cities Authors - A. Zanella, N.Bui, A. Castellani, L. Vangelista, and M. Zorzi Published in – 14 Feb 2014ASCIMER (Assessing Smart Cities in the Mediterranean Region) is a project developed by the Universidad Politecnica of Madrid (UPM) for the EIBURS call on ―Smart City Development: Applying European and International Experience to the Mediterranean Region‖. Nowadays, many initiatives aimed at analysing the conception process, deployment methods or outcomes of the -referred as- Smart City projects are being developed in multiple fields. Since its conception, the Smart City notion has evolved from the execution of specific projects to the implementation of global strategies to tackle wider city challenges. ASCIMER´s project takes as a departure point that any kind of Smart City assessment should give response to the real challenges that cities of the 21st century are facing. It provides a comprehensive overview of the available possibilities and relates them to the specific city challenges. A selection of Smart City initiatives will be presented in order to establish relations between the identified city challenges and real Smart Projects designed to solve them. As a result of the project, a Projects Guide has been developed as a tool for the implementation of Smart City projects that efficiently respond to complex and diverse urban challenges without compromising their sustainable development and while improving the quality of life of their cities.

Internet of things (IOT): A vision, architectural elements, and future directions. Authors – J.Gubbi and Buyya, Published in - 01 july 2012 Ubiquitous sensing enabled by Wireless Sensor Network (WSN) technologies cuts across many areas of modern day living. This offers the ability to measure, infer and understand environmental indicators, from delicate ecologies and natural resources to urban environments. The proliferation of these devices in a communicating–actuating network creates the Internet of Things (IoT), wherein sensors and actuators blend

seamlessly with the environment around us, and the information is shared across platforms in order to develop a common operating picture (COP). Fueled by the recent adaptation of a variety of enabling wireless technologies such as RFID tags and embedded sensor and actuator nodes, the IoT has stepped out of its infancy and is the next revolutionary technology in transforming the Internet into a fully integrated Future Internet. As we move from www (static pages web) to web2 (social networking web) to web3 (ubiquitous computing web), the need for data-on-demand using sophisticated intuitive queries increases significantly. This paper presents a Cloud centric vision for worldwide implementation of Internet of Things. The key enabling technologies and application domains that are likely to drive IoT research in the near future are discussed. A Cloud implementation using Aneka, which is based on interaction of private and public Clouds is presented. We conclude our IoT vision by expanding on the need for convergence of WSN, the Internet and distributed computing directed at technological research community.

3.DESIGN: ANALYSIS, DESIGN METHODOLOGY

- It can be used to monitor the growth of plants every day and predict probability for raining.
- This system maintains all the necessity of plants like atmospheric pressure, temperature, humidity, moisture, light intensity.
- We propose a novel framework, named "An IoT-based Smart garden with weather Station System".
- For this purpose we are using different sensory according to it. Barometric Pressure, DHT11 Temperature, and Humidity Sensor, Soil Moisture Sensor and Light intensity module sensor.

4. PROPOSED SYSTEM

Product Development Canvas

Purpose of designing this system is to automate the controlling part and make the monitoring worldwide. This system will be helpful to farmers, individuals, food experts, industries and smart farms. AT89S52 microcontroller is central controlling processor. LDR, LM35 are sensors which will sense the light and temperature and through ADC outputs of sensors will be converted to digital form.

Fig 3.1 Business model canva

Communication

The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The '16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A Software Serial library allows for serial communication on any of the Uno's digital pins. The ATmega328 also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus; see the documentation for details. For SPI communication, use the SPI library.

Driver Circuit

The driver circuit is used to enhance the current handling capacity in the circuit. More over its acts as a driving circuit for the relays. The IC ULN 2004 is used, this IC consist of an array of emitter-follower circuits.

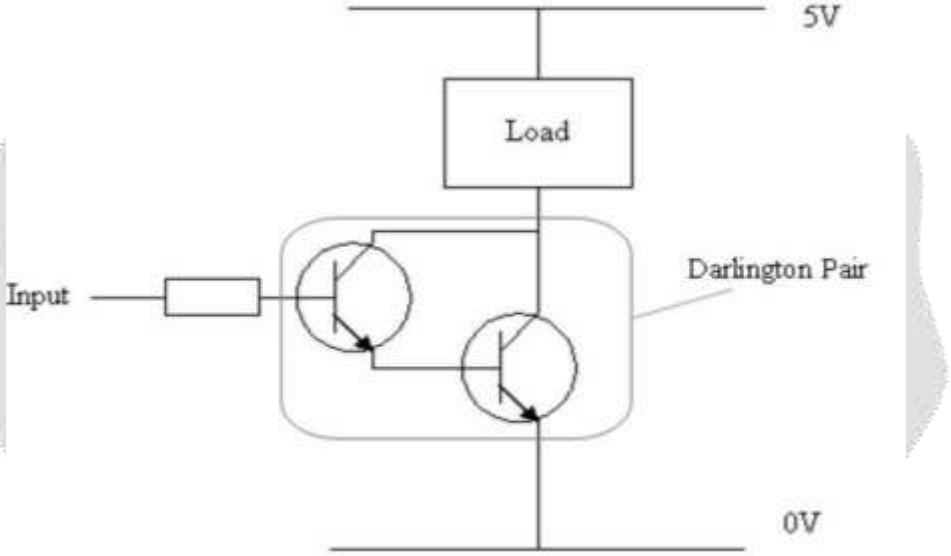

Fig 3.2 Basic Darlington Pair circuit

Buffer

The BUFFER IC used is IC 4050 which is a voltage amplifier; its a non-inverting buffer. A buffer doesn't change the logical state and it also provides an extra voltage drive. This 16-pinDIL packaged IC 4050 acts as Buffer as-well-as a Converter. The input signals may be of 2.5to 5V digital TTL compatible or DC analogue the IC gives constant output voltage. The IC acts as buffer and provides isolation to the main circuit from varying input signals.

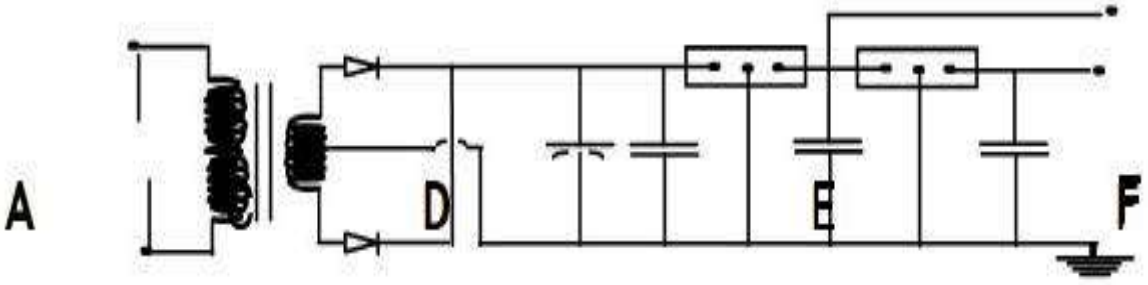

Fig 3.3 Circuit Diagram Of +5v & +12v Full Wave Regulated Power Supply

Here the IC is use to increase the voltage. It acts as a voltage amplifier. Typically a voltage buffer amplifier is used to transfer a voltage from a first circuit, having a low output impedance level, to a second circuit with a high input impedance level.[7]

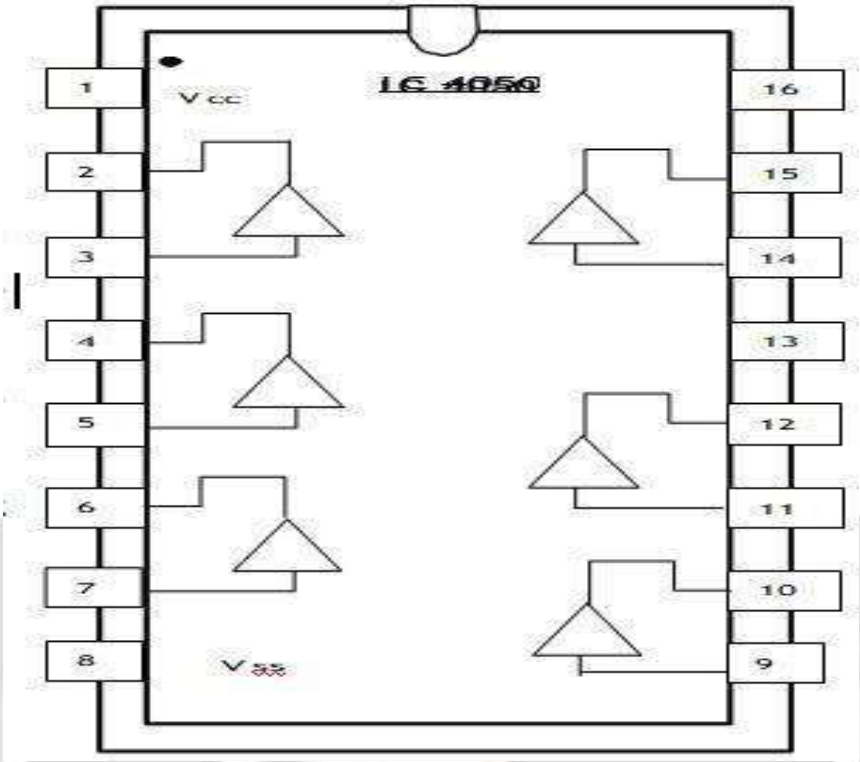

Fig 3.4 Buffer circuit

Light Dependent Resistor (LDR)

They are also called as photo conductors, photo conductive cells or simply photocells. They are made up of semiconductor materials having high resistance. There are many different symbols used to indicate a LDR, one of the most commonly used symbol is shown in the figure below. A light dependent resistor works on the principle of photo-conductivity. Photo conductivity is an optical phenomenon in which the materials conductivity is increased when light is absorbed by the material. When light falls i.e. when the photons fall on the device, the electrons in the valence band of the semiconductor material are excited to the conduction band. These photons in the incident light should have energy greater than the band gap of the semiconductor material to make the electrons jump from the valence band to the conduction band. Hence when light having enough energy strikes on the device, more and more electrons are excited to the conduction band which results in large number of charge carriers. The result of this process is more and more current starts flowing through the device when the circuit is closed and hence it is said that the resistance of the device has been decreased. This is the most common working principle of LDR.

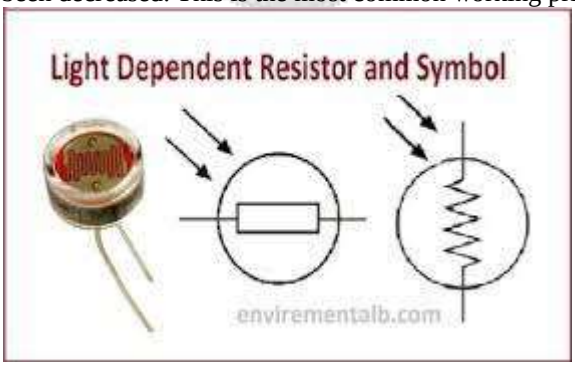

Fig 3.5 LDR

5.CONCLUSIONS AND FUTURE SCOPE

This paper describes the design of a greenhouse monitoring system based on Cloud IoT. Agriculture projects even in urban areas are on a rise in recent times, in unique forms.
Technological progress makes the agricultural sector grow high, which here is made by the Cloud IoT. The IoT will dramatically change the way we live our daily lives and what information is stored about us. This cloud computing is free to use anytime and anywhere as long as the computer is connected with the Internet. This monitoring system percepts different parameters inside the greenhouse using sensors, GSM, and cloud to provide the updates. The developed system can be proved profitable as it will optimize the resources in the greenhouse. The complete module is of low cost, low power operation hence, easily available to everyone. This project is a basic idea of the research regarding greenhouse but still there is a lot more to be explored technologically.

6.REFERENCES

[1]. J. Gubbi and R. Buyya, ―Internet of things (IOT): A vision, architectural elements, and future directions,‖ Future Generation Computer Systems 29, pp. 1645-1660, 2013.
[2] Dr. Ovidiu Vermesan SINTEF, Norway, Dr. Peter FriessEU, Belgium, "Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems", river publishers' series in communications, 2013.
[3] Dr. Ovidiu Vermesan SINTEF, Norway, Dr. Peter FriessEU, Belgium, "Internet of Things–From Research and Innovation to Market Deployment", river publishers' series in communications, 2014.
[4] O. Vermesan, P. Friess, P. Guillemin, S. Gusmeroli, et al0., "Internet of Things Strategic Research Agenda", Chapter 2 in Internet of Things -Global Technological and Societal Trends, River Publishers, 2011.
[5] IoT: https://dzone.com/articles/the-internet-of-thingsgateways-and-next-generation.
[6] [http://www.reloade.com/blog/2013/12/6characteristicswithin-internet-things-iot.php].
[7] Martín Serrano, Payam Barnaghi, Francois Carrez Philippe Cousin, Ovidiu Vermesan, Peter Friess, "Internet of Things Semantic Interoperability: Research Challenges, Best Practices, Recommendations and Next Steps", European research cluster on the internet of things, IERC,2015.
[8] Karen Rose, Scott Eldridge, Lyman Chapin, "The Internet of Things: An Overview Understanding the Issues and Challenges of a More Connected World", The Internet Society (ISOC), 2015.
[9] H. van der Veer, A.Wiles, "Achiveing Technical Interoperability —the ETSI Approach", ETSI White Paper No.3, 3rd edition, April 2008,
http://www.etsi.org/images/files/ETSI White Papers/IOP%20whitepaper%20Edition%203%20fi nal.pdf
[10] Martin Serrano, Insight Centre for Data Analytics, Ireland ,Omar Elloumi, Alcatel Lucent, France, Paul Murdock, Landis+Gyr, Switzerland, "ALLIANCE FOR INTERNET OF THINGS INNOVATION, Semantic Interoperability" , Release 2.0, AIOTI WG03 – loT Standardisation,2015.

PATENTS:

- US 2011/0035059 A1 by Bulut F Ersavas
- US20090223128A1 by Brian C Kuschak
- US4430828A by Oglevee James R, Oglevee Kirk A
- US20030083980A1 by Tsukasa Satake
- The 8051 Microcontroller by Kenneth J.Ayala

BIOGRAPHIES (Not Essential)

	**Mrs. Deepa Gowda N.** received her B.E. (Electronics and Communication Engineering) from Golden valley Institute of Technology, KGF, Karnataka, India in the year 2007 and completed her M.Tech.(Digital Communication and Networking) from S.E.A College of Engineering and Technology, Bangalore, Karnataka in the year 2014 and since then actively involved in teaching and research and has Eleven years of experience in teaching. At present she is working as Assistant Professor in S.E.A. College of Engineering & Technology, Bangalore affiliated to Visveswaraya Technological University. Her area of interest is Multimedia communication, Computer Networks, Embedded Systems. gowda.ndeepa@gmail.com, 9008643123
	**Ms. Nadiveedi Sri Priya** is pursuing her B.E.(Electronics and Communication Engineering) from S.E.A. College of Engineering &Technology, Bangalore affiliated to Visveswaraya Technological University, Belgaum, Karnataka, India. Her area of interest is signal processing, Electronics and Embedded systems.
	**Ms. Mamta Kumari.D** is pursuing her B.E.(Electronics and Communication Engineering) from S.E.A. College of Engineering &Technology, Bangalore affiliated to Visveswaraya Technological University, Belgaum, Karnataka, India. Her area of interest is VLSI design, Electronics and Communication Systems
	**Ms. Priyanka Kumari** is pursuing her B.E.(Electronics and Communication Engineering) from S.E.A. College of Engineering &Technology, Bangalore affiliated to Visveswaraya Technological University, Belgaum, Karnataka, India. Her area of interest is Digital signal processing, Digital Electronics and Embedded systems.
	**Ms. Sathvika GB** is pursuing her B.E.(Electronics and Communication Engineering) from S.E.A. College of Engineering &Technology, Bangalore affiliated to Visveswaraya Technological University, Belgaum, Karnataka, India. Her area of interest is Analog Electronics, Logic Design and Communication Systems.