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Importance and Responsibilities of Internet of Everything (IOE) For Monitoring and Controlling in Smart Agriculture Systems.

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Abstract*: Nowadays, Internet Of Everything (IOE) plays an important role in varies sectors like Home Automation, Smart Cities, Education, Industry, Healthcare, smart grid, business, supply chain Management, technology and in Agriculture. The implementation IOE technology in the Agricultural system makes the Farmers to monitor their Agricultural Fields & crops and controls the things, remotely from their Mobile Phones. The various Wireless Sensor Network (WSN) can sense the Parameters and sends the measured and observed data to the farmers through IOE network. Accordingly, things can be controlled smartly. This helps in applications like soil moisture and nutrients Sensing, Reporting atmospheric condition, custom fertilizer profiles supported soil chemistry, Controlling water usage for optimal plant growth, it also include farm vehicle tracking, storage monitoring etc. This paper focuses on Importance and Responsibilities of IOE in agricultural Systems, those results in smart framing and will minimizing the losses in the Agriculture.

Keywords : Internet of Everything's (IoE), IOT (Internet Of Things), Wireless Sensor Network (WNS),Wi-Fi Modem, Pi-Camera, Sensors, Raspberry-Pi, Cloud Server.

I. INTRODUCTION

CISCO defines the net of Everything (IoE) is the connection of individuals, process, data and things. The Internet of Everything (IoE), where numbers of objects are used the sensors to sense and measure the various parameters and their status to various devices connected to the IoE Systems. All these systems are connected by the general public or the private networks by using the quality and the appropriate protocols. Cisco tends that the Internet of Everything (IoE) is the next stage of the Internet of Things (IoT). Internet of Everything (IoE) is an ecosystem of connected of several devices like Computing, Mechanical or Digital devices within the existing Internet infrastructure. IoE plays vital role to boost and atomization of farming System. That helpful to farmers to minimize waste and improve the Crops quality. That will result in improvement in income for the farmers. IoE-based smart farming system is made for monitoring the crops with assistance of various sensors, which are Water level Sensors, Humidity Sensors, temperature sensors, soil moisture sensors, Ultra sonic Obstacle sensor etc. Also it includes Pi- Camera to monitor and detect the various Leaf Diseases. This will boost the crop productivity and efficiently, it's necessary to watch the environmental conditions in and round the field. There are various applications of IoE present in today's farming systems. This paper focuses on agricultural industry combined with some farmer friendly applications.

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II. LITERATURE REVIEW

Here the steps involved for agriculture are discussed and mainly focused on application of IoT in Agriculture System[2]. The various IoT sensors used, that will collect information from various sensors. This information send to server through Wi-Fi network and the servers can take actions as per the collected the data[3].It includes only monitoring temperature and humidity parameters in agricultural. Here Interfaced Camera is sends the captured images on the farmers mobile through the Wi-Fi Network[9]. IoT based smart farming system includes network architectures, network topologies and various protocols[1]. The Information and device to device Communication Technologies are used into the smart agriculture. The use IoT based hardware and software successful results for smart farming System[4]. IOT based network architectures by using OPNET will helpful in Smart Agriculture. [5] Here, Cross-Layer-Based channel access and routing solution are used for sensing and actuating the today's IoT based agriculture system[6]. Here, embedded based soil monitoring system and irrigation systems are used for reduce the manual monitoring of the crops and field[8]. Here, IoT sensors are used for agricultural productions. for sowing seeds by selling agricultural products to consumers[11]. Here, collection of real time data from various sensors and send the information or data through Short Messaging Service i.e. SMS[10]. Here, efficient water management system is developed. This will optimize the usage of water for crops[7].

III. EXISTING SYSTEM

Agriculture is most useful and therefore the oldest human industry. But there are not any technological changes within the farming technologies. Most of this agricultural technologies uses autonomous robots, drones, sensors and therefore the Internet of Things (IoT). Today's existing technology includes IoT based smart farming systems. They're uses Remote Controlled based Robots. These Robots are used to perform the tasks like the weeding, spraying on the crops , moisture sensing within the field. It includes IoT based smart irrigation with smart control supported real time field data. Also it includes IoT based smart management system which includes the temperature measurement and maintenance system It also include humidity measurement and maintenance and various theft detection within the warehouse. Controlling of these operations are going through IoT and any remote smart device or remote computers which are connected to Internet. Therefore these operations are to be monitor and controlled by interfacing various sensors, Zig-Bee modules, Wi-Fi Modems, cameras, and actuators with the microcontroller and raspberry pi.

IV. PROPOSED SYSTEM

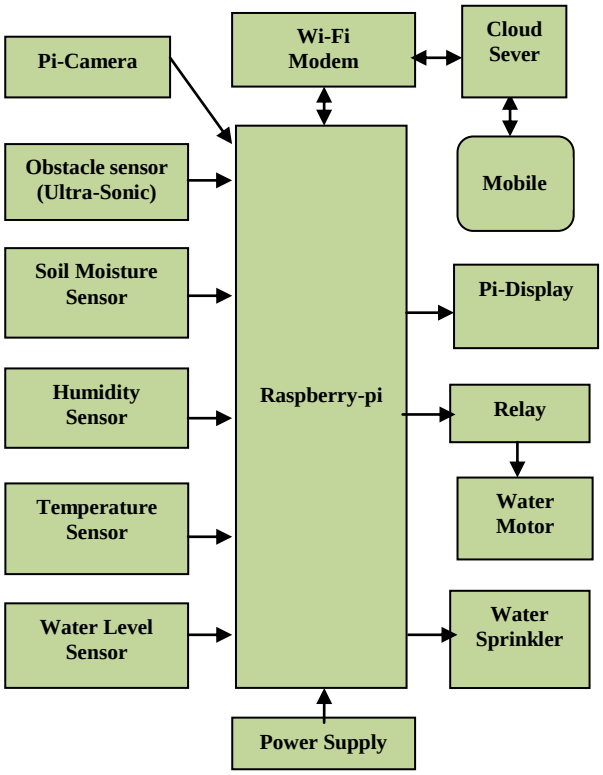

Fig.1. Proposed System

The Proposed System consist of Raspberry-Pi. It is a Mini computer with Various Sensors such as Obstacle Sensor (Ultra-Sonic),Soil Moisture Sensor, Humidity Sensor, Temperature Sensor and Water Level Sensor. It also consist of Pi- Camera to capture the leaf Pictures. At the output side it consist of Pi-Display, Relay to ON/OFF the Water Motor and Water Sprinkler. Wi-Fi Module used establish to communication by use of Internet with Raspberry-Pi and remote User. User can Monitor and control the devices by using Smart Phone. Smart Phone consist of Android Application to Monitor the Real time Sensor values , Pi-Camera Image and Controlling Tabs of Water Motor and Water Spinkler.

A. Pi- Camera:-

It is used as Leaf Disease Detection Module. This module consists of Pi camera. It captures the images of the leaf and these images are compared with the pre-stored images which are stored in database. First, the real time images of various leaves are captured using a pi camera. Camera interfacing with raspberry pi is very easy.

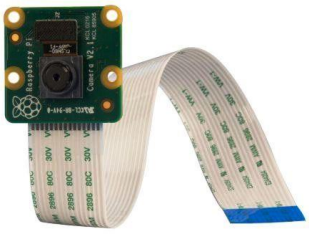

Fig.2. Pi- Camera

B. Obstacle Sensor (Ultra-Sonic):-

The ultra-sonic sensors are working property of sound waves transmission and their reflection properties. These type of sensors are of ultra-sonic transmitter and ultra-sonic receiver. Transmitter transmits the ultra-sonic signal about 20 to 50 KHz sound wave. The receiver receives the reflected ultra-sonic signal with the 40 KHz wave and on its reception. This Sensor is used for obstacle detection. This will help for avoiding the obstacles in the path of the Agricultural Monitoring System.

Fig.3. Obstacle Sensor

C. Temperature Sensor LM 35:-

The LM 35 is a sensor IC. Its Output electrical signal is a analog signal which is proportional to the temperature in Degree Centigrade. It gives +10 mv per degree Centigrade. It is Calibrated directly in Celsius. It is operates from 4v to 30v. It is rated for full temperature range of -55^{0}C to 150^{0}C. LM 35 has three terminals Vs- Supply Voltage, Vout- Output Voltage and GND- Ground.

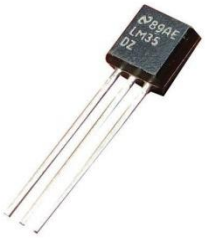

Fig.4. LM35

D. Soil Moisture sensor:-

The Soil moisture sensor has a facility to sense the Wetness of the soil. This is also call as Soil Moisture Meter. According to soil moisture it tells us need of watering in the yard. It consist of two probes, they are act as variable resistors. These two probes used to measure volumetric contents of water. These two probes allows to flow the current to pass through soil and it gets resistance value to measure the moisture.

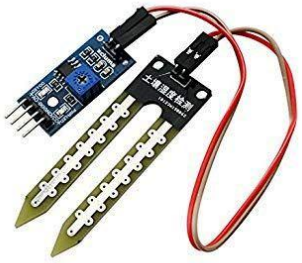

Fig.5. Soil Moisture Sensor

E. Humidity Sensor:-

The DHT 11 is a Humidity and Temperature Sensor. It generates Digital Output. The Sensor Comes with a NTC to measure Temperature. It sends 8bit data of temperature and serial data of Humidity to the Raspberry –Pi.

Fig.6. DHT 11 Humidity Sensor

F. Water Level Sensor:-

Water level sensor is also called drift balls. They are round, tube shaped. They are used to measure the water level in the Field. It has three levels , Low, Middle and High levels. Ti is used to send water level signal to the Raspberry pi to control the water Motor.

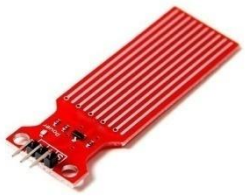

Fig.7. Water Level Sensor

G. Pi- Display:-

This display used to see the status of the working sensors connected to the Raspberry Pi.It is also used to see the Captured Image of the Pi- Camera. It is also used for installing and configuring the Raspberry Pi module and varies sensors to it.

Fig.8. Pi-Display

H. Wi-Fi Modem:-

Wi-Fi modem is connected between Raspberry Pi and the Cloud server. This module transmit the data from Raspberry Pi to User and Vise a Versa. A various sensors data, sensors status and the status of varies devices connected to the Raspberry Pi is sends to user by using Wi-Fi Modem. Also user can send the data or commands to control the various devices connected to the Raspberry Pi by using Wi-Fi Modem.

I. Raspberry pi:-

Raspberry Pi is a small and cheap computer. It runs on Linux operating systems. It is used to perform for any automation. It is a mini computer. Raspberry Pi is used for controlling the various sensors and output devises connected to it.

J. Mobile:-

End user is monitor and control the various devises connected to the Raspberry Pi by using Mobile device. User can send the various command to Control Raspberry Pi and the Devices connected to the Raspberry Pi. Mobile device contains the Application which controls the overall operation of monitoring and controlling of various activities of Raspberry-Pi and its input and output devices.

V. APPLICATIONS OF IOE IN AGRICULTURAL FIELD

A. Precision Farming:-

Precision farming is one of the most famous and most required applications of IoE system, in the agricultural sector. The numerous organizations are uses this technique around the world. By use of various sensors like light, humidity, temperature, soil moisture etc. the farmers can reduce waste and enhance productivity. Farmers are facing the challenges such as extreme weather conditions and rising climate change, and environmental. IOT enables to fight such challenges and reduces the west of food.

B. Agriculture Drones

The Drones are plays important role in the agricultural fields. Drones are used for crop health monitoring , Water conservation and irrigation, planting, Remote equipment monitoring, and soil & field analysis. The uses of drones are very ease. It will be time-saving, labor cost saving, and energy saving.

C. Livestock Monitoring

IOT can be used in the agricultural fields for Livestock monitoring. The farmers can locate their cattle with the help of IoE based sensors. It will also checks the health of cattle. The farmer can save the man power from controlling and tracking the cattle. The IOE sensor enables farmers to be more focused on their Cattle.

D. Smart Greenhouses

In greenhouses the various sensors are used to monitor and control the greenhouse temperature, soil moisture etc. It will help to maintain the proper temperature and soil moisture. It will help to reduce production loss, energy loss, and labor cost. The various sensors can monitor the health of Crops.

E. Pest Management & Control

Varies sensors are used for the Pest identification, management and preventing the crops against the pest. So the farmers can use the proper pest controls to prevent the crops from the pests. It will improve the productivity of the food.

F. Detect Crop Diseases

Various sensors are used to detect the Crop Diseases and inform to the farmers about such diseases to prevent the crops from more damage.

VI. RESULT AND OBSERVATIONS

Below table shows the Result and observations of used sensors in proposed system. It contains the practical operating rang of sensors used in the Proposed project module.

Table- I: Result & Observations used Sensors

Sr. No	Sensors	Parameters	Operating Range
1)	Obstacle Sensor (Ultra-Sonic)	Distance	20 khz to 50 khz
2)	Temperature Sensor LM 35	Temperature	-40^0 C to 110^0 C
3)	Soil Moisture sensor	Moisture	0 ~ 99.9 %
		Temperature	0 ~ 60^0 C
4)	Humidity Sensor DTH 11	Temperature	0^0 C to 50^0 C
		Humidity	20% to 90%
5)	Water Level Sensor	Water Level	0 to 10 m
		Water Temperature	0^0 C to 100^0 C

VII. CONCLUSION

Through this paper we have made an attempt to become the farmers as a smart farmer. IOE is next stage of IOT. It is considered as a future of Internet. We have implemented a system that will much more helpful to framers for Precision Farming. The proposed system consist of various sensors, they are Obstacle Sensor (Ultra- Sonic), Temperature Sensor LM35, Soil Moisture, Humidity Sensor DHT 11 and Water Level Sensor to sense the parameters for monitoring and controlling the Things such as Water Motor and Water Sprinkler. Pi- Camera used to capture the Leaf Pictures for detection the Leaf Diseases. It is helpful to framers to collecting the data from various nodes and controlled the remote applications.

It will also helpful to control on wastage of food, monitor and control on water irrigation, Agricultural Chemicals such as Pesticides and Fertilizers, also in labor cost cutting, health of crops and cattle etc.

This is also helpful for real time easily controlling the devices by use of smart phones.

VIII. FUTUTE SCOPE

The proposed system can be farther interfaced with various sensors for better smart Agricultural systems. The sensors are like leaf wetness ,solar radiation - par, ultraviolet radiation - uv ,trunk diameter ,stem diameter ,fruit diameter , anemometer ,wind vane ,pluviometer and luminosity (luxes) , acoustic sensors, Field-programmable gate array (FPGA)-based sensors, optical sensors, ultrasonic ranging sensors, optoelectronic sensors, airflow sensors, electrochemical sensors, electromagnetic sensors, mechanical sensors, mass flow sensors, eddy covariance-based sensors, soft water level-based (SWLB) sensors, light detection and ranging (LIDAR), telematics sensors and remote sensing sensors etc.

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