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IoT Powered Automatic Irrigation Management System With Water Maintenance And Enhanced Security System

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ABSTRACT

The Embedded Technology is now in its prime and the wealth of Knowledge available is mind-blowing. Embedded System is a combination of hardware and software. Embedded technology plays a major role in integrating the various functions associated with it. This needs to tie up the various sources of the Department in a closed loop system. This proposal greatly reduces the manpower, saves time and operates efficiently without human interference. This project puts forth the first step in achieving the desired target. With the advent in technology, the existing systems are developed to have in built intelligence. Irrigation is the back bone of India but automation in irrigation is not yet existed, this paper proposes a new automated embedded technology for multiple type crop cultivation in a single farm, automatic watering based on moisture level sensor and fire sensing and intimation using IoT. The gas sensor analyses the usage of hazardous manure, the PIR sensor senses the unknown person and animal movement, the database will be maintained in PC. This proposal will help us to eliminate wastage of power, water and to rescue the crops from fire immediately.

Keywords: Arduino IDE, PIR Motion Sensor, Gas Sensor, DHT11, DC Motor Pump.

1. INTRODUCTION:

Agriculture is the backbone of an India's economic activity. Everywhere water scarcity is one of the major problems faced by the farmer. In India, since agriculture is one of the major economies, this situation is overhang. There are various types of the irrigation systems like well water irrigation, canal irrigation, sprinkler irrigation, furrow irrigation etc. but the common problem of this all systems are regarding to wastage of water. The field surface of the farm is non-uniform all over. It is somewhere up or decreasing in slope. In this case, the supplied water is accumulated at one place. So the proper water is not supplied at complete field. And, due to accumulating water at one place causes the wastage of water. There are few existing systems working for reducing agriculture water consumption. But in these systems watering is done without analyzing the soil parameters due to which system apply non-uniform water to the soil. Also the existing systems require human monitoring.

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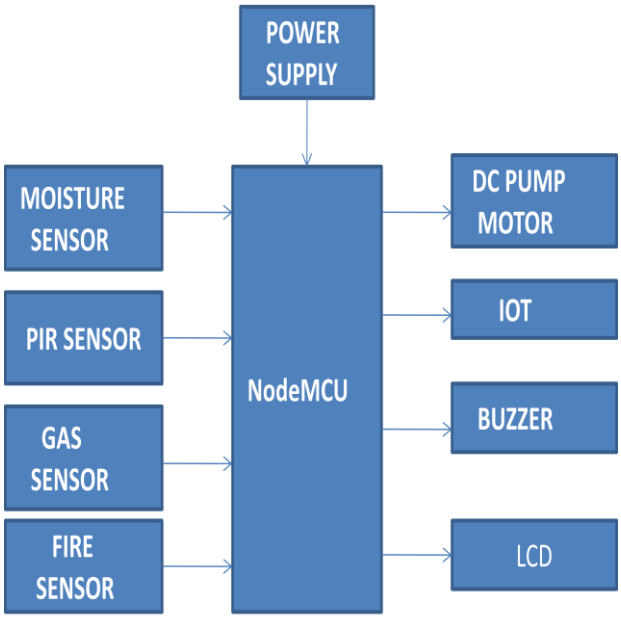
2. BLOCK DIAGRAM:



3. WORKING:

Here we are using NodeMCU controller, pump motor, moisture level sensor , fire sensor, gas sensor, PIR sensor. In a farm we cultivate multiple crops and the moisture level for various crops are stored in the controller the pump motor will automatically switch on when the water level is lowered than the predefined level and get off when it reaches the ordinary level when ever the fire happens it will be sensed by the fire sensor and it will give the intimation through the IoT to the fire station. The gas sensor senses the usage of hazardous manure if it crosses the threshold level then it will be intimated using buzzer and notified via IoT.The PIR sensor senses the person/animal movement in the field this status is notifiedusing IoT.Here we are using the lcd display to display the output.

4. EXISTING SYSTEM:

- Here fire must be identified manually
- Automatic maintenance of plant health is not possible.
- Multiple crop cultivation in single farm is not possible.
    1. Human intervention is needed
    2. Automatic alarm indication is not possible
    3. Consumes more human effort.

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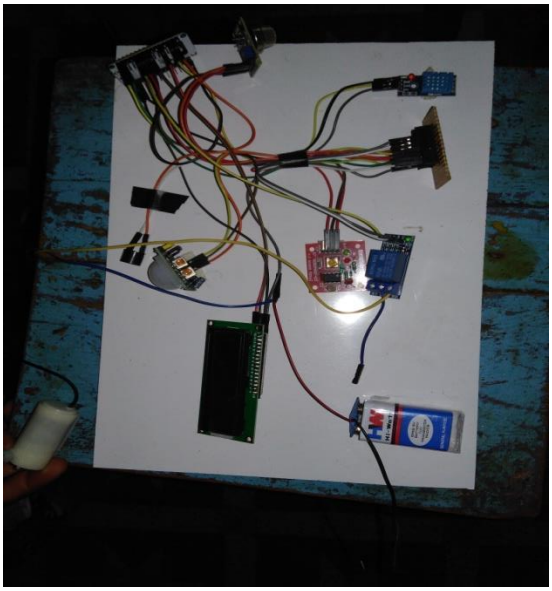
5. PROPOSED SYSTEM:

- In a farm we cultivate multiple crops and the moisture level for various crops are stored in the controller the pump motor will automatically switch on when the water level is lowered than the predefined level and get off when it reaches the ordinary level.
- The PIR sensor senses the person/animal movement in the field this status isnotifiedusing IoT.
- The gas sensor senses the usage of hazardous manure, if it crosses the threshold level then it will be intimated using buzzer and notified via IoT.
- when ever the fire happens it will be sensed by the fire sensor and it will give the intimation through the IoT to the fire station.

6. HARWARD DESCRIPTION:

This paper consists of the following hardware's:



Node MCU: Node MCU is a open source IOT platform. It includes firmware by which runs out on the WI-Fi and the hardware is based on the ESP-12 module. The term "NODEMCU" by default refers to the firmware rather than the development kits.

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Fig.1 Front side surface of Node MCU

PIR Sensor: When the sensor is idle, both slots detect the same amount of IR, the ambient amount radiated from the room or walls or outdoors. When a warm body like a human or animal passes by, it first intercepts one half of the PIR sensor, which causes a positive differential change between the two halves.

Fig.2*PIR Sensor*

Gas Sensor: As detectors measure a specified gas concentration, the sensor response serves as the reference point or scale. ... Electrochemical sensors or cells are most commonly used in the detection of toxic gases like carbon monoxide, chlorine and nitrogen oxides. They function via electrodes signals when a gas is detected.

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Fig.3Gas Sensor

Fire Sensor: The Working Principle of LDR. This resistor works on the principle of photo conductivity. It is nothing but, when the light falls on its surface, then the material conductivity reduces and also the electrons in the valence band of the device are excited to the conduction band.

Fig.4Fire Sensor

Soil moisture sensor: DHT11 is a Humidity and Temperature Sensor, which generates calibrated digital output. DHT11 can be interface with any microcontroller like Arduino, Raspberry Pi, etc. and get instantaneous results. DHT11 is a low cost humidity and temperature sensor which provides high reliability and long term stability. In this project, we will build a small circuit to interface Arduino with DHT11 Temperature and Humidity Sensor. One of the main applications of connecting DTH11 sensor with Arduino is weather monitoring.

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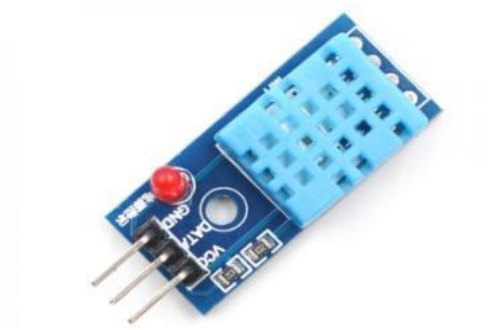

Fig.5 Soil moisture sensor

Buzzer: The Working Principle of Magnetic Buzzers. The vibrating disk in a magnetic buzzer is attracted to the pole by the magnetic field. When an oscillating signal is moved through the coil, it produces a fluctuating magnetic field which vibrates the disk at a frequency equal to that of the drive signal.

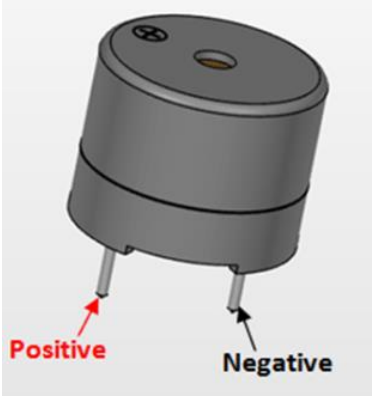

Fig.6 Buzzer

DC Pump motor: The electric water pumps, such as the kinds used in homes, usually have small DC motors. The **DC motor** is contained in a sealed case attached to the impeller and powers it through a simple gear drive.Through a series of pushes, the rotor continues to spin, driving the impeller and powering.

Fig.7 Dc Pump Motor

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LCD: Liquid crystal display screen works on the principle of blocking light rather than emitting light. LCD'srequires backlight as they do not emits light by them. We always use devices which are made up of LCD's displays which are replacing the use of cathode ray tube.

Fig.8 LCD Display

VII.SIMULATION RESULT:

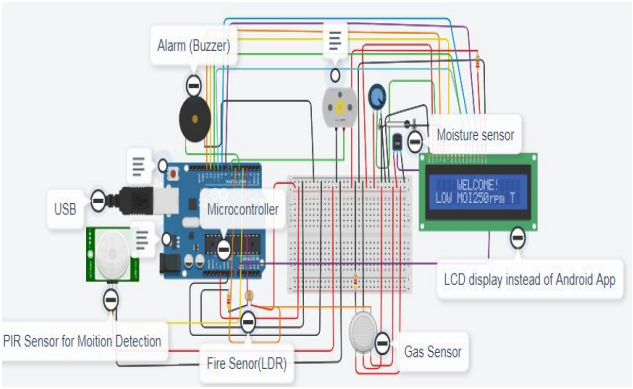

Fig.9 Simulation Result

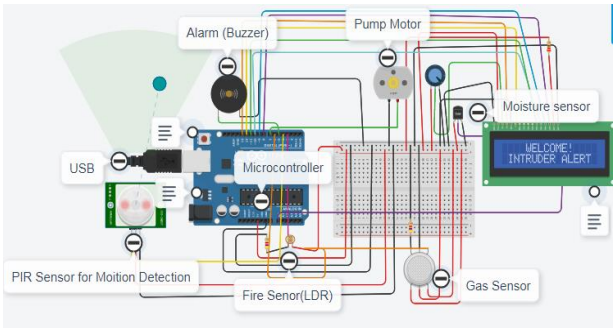

Fig.10 Simulation Result

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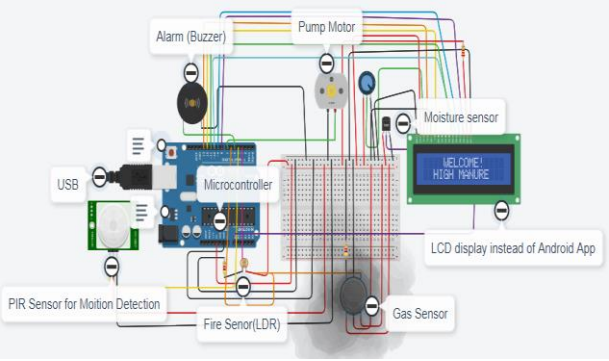

Fig.11 Simulation Result

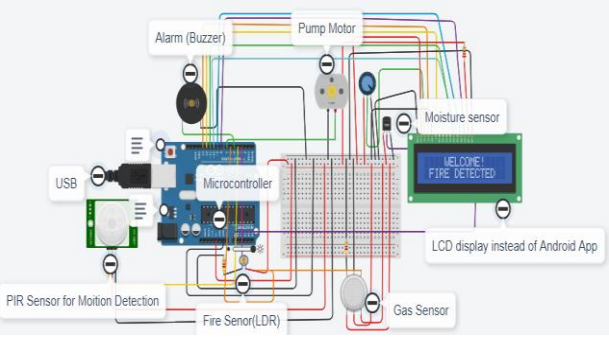

Fig.12 Simulation Result

APPLICATION:

- We can cultivate multiple crops.
- Fire identification and intimation done automatically.

CONCLUSION:

The wireless irrigation and monitoring system has been designed to reduce the water consumption and gives the only require amount of water to crop. This system minimized the manual efforts with the help of schedules we introduce in system to irrigate the farm. We can save the electricity using this system because we used the low power consumption devices to save electricity. It is very manageable and cost effective system. This system we can use for any type of crop irrigation andin any place as it has small module hence it has very less maintenance.

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