Greenhouse Monitoring Using IOT Technology

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Abstract: *This article is an working between the control unit of agriculture application's and processing of data in between the agro-application with the help of latest and trending technology i.e. IOT.*

As we know agriculture application are get control by some wireless and controlling technics like GSM modem ,WAN,WIFI and again some wired controlling technics ,in which temperature ,humidity, moisture, air flow, motor and some agricultural application get communicate and control. But with change of time we want fast and billions of application controlling and data processing technics so that's why we have a best option here now days.

IOT technology can farmer not only to access and process data from agriculture application like used in GREEN HOUSE   but also farmer can control it over 'INTERNET', this technology have capability over largest distance ,simple access, fast data processing and billions of applications can get connected over network. IOT can bring farmer to connect a real digital technology to increase gain from farmers and productivity of crop, where we actual need to use technology for development of any country because food productivity is an basic need of any country, and this kind technology we must use in basic need, so trying to implement this tremendous technology with an basic requirement, in this paper.

Key words: IOT technology, Agro applications, Greenhouse remote access, Green-house data acquisition, greenhouse monitoring.

1. INTRODUCTION

Today according to human populations we need a food more as compare to current productivity and due insufficient and unbalance availability of food, crop, grain and all type of farmers production get import and export in between country's for full fining need of people but we can improve our food production by taking help of technology during production and preserving food.

Many number of farmer now days use most of the trending technology and they try implement technology in their farm too like controlling motor, uses solar pump, GSM modem for communicating and control motor and other application but most of the farmers fail to implement this kind of technology .sometime lack of awareness, insufficient knowledge about technological factors, uses and their advantage's.

So by implementing IOT in the farm we can not only help to improve productivity of food but also it will directly help to develop country too. IOT technology can connect, sensors, application and controlling over an network. Internet of things now a days inevitable trends for agriculture application, which help to control all agro application remotely with highly accuracy and real time data which help to prevent crop form disaster's and help to increase productivity of food .GREENHOUSE can more preferable to technology for controlling all controls over internet we can discuss below.

2. GREEN-HOUSE:

Greenhouse technology is the unique technique of providing favorable conditions to the plants. Growing plants is both an art and science. In spite of many challenges man has learnt how to grow plant under natural environment. Even in extreme adverse climatic conditions where no crops can grow, man has developed a method of growing high value crops which is called as Greenhouse Technology.

In green house technology we use some sensors and some controllers for maintaining required environment in house and help to increase productivity; they are like as follows,

Temperature sensors
Humidity sensors
Moisture sensors
Light sensors
Magnetic sensors, etc.

And many applications are used to control environment between green hose, they are like as, bulb, fan, motor, heater, etc. all these get control with respect to collecting data of sensors, and control overall healthy environment inside the green house .Sensors are used to measure physical quantities such as temperature, light, pressure, sound, and humidity. They send signals to the processors For example:

Temperature sensors could be used to control the heating in a large building.

A security alarm system may have an infrared sensor which sends a signal when the beam is broken.

A heat sensitive sensor in the corner of a room may detect the presence of a person. Magnetic sensors are used to detect metal and can be placed in roads to monitor traffic flow.

For best productions in green house four factors are majorly get controlled by technology they are as follows:

2.1) HUMIDITY

Humidity is measured by using the humidity sensor. If the humidity of the environment is below the defined levels, sprays are automatically turned on and if the humidity level exceeds from the defined level sprays are automatically turned off. But here in this project instead of a spray I have used CFL light to denote the spray. A status or notification message is also sent to the owner by the system using GSM Module.

2.2) SOIL MOISTURE

Water supply for plants is very important for good growth. So here in this demonstration I have used a water pump and a soil moisture sensor, for detecting soil moisture. Two probes of soil-moisture-sensors are used and placed in soil. When the sensor does not sense moisture in soil then the system turns on the water pump until it reaches the required level. A notification is also sent to the owner with status of water pump like Motor On or Motor Off. Here for sensing soil moisture a transistor is used as a switch.
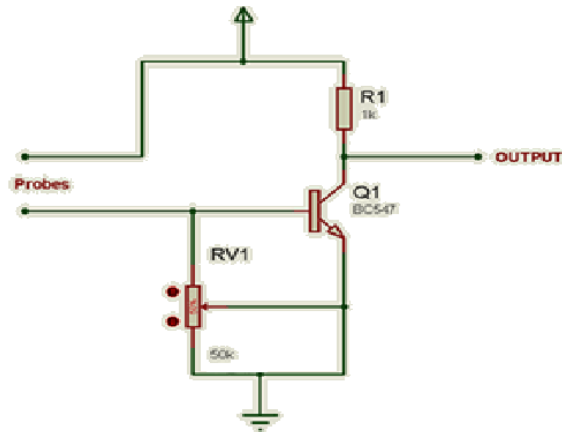

Fig.1.Circuit diagram of the Soil Moisture Sensor

2.3) TEMPERATURE

The temperature sensor is used for sensing temperature. When temperature exceeds from a defined level or critical level, the system automatically turns on the fan and a message is also sent to the owner or the operator with information of all parameters (Temperature, Humidity, Light intensity and Electrical appliance on off status). And when the temperature comes in normal range or comes below the defined level the fan turns off automatically.

2.4) LIGHT INTENSITY

Light intensity is an important factor for the plant growth. If the light intensity is low then it affects the growth of the plants. To resolve the problem of low light, artificial lights are used. Here in this project 100 watt bulb is used for demonstration. When light intensity is lower than a defined level, the artificial lights turns on, and when the light intensity comes in normal range artificial lights automatically turns off and a notification message is also sent to the owner.
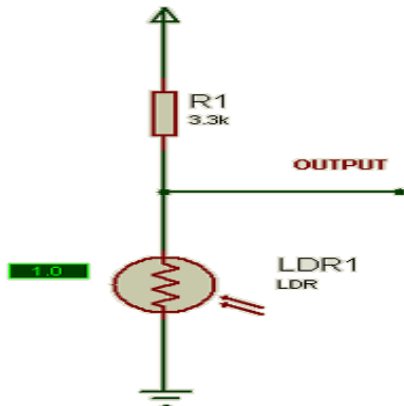
Fig2..Light Intensity Sensor Circuit Diagram

For detecting light intensity LDR is used. Generally light intensity is measured in LUX and therefore for demonstration 100 LUX light is used as defined or threshold level. If light intensity exceeds from 100 LUX, the artificial lights automatically turns on.

Good crop management depends on having the right information to make necessary decisions. In the past, the grower has been the greenhouse sensor and control system – checking conditions and adjusting equipment settings as needed to optimize crop growth. Medium and high technology greenhouses make use of a range of sensors which link into automated control systems. These systems can monitor temperature, relative humidity, vapor pressure deficit, light intensity, electrical conductivity (feed and drain), pH (feed and drain), carbon dioxide concentrations, wind speed and direction and even whether or not it is raining. The information is used to control heating, venting, fans, screens, nutrient dosing, irrigation, carbon dioxide supplementation and fogging or misting systems

Good control in the greenhouse is the ultimate aim of controlled environment horticulture. The most important benefit of control in the greenhouse is the efficiency and effectiveness of your management decisions. There are a lot of other benefits too which save money and result in a better crop. These include greater energy and labor efficiency, more efficient use of water and fertilizers and fewer pesticides. Better control also gives you a more uniform crop so it costs you less to sell.

Fig3. Green-house

Now to control this all sensors and application discus above we can use an Internet of Thing (IOT) Technology now a short review on IOT technology is further.

3. IOT TECHNOLOGY

Internet of things (IOT) is rapidly expanding technology now a days .we know that all the technology now a days get relate or controlled by Internet . There're lots of features and advantages behind that.

It is the hyper connected technology can use through mobile, laptop, and other connecting device which helpful for rapid connection with sensors and applications so it get controlled over the largest distance ever which make an great communicating achievement compare to other controlling and communicating technology's.

"The Internet of things will involve a massive development of connected devices and sensors into the fabric of our lives and businesses. Devices deeply embedded in public and private places will recognize us and adapt to our requirements for comfort, safety, streamlined commerce, entertainment, education, resource conservation, operational efficiency and personal well-being.",

IOT Network Can Manage the Following Applications in Day To Day Life such as
Healthcare,
Smart Infrastructure,
Security and surveillances,
Transportation and Retails,
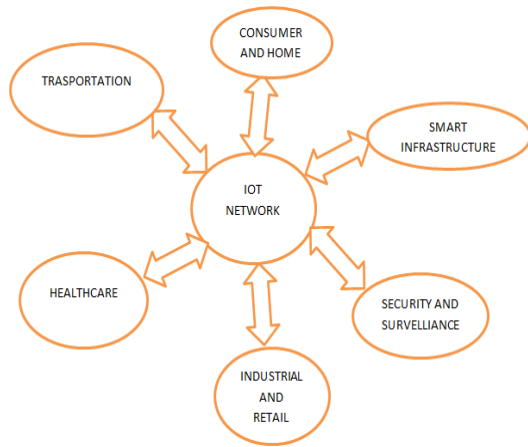Consumers and Home,
Industrial and Retail,
Etc.

Fig4:-IOTNetwork Applications

The large-scale implementation of IOT devices transform many aspects of the way we live. For people, new IOT products like Internet-operated appliances, which can control by internet like

Home automation applications, and energy management devices are moving us toward an invention of the 'smart home', offering more security, highly controllable, real time operation, high speed connectivity with large distance and energy efficiency.

Other personal IOT devices like wearable fitness and health monitoring devices and network enabled medical devices are transforming the way healthcare services are delivered. Which increase high monitoring towards patient and with the help of IOT technology it is very easy to get an large no real time data about patient health and get connected all the time with health monitoring application's This technology promises to be beneficial for people with disabilities and the elderly, enabling improved levels of independence and quality of life at a reasonable cost.

IOT systems like networked vehicles, intelligent traffic systems, and sensors embedded in roads and bridges move us closer to the idea of "smart cities'', which help minimize congestion and energy consumption.

IOT technology offers the possibility to transform agriculture, industry, and energy production and distribution by increasing the availability of information along the value chain of production using networked sensors. However, IOT raises many issues and challenges that need to be considered and addressed in order for potential benefits to be realized.

With the help of IOT we can change agriculture industrial product at high level giving an INTERNET connectivity to those agro application's and get controlled by internet or mobile app too.

As we know now a days lots of people have mobile and mobile now a part of living life and all control we just want in a one hand so IOT technology can bring this dreams come true and a simple and understandable control farmer can get because of this technology.

Improved Customer Engagement – Current analytics suffer from blind-spots and

• Significant flaws in accuracy; and as noted, engagement remains passive. IOT completely transforms this to achieve richer and more effective engagement with audiences. Technology Optimization – The same technologies and data which improve the

• Customer experience also improves device use, and aid in more potent improvements to technology. IOT unlocks a world of critical functional and field data. 1. IOT – Overview Internet of Things 2 Reduced Waste – IOT makes areas of improvement clear. Current analytics give us

• Superficial insight, but IOT provides real-world information leading to more effective management of resources. Enhanced Data Collection – Modern data collection suffers from its limitations and its

• Design for passive use. IOT breaks it out of those spaces, and places it exactly where humans really want to go to analyze our world. It allows an accurate picture of everything.
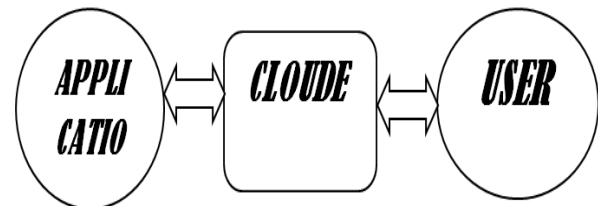
4. GREEN HOUSE MONITORING USING IOT TECHNOLOGY

A greenhouse will normally produce more crops per square meter when compared to open field cultivation since the microclimatic parameters that determine crop yield are continuously monitored and controlled to ensure that an optimum environment is created. The automated greenhouse control system achieves monitoring and control of a greenhouse environment by using sensors and actuators which are under the control of a microcontroller running a computer program. The system is composed of two stations: Remote monitoring station and the

Actuators/Sensors Station. The controller used in the actuators/ sensors station which ensures that the microclimatic parameters stay within pre-defined values as determined and set by the user is the Arduino prototyping platform. The climatic conditions of the greenhouse and state of actuators are transmitted to the remote monitoring station. The codes for the controller were written in the Arduino programming language, debugged, compiled, and burnt into the microcontroller using the Arduino integrated development environment (IDE). A scaled-down prototype of the system was built and tested. Automation of a greenhouse brings about efficient data acquisition and control of the microclimatic parameters. It also significantly reduces the labor involved in its maintenance thus making the system useful for rural farmers, small scale agriculturists, gardeners, and agricultural researchers
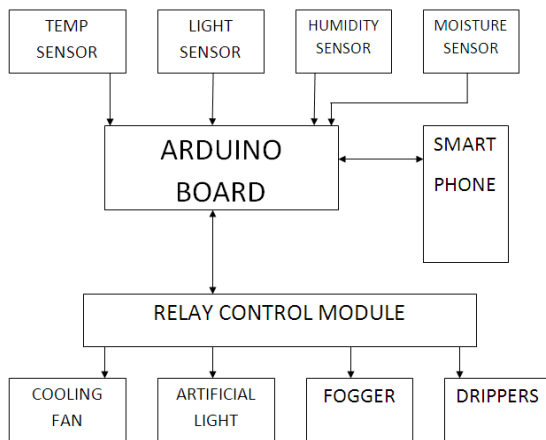

Fig6. Block Diagram of Proposed Remote Operating Station

5. CONCLUSION

Using IOT controlled green house or any agro applications can get access and control by farmer at anytime, anywhere, with high speed and real time data acquisitions. Which help to farmer increase productivity and gain. In this project farmer can get full control over green house with the help of internet.

6. ACKNOWLEDGMENT

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