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IOT Based Smart Agriculture

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***Abstract*:**

In this era of digitalization and automation, the life of human beings is getting simpler as almost everything is automatic, replacing the old manual systems. Now-a-days humans have made internet an integral part of their everyday life without which they are helpless. Internet of things(IOT) provides a platform that allows devices to connect, send and controlled remotely across a network infrastructure. The basic idea of this project is , we need a smart irrigation system which is of low cost effective and a middle class farmer use it in farm field. Today industries are use automation and control machine which is high in cost and not suitable for using in a farm field. So here we design a smart irrigation technology in low cost which is usable by Indian farmers.

The project discuss about IOT based smart agriculture with arduino UNO which integrates different platform with different communication technology. Here we are using different monitoring sensors like temperature, humidity , rain , salinity , water level sensors and water flow control gate.

Keywords:
Temperature, humidity , rain , salinity , water level sensors and water flow control gate.

I. INTRODUCTION

The Internet of things (IOT) is the inter-networking of physical devices vehicles, (also referred to as “connected devices” and smart devices”) buildings and other items embedded with electronics, software, sensors, actuators and network connectivity that enable these objects to collect and exchange data. In 2013, the Global Standards Initiative on Internet of Things (IOT-GSI) defined the IOT as “the infrastructure of the information society”. The IOT allows objects to be sensed or controlled remotely across existing network infrastructure,] creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. When IOT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities. Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet infrastructure. Experts estimate that the IOT will consist of almost 50 billion objects by 2020.

Typically, IOT is expected to offer advanced connectivity of devices, systems and services that goes beyond machine to machine (M2M) communications and covers a variety of protocols, domains, and applications. The interconnection of these embedded devices (including smart objects), is expected to usher in automation in nearly all fields, while also enabling advanced applications like a smart grid, and expanding to areas such as smart cities.

"Things," in the IOT sense, can refer to a wide variety of devices such as heart monitoring implants, biochip transponders on farm animals, electric clams in coastal waters, automobiles with built-in sensors, DNA analysis devices for environmental/food/pathogen monitoring or field operation devices that assist fire-fighters in search and rescue operations. Legal scholars suggest looking at "Things" as an "inextricable mixture of hardware, software, data and service". These devices collect useful data with the help of various existing

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technologies and then autonomously flow the data between other devices. Current market examples include home automation (also known as smart home devices) such as the control and automation of lighting, heating (like smart thermostat), ventilation, air conditioning (HVAC) systems, and appliances such as washer/dryers, robotic vacuums, air purifiers, ovens or refrigerators/freezers that use Wi-Fi for remote monitoring.

As well as the expansion of Internet-connected automation into a plethora of new application areas, IOT is also expected to generate large amounts of data from diverse locations, with the consequent necessity for quick aggregation of the data, and an increase in the need to index, store, and process such data more effectively. IOT is one of the platforms of today's Smart City, and Smart Energy Management Systems.

The concept of the Internet of things was invented by and term coined by Peter T. Lewis in September 1985 in a speech he delivered at a U.S. Federal Communications Commission (FCC) supported session at the Congressional Black Caucus 15th Legislative Weekend Conference.

II. EXISTING METHODS

a)The GSM based motor control system is the previous system in which it aims to develop a simpler and cheaper solution that will provide remote control for motors through mobile phones using messages. This work provides Short Messaging Service (SMS)approach which in turn offers a simple interface with only destination mobile phone address and message requirement without any protocol. So this method is suitable for remote monitoring of systems with moderate complexity. The disadvantage of this method is it does not use trending technologies like IOT, smart phones and laptops. The block diagram of the GSM based motor control system is as shown below.

b) Another previous method is Arduino based Smart Irrigation system which proposes an economical and easy way to use arduino based controlled irrigation system. The designed system deals with various environmental factors such as moisture, temperature and amount of water required by the crops using sensors like water flow sensor, temperature sensor and soil moisture sensor. Data's are collected and received by arduino which can be linked to an interactive website which show the real time values along with the standard values of different factor required by a crop. This allows user to control irrigation pumps and sprinklers from far distance through a website and to meet the standard values. The disadvantages of this paper is no proper actuation is provided and also during the network unavailability this project is no use since it does not inform the conditions of the farm to the farmer residing at far distances from his farm. The block diagram of Arduino based Smart Irrigation System.

III. PROPOSED METHOD

The proposed method helps in monitoring the farm and controlling the moisture levels automatically. This system reduces the efforts of the farmer and makes his life easy. The system is a bit more efficient than the previous methods that have been proposed till date. . Here we are using different monitoring sensors like temperature , humidity , rain , salinity , water level sensors and water flow control gate.

IV.COMPONENTS

1. Soil Moisture Sensor DTH11
2. Temperature and Humidity Sensor SEN-13322
3. Rain Sensor
4. Salinity Sensor
5. Arduino Uno
6. ESP8266 Wi-Fi Module
7. Water Level Indicator
8. Water Motor
9. DC Motor
10. Relay

Soil Moisture Sensor:

Measuring soil moisture is important in agriculture to help farmers manage their irrigation systems more efficiently.

Temperature and Humidity Sensor:

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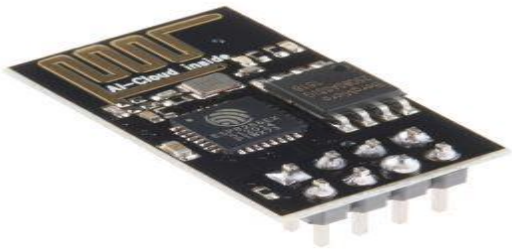
The DHT11 detects water vapour by measuring the electrical resistance between two electrodes. The humidity sensing component is a moisture holding substrate with electrodes applied to the surface.

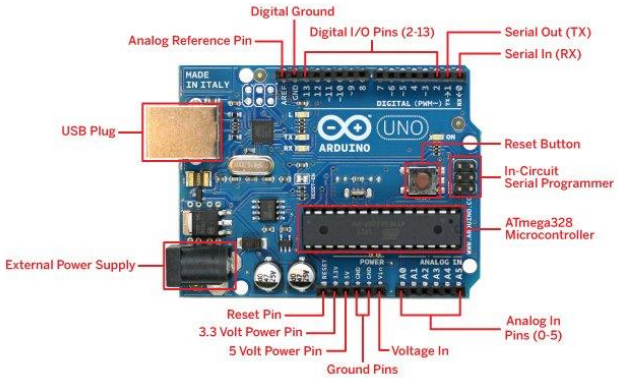
ESP8266 Wi-Fi Module

ESP8266 is a Wi-Fi SOC (system on a chip) produced by Express. It is an highly integrated chip designed to provide full internet connectivity in a small package.



Arduino Uno

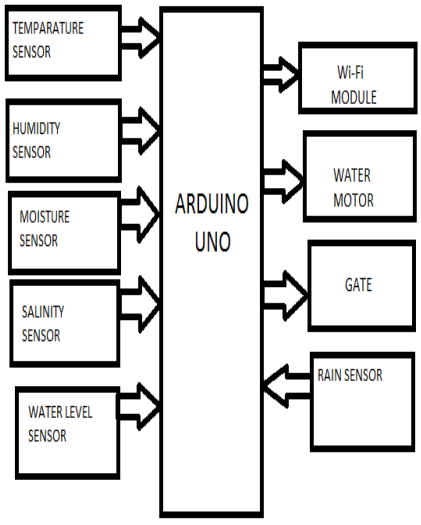
Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board.



DC MOTOR:

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.

V.BLOCK DIAGRAM DESCRIPTION



VI. On board connections for Arduino

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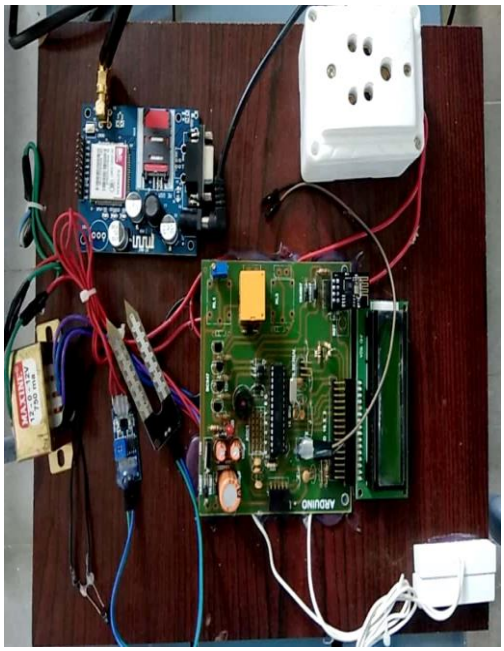


VII.INTERNET OF THINGS

The Internet of things (IOT) is the inter-networking of physical devices vehicles, (also referred to as "connected devices" and smart devices") buildings and other items embedded with electronics, software, sensors, actuators and network connectivity that enable these objects to collect and exchange data. In 2013, the Global Standards Initiative on Internet of Things (IOT-GSI) defined the IOT as "the infrastructure of the information society".

VIII.ADVANTAGES:

- **Increased Production**

Optimized crop treatment such as accurate planting, Watering, pesticide application and harvesting directly affects production rates.

- **Water Conservation**

Weather predictions and soil moisture sensors allow for water use only when and where needed.

- **Real Time Data and Production Insight**

Farmers can visualize production levels, soil moisture, Sunlight intensity and more in real time and remotely to accelerate decision
making process.

- **Lowered Operation Costs**

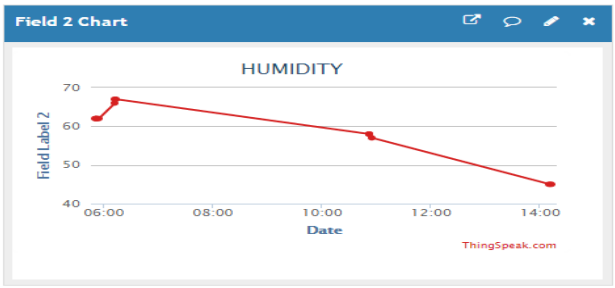
Automating processes in planting, treatment and harvesting can reduce resource consumption, human error and overall cost.

- **Increased Quality of Production**

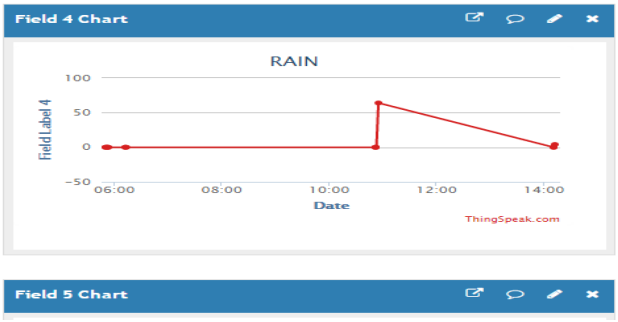
Analysing production quality and result in correlation to treatment can teach farmer to adjust processes to increase the quality of the product.

IX.RESULTS AND DISCUSSION

1)temperature values vs Time



2) humidity vs time



3) rain vs time

X. Conclusion

The proposed method helps in monitoring the farm and controlling the moisture levels automatically. This system reduces the efforts of the farmer and makes his life easy. The system is a bit more efficient than the previous methods that have been proposed till date. Also the system constantly updates the farmer about the status of the soil and irrigation system. Hence this project helps in introducing an efficient system to enhance the way the farmers have been monitoring their farm. Mainly it helps in improving the production yield by 25%. Intensive irrigation simply increases the farm production with minimum or no effort as the proposed method automatically controls the irrigation.

As nearly 1/6th of land is prone to drought the proposed system also has rain water harvesting method to store and help formers in drought conditions. Salinity of soil alerts the former about the degradation/nutation of the soil , so the former can take counter steps. The water level indicator indicates the water level of well so that we can prevent the failure/burning of motor which costs around 30,000.

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