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IOT Based Smart Real Time Monitoring Echo System

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Abstract:- **An ecosystem, a term very often used in biology, is a community of plants and animals interacting with each other in a given area, and also with their non-living environments. Global warming and climate change have the potential to alter biological systems. As global warming alters these patterns on timescales considerably shorter than those that arose in the past from natural climate variability, relatively sudden climatic changes may challenge the natural adaptive capacity of many species. On land, rising temperatures and changes in precipitation patterns and drought frequencies are likely to alter patterns of disturbance by fires and pests. So to overcome this problem we go for smart Ecosystem techniques using IoT. This project includes various features like GPS based remote controlled monitoring, wild fire, moisture & temperature sensing, intruders scaring, security, leaf wetness and proper irrigation facilities. It makes use of wireless sensor networks for noting the soil properties and environmental factors continuously. Various sensor nodes are deployed at different locations in the Ecosystem. Controlling these parameters are through any remote device or internet services and the operations are performed by interfacing sensors, Wi-Fi, camera with microcontroller. This concept is created as a product and given to the conservation of Ecosystem**

1. INTRODUCTION

As the world is trending into new technologies and implementations it is a necessary goal to trend up in Ecosystem also. Most projects signify the use of wireless sensor network collect data from different sensors deployed at various nodes and send it through the wireless protocol. The collected data provide the information about the various environmental factors. Monitoring the environmental factors is not the complete solution to increase the yield. There are number of other factors that decrease the productivity to a greater extent. Hence automation must be implemented in ecosystem to overcome these problems. So, in order to provide solution to all such problems, it is necessary to develop an integrated system which will take care of all factors affecting the productivity in every stage. But complete automation in ecosystem is not achieved due to various issues. Though it is implemented in the research level it is not given to the farmers as a product to get benefitted from the resources. Hence this paper deals about developing smart ecosystem using IoT and given to the life.

2. LITERATURE SURVEY

The existing method is not used in ecosystem but used in agriculture. This method and one of the oldest ways in agriculture is the manual method of checking the parameters. In this method the farmers they themselves verify all the parameters and calculate the readings. It focuses on developing devices and tools to manage, display and alert the users using the advantages of a wireless sensor network system. It aims at making agriculture smart using automation and IoT technologies. The highlighting features are smart GPS based remote controlled robot to perform tasks like weeding, spraying, moisture sensing, human detection and keeping vigilance. It proposes an idea about how automated irrigation system was developed to optimize water use for agricultural crops. In addition, a gateway unit handles sensor information. The atmospheric conditions are monitored and controlled online by using Ethernet IEEE 802.3.The partial root zone drying process can be implemented to a maximum extent. It is designed for IoT based monitoring system to analyze crop environment and the method to improve the efficiency of decision making by analyzing harvest statistics. The greenhouse is a building in which plants are grown in closed environment. It is used to maintain the optimal conditions of the environment, greenhouse management and data acquisition.

3. PROPOSED WORK

In the field section, various sensors are deployed in the field like temperature sensor, moisture/humidity sensor, fire sensor, smoke sensor, water level, ultrasonic sensor and PIR sensor. The data collected from these sensors are connected to the microcontroller through RS232. In control section, the received data is verified with the threshold values. If the data exceeds the threshold value the buzzer is switched ON and the LED starts to blink. This alarm is sent as a message to the controller and automatically the power is switched OFF after sensing. The values are generated in the web page and the controller gets the detailed description of the values. In automatic mode, the microcontroller gets switched ON and OFF automatically if the value exceeds the threshold

point. Soon after the microcontroller is started, automatically an alert must be sent to the user. This is achieved by sending a message from webpage. Other parameters like the temperature, humidity, moisture, fire, ultrasonic and the PIR sensors shows the threshold value and the water level sensor is used just to indicate the level of water inside a tank or the water resource.

4. HARDWARE USED

4.1. Arduno Mega

The Arduino Mega is a microcontroller board based on the ATmega1280. It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega is compatible with most shields designed for the Arduino Duemilanove or Diecimila. The Arduino Mega can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector. The board can operate on an external supply of 6 to 20 volts.

4.2. GAS Sensor

Gas detectors measure and indicate the concentration of certain gases in an air via different technologies. Typically employed to prevent toxic exposure and fire, gas detectors are often battery operated devices used for safety purposes. They are manufactured as portable or stationary (fixed) units and work by signifying high levels of gases through a series of audible or visible indicators, such as alarms, lights or a combination of signals. While many of the older, standard gas detector units were originally fabricated to detect one gas, modern multifunctional or multi-gas devices are capable of detecting several gases at once. Some detectors may be utilized as individual units to monitor small workspace areas, or units can be combined or linked together to create a protection system. As detectors measure a specified gas concentration, the sensor response serves as the reference point or scale. When the sensors response surpasses a certain pre-set level, an alarm will activate to warn the user. There are various types of detectors available and the majority serves the same function: to monitor and warn of a dangerous gas level. However, when considering what type of detector to install, it is helpful to consider the different sensor technologies. Although detectors are an essential application for home and commercial safety, they are also employed in numerous industrial industries. Gas detectors are used in welding shops to detect combustibles and toxics and in nuclear plants, to detect combustibles. They are also commonly used to detect hazardous vapors in wastewater treatment plants.

4.3. Flame Detector

Flame Detection Sensor Module is sensitive to the flame, but also can detect ordinary light. Usually used as a flame alarm. Detects a flame or a light source of a wavelength in the range of 760nm-1100 nm. Detection point of about 60 degrees, particularly sensitive to the flame spectrum. Sensitivity is adjustable, stable performance. Features: 100% brand new and high quality Detection angle about 60 degrees, it is sensitive to the flame spectrum. Accuracy adjustable Operating voltage 3.3V-5V Output a. analog voltage output. digital switch outputs (0 and 1) With a mounting screw hole PCB size: 3cm * 1.6cm Power indicator (red) and digital switch output indicator (green) Comparator chip LM393 ,it is stable. Flame detection distance, lighter flame test can be triggered within 0.8m, if the intensity of flame is high , the detection distance will be increased. Please keep a distance with flame, high temperature maybe burn out the sensor module.

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4.4. Soil Moisture Sensor

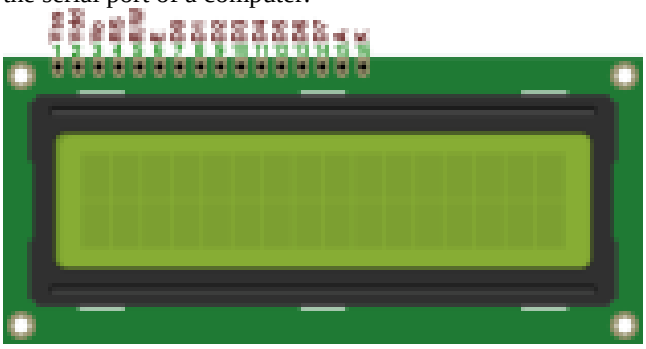
Soil Moisture Sensor Soil moisture sensor is a sensor which senses the moisture content of the soil. The sensor has both the analog and the digital output. The digital output is fixed and the analog output threshold can be varied. It works on the principle of open and short circuit. The output is high or low indicated by the LED. When the soil is dry, the current will not pass through it and so it will act as open circuit. Hence the output is said to be maximum. When the soil is wet, the current will pass from one terminal to the other and the circuit is said to be short and the output will be zero. The sensor is platinum coated to make the efficiency high. The range of sensing is also high. It is anti-rust and so the sensor has long life which will afford the farmer at a minimum cost.

4.5. Humidity sensor

Humidity is the presence of water in air. Temperature and humidity combined sensor AM2320 digital temperature and humidity sensor is a digital signal output has been calibrated. Using special temperature and humidity acquisition technology ensure that the product has a very high reliability and excellent long-term stability. Sensor consists of a capacitive moisture element and integrated high-precision temperature measurement devices, and connected with a high-performance microprocessor. The product has excellent quality, super fast response, strong anti-interference ability, very high property price rate. To mention moisture levels, variety of terminologies are used. The study of water vapor concentration in air as a function of temperature and pressure falls under the area of psychometrics. Psychometrics deals with the thermodynamic properties of moist gases while the term "humidity' simply refers to the presence of water vapour in air or other carrier gas.

4.6. LCD 16x2 Display

Alphanumeric displays are used in a wide range of applications, including palmtop computers, word processors, photocopiers, point of sale terminals, medical instruments, cellular phones, etc. The 16 x 2 intelligent alphanumeric dot matrix display is capable of displaying 224 different characters and symbols. A full list of the characters and symbols is printed on pages 7/8 (note these symbols can vary between brand of LCD used). This booklet provides all the technical specifications for connecting the unit, which requires a single power supply (+5V). Available as an optional extra is the Serial LCD Firmware, which allows serial control of the display. This option provides much easier connection and use of the LCD module. The firmware enables microcontrollers to visually output user instructions or readings onto an LCD module. All LCD commands are transmitted serially via a single microcontroller pin. The firmware can also be connected to the serial port of a computer.



4.7. Piezo Buzzer

A piezoelectric element may be driven by an oscillating electronic circuit or other audio signal source, driven with a piezoelectric audio amplifier. Sounds commonly used to indicate that a button has been pressed are a click, a ring or a beep.

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4.8. PIR-based Motion Detector

A PIR-based motion detector is used to sense movement of people, animals, or other objects. They are commonly used in burglar alarms and automatically-activated lighting systems. They are commonly called simply "PIR", or sometimes "PID", for "passive infrared detector". An individual PIR sensor detects changes in the amount of infrared radiation impinging upon it, which varies depending on the temperature and surface characteristics of the objects in front of the sensor. When an object, such as a human, passes in front of the background, such as a wall, the temperature at that point in the sensor's field of view will rise from room temperature to body temperature, and then back again. The sensor converts the resulting change in the incoming infrared radiation into a change in the output voltage, and this triggers the detection. Objects of similar temperature but different surface characteristics may also have a different infrared emission pattern, and thus moving them with respect to the background may trigger the detector as well. PIRs come in many configurations for a wide variety of applications. The most common models have numerous Fresnel lenses or mirror segments, an effective range of about ten meters (thirty feet), and a field of view less than 180 degrees. Models with wider fields of view, including 360 degrees, are available—typically designed to mount on a ceiling.

4.9. Pump

A pump is a device that moves fluids (liquids or gases), or sometimes slurries, by mechanical action. Pumps can be classified into three major groups according to the method they use to move the fluid: direct lift, displacement, and gravity pumps. Pumps operate by some mechanism (typically reciprocating or rotary), and consume energy to perform mechanical work by moving the fluid. Pumps operate via many energy sources, including manual operation, electricity, engines, or wind power, come in many sizes, from microscopic for use in medical applications to large industrial pumps

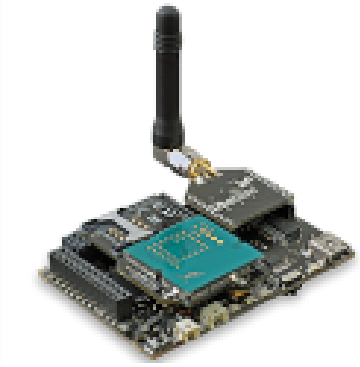
4.10. Ultrasonic Sensor

Ultrasonic transducers are transducers that convert ultrasound waves to electrical signals or vice versa. Those that both transmit and receive may also be called ultrasound transceivers; many ultrasound sensors besides being sensors are indeed transceivers because they can both sense and transmit. These devices work on a principle similar to that of transducers used in radar and sonar systems, which evaluate attributes of a target by interpreting the echoes from radio or sound waves, respectively. Active ultrasonic sensors generate high-frequency sound waves and evaluate the echo which is received back by the sensor, measuring the time interval between sending the signal and receiving the echo to determine the distance to an object. Passive ultrasonic sensors are basically microphones that detect ultrasonic noise that is present under certain conditions, convert it to an electrical signal, and report it to a computer.

4.11. Wi-Fi Module

Wi-Fi or Wi-Fi is a technology for wireless local area networking with devices. Wi-Fi most commonly uses the 2.4 gigahertz (12 cm) UHF and 5.8 gigahertz (5 cm) SHF ISM radio bands. Anyone within range with a wireless modem can attempt to access the network; because of this,

Wi-Fi is more vulnerable to attack (called eavesdropping) than wired networks. Wi-Fi Protected Access is a family of technologies created to protect information moving across Wi-Fi networks and includes solutions for personal and enterprise networks. Security features of Wi-Fi Protected Access constantly evolve to include stronger protections and new security practices as the security landscape changes.



4.12. Smoke Detector

A smoke detector is a device that senses smoke, typically as an indicator of fire. Commercial security devices issue a signal to a fire alarm control panel as part of a fire alarm system, while household smoke detectors, also known as smoke alarms, generally issue a local audible or visual alarm from the detector itself. Smoke detectors are housed in plastic enclosures, typically shaped like a disk about 150 millimeters (6 in) in diameter and 25 millimeters (1 in) thick, but shape and size vary. Smoke detectors in large commercial, industrial, and residential buildings are usually powered by a central fire alarm system, which is powered by the building power with a battery backup.

5. SOFTWARE USED

one of the best simulation software for various circuit designs of microcontroller. It has almost all microcontrollers and electronic components readily available in it and hence it is widely used simulator.It can be used to test programs and embedded designs for electronics before actual hardware testing. The simulation of programming of microcontroller can also be done in Proteus. Simulation avoids the risk of damaging hardware due to wrong design.

6. FUTURE WORK & CONCLUSION

For future developments it can be enhanced by developing this system for large acres of ecosystem: ie National Park, Sanctuary etc. Also the system can be integrated to check the quality of the soil and the growth of crop or plants in each soil. The sensors and microcontroller are successfully interfaced and wireless communication is achieved between various nodes. All observations and experimental tests prove that this project is a complete solution to field activities and irrigation problems. Implementation of such a system in the field can definitely help to improve the yield of the crops or plats and overall production.

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