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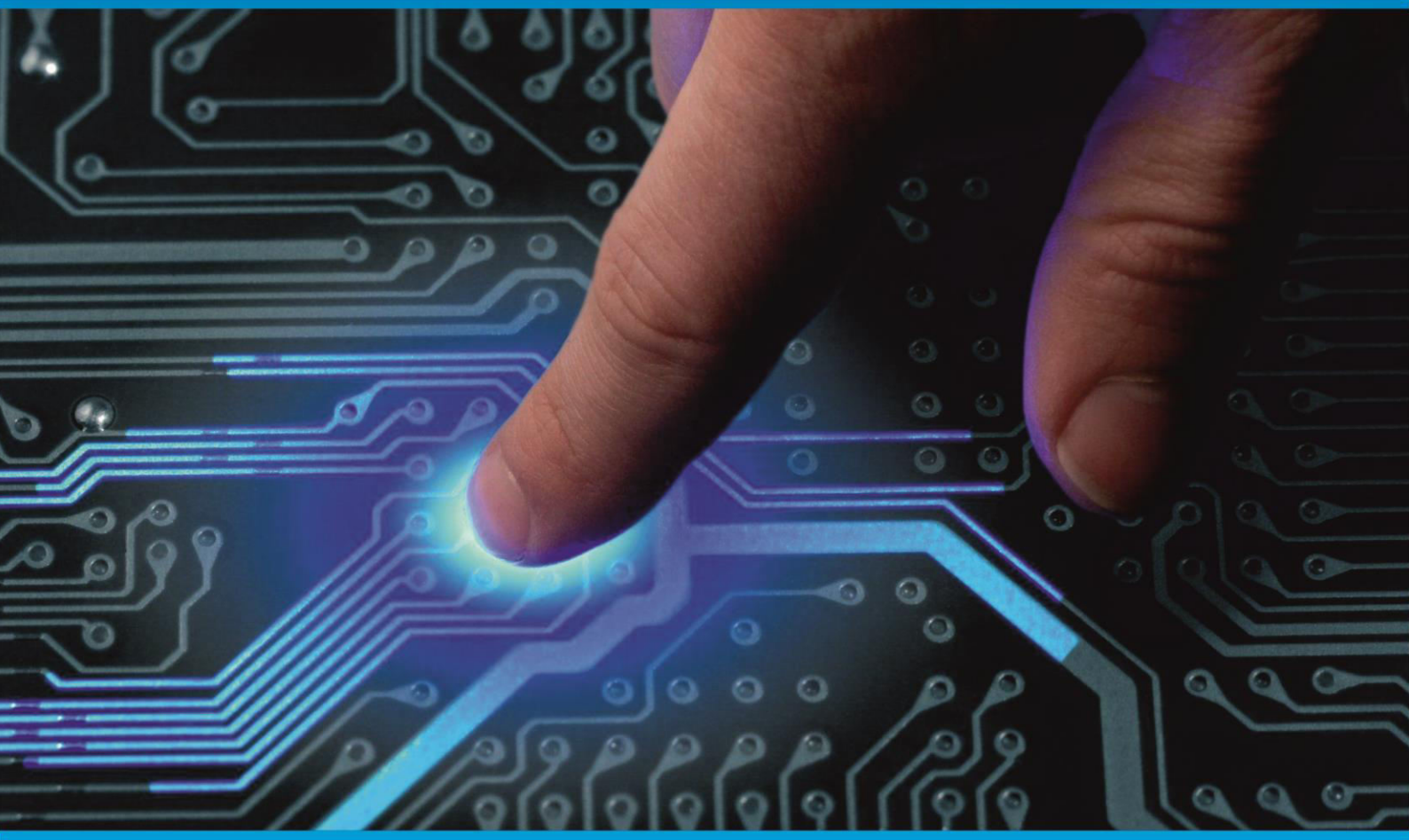

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Agricultural Field Monitoring System Based on IOT

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ABSTRACT:With new technological advancement in controlled-environment agriculture systems, the level of productivity has significantly increased. Agriculture systems are now more capable, reliable, and provide enhanced productivity. An agriculture environment can range from a single plant in a house, a backyard garden, a small farm, to a large farming facility. These agricultural automated systems will help in managing and maintain safe environment especially the agricultural areas. In this paper, we propose a smart Agriculture System (AgriSys) that can analyze an agriculture environment and intervene to maintain its adequacy. The system deals with general agriculture challenges, such as, temperature, humidity, and soil moisture support. The system interventions are mainly intended to maintain the adequacy of the agriculture environment.

KEYWORDS: IOT, Smart Agriculture Systems, MATLAB, sensor, Locust identification, IOT module.

I.INTRODUCTION

Agricultural is the backbone of Indian Economy. In India most of the people earn from agriculture. The primary process involved are collecting of information and analyse. In this project we can do lessen manual work in the agriculture using sensors. The monsoons are irregular unevenness of availability of water throughout the year poses a major problem. Due to this the yield of crop become low, farmer suffer large financial losses become of usage of incorrect irrigation mechanism insect pest and wrong prediction of weather, for getting higher yield on crops monitoring is the ritual task for the farmers.

In this agricultural monitoring system is used to better products quality, control over the risks, data that works for you, using sensor irrigated automatically, drained the water stagnant, labour cost reduced for maintenance.

This paper propose agricultural field monitoring system based on IOT technology. These agricultural automated systems will help in managing and maintain safe environment especially the agricultural area . A wireless sensor network (WSN) is a wireless network in which various sensor are inter connection to monitor physical or surrounding environmental condition. The system deals with general agriculture challenges, such as, temperature, humidity soil moisture and pest identification. Using sensor, irrigated automatically, drained the water stagnant in the field automatically during rain. Ultrasonic sensor is used for water level measurement, rain sensor is used to unpredictable management, soil moisture sensor is used to measure the water content of soil. Image processing techniques in MATLAB for an automatic pest identification . The systems interventions are mainly intended to maintain the adequacy of the agriculture environment.

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II. RELATED WORK

The Internet of Things is the network of physicaldevices, vehicles, buildings and other items embedded with electronics, software, sensors, actuators and network connectivity that enable these objects to collect and exchange data.

IOT allows objects to be sensed and 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. When the IOT based agriculture monitoring systems starts it checks the water level, humidity and moisture level. It sends the information about the levels. Sensors sense the level of water if it goes down, automatically starts the water pump. This all is displayed on the LCD display module. This all is also seen in IOT where it shows information of humidity, moisture and water level.

In the proposed system, agricultural field monitored automatically using IOT and sensors. The smart irrigation system provides away on timely management based on the real time data sensed by the sensor. It will analyses the field parameters such as temperature ,soil moisture. The soil moisture sensor will monitor moisture level, temperature sensor will monitor temperature level. Image processing techniques in MATLAB for an automatic pest identification . The systems interventions are mainly intended to maintain the adequacy of the agriculture environment.

III. DEVELOPMENT TOOLS

1.HARDWARE REQUIREMENTS

A.ARDUINO MEGA:

The MEGA 2560 is designed for more complex projects. With 54 digital I/O pins, 16 analog inputs and a larger space for your sketch it is the recommended board for 3D printers and robotics projects. This gives your projects plenty of room and opportunities. The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 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.

B.SOIL MOISTURE SENSOR:

This sensor can be used to test the moisture of soil, when the soil is having water shortage, the module output is at high level and else the output is at low level. By using this sensor one can automatically water the flower plant, or any other plants requiring automatic watering technique. Module triple output mode, digital output is simple, analog output more accurate, serial output with exact readings.

C.HUMIDITY SENSOR

This DHT11 Temperature & Humidity Sensor features a temperature & humidity sensor complex with a calibrated digital signal output. By using the exclusive digital-signal-acquisition technique and temperature & humidity sensing technology, it ensures high reliability and excellent long-term stability. This sensor includes a resistive-type humidity measurement component and an NTC temperature measurement component, and connects to a high-performance 8-bit microcontroller, offering excellent quality, fast response, anti-interference ability and cost-effectiveness. Each DHT11 element is strictly calibrated in the laboratory that is extremely accurate on humidity calibration. The single-wire serial interface makes system integration quick and easy.

D.ULTRASONIC SENSOR

Sound is a mechanical wave travelling through the mediums, which may be a solid, or liquid or gas. Sound waves can travel through the mediums with specific velocity depends on the medium of propagation. The sound waves which are having high frequency reflect from boundaries and produces distinctive echo patterns.

Sound waves are having specific frequencies or number of oscillations per second. Humans can detect sounds in a frequency range from about 20Hz to 20 KHz. However the frequency range normally employed in ultrasonic detection is 100 KHz to 50MHz. The velocity of ultrasound at a particular time and temperature is constant in a medium.

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W = C/F (or) W = CT

Where W = Wave length,

C = Velocity of sound in a medium,

F = Frequency of wave,

T=Time Period.

E. RAIN DETECTOR SENSOR

The YL-83 operates via droplet detection rather than by signal level threshold. A special delay circuitry allows about two-minute interval between raindrops before assuming an OFF (no rain) position. This enables the sensor to accurately distinguish between rain cessation and light rain. The YL-83 also features an analog Rain Signal for estimating rain intensity. Since this signal is proportional to the percentage of moist or wet area on the sensor plate, rain intensity has a direct impact on the amplitude and variation of this analog signal. The YL-83 sensor is positioned at a 30° angle. This design, together with the internal heating element, ensures that the surface dries quickly, an essential factor in calculating intensity. The same heating element also protects the surface from fog and condensed moisture, and is activated at low temperatures in order to melt snow, thus allowing snow detection. Sensor performance is not affected by reasonable amounts of dirt and dust due to droplet detection. It is intended to be used in areas with only rain or wet/moist snow precipitation.

F. LIQUID CRYSTAL DISPLAY

LCD screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

G.IOT

The internet of things (IoT) is the network of physical devices, vehicles, 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 and 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.

H. WATER PUMP MOTOR

As the name implies, water pumps pump water. Whether that is in a vehicle, at a business, in the home, or in a well, shoppers can probably find a water pump to fit their vehicle or to help them draw water from the ground in a self-dug well to be used in pressure tanks within the location. Vehicle water pumps help regulate the flow of water through a vehicle's cooling system; when the seal on these go bad, the whole pump must be replaced. Located within the home or business, pressure water pumps regulate the water pressure year round, controlling water flow to different areas of the location.

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I.SOLAR ELECTRICITY

If you truly wish your source of energy to be independent, there are only a few choices: solar in the form of solar electric panels, hot water panels, and passive heating; wind generators for electric production and windmills for water pumping; and hydro electric generators.

J.SERVO MOTOR

A Servo Motor is a small device that has an output shaft. This shaft can be positioned to specific angular positions by sending the servo a coded signal. As long as the coded signal exists on the input line, the servo will maintain the angular position of the shaft. If the coded signal changes, the angular position of the shaft changes. In practice, servos are used in radio-controlled airplanes to position control surfaces like the elevators and rudders. They are also used in radio-controlled cars, puppets, and of course, robots.

2. SOFTWARE REQUIREMENTS

A. ARDUINO IDE

Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom right hand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

B.EMBEDDED C

Embedded System is a system composed of hardware, application software and real time operating system. It can be small independent system or large combinational system.

Our Embedded System tutorial includes all topics of Embedded System such as characteristics, designing, processors, microcontrollers, tools, addressing modes, assembly language, interrupts, embedded c programming, led blinking, serial communication, LCD programming, keyboard programming, project implementation etc.

III. WORKING

In this system, we use ARDUINO MEGA (ATmega2560) microcontroller which acts as brain of the system, because the entire system program instruction stored in it. Here we have temperature and humidity (DHT11) sensor to know the atmospheric status. Soil moisture sensor is used to check the field soil dry or wet, if dry, automatically triggers the pump motor to ON stage to irrigate the field. Ultrasonic sensor is used to check the water level in the water well or sump. Rain sensor is used to check the status of rain, if rain detects using servo motor to remove water stagnant in the agricultural field.All the sensors data is displayed in the LCD and also monitored using IOT.

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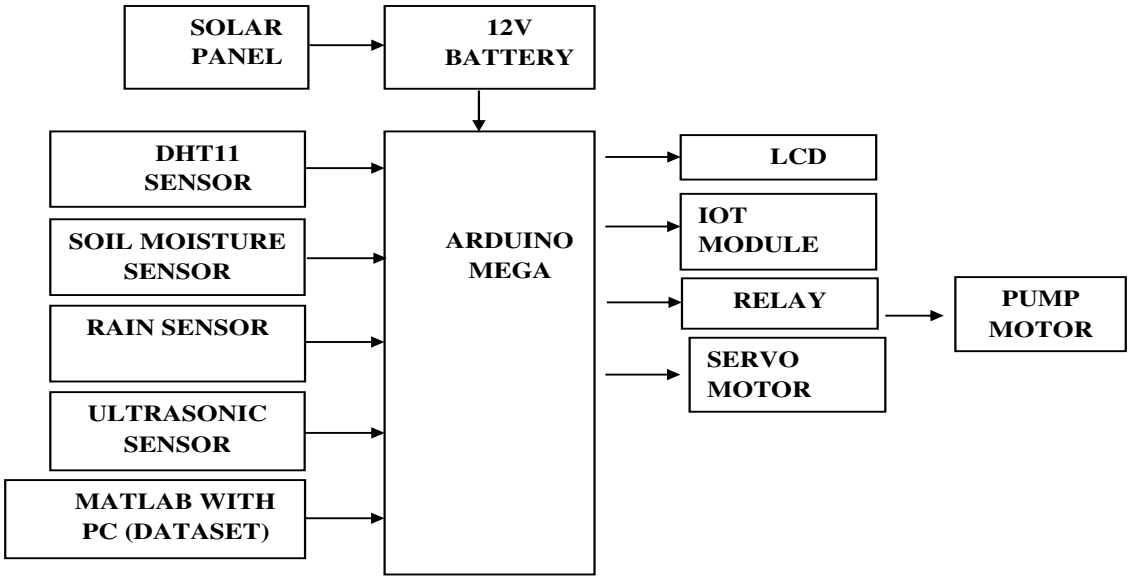
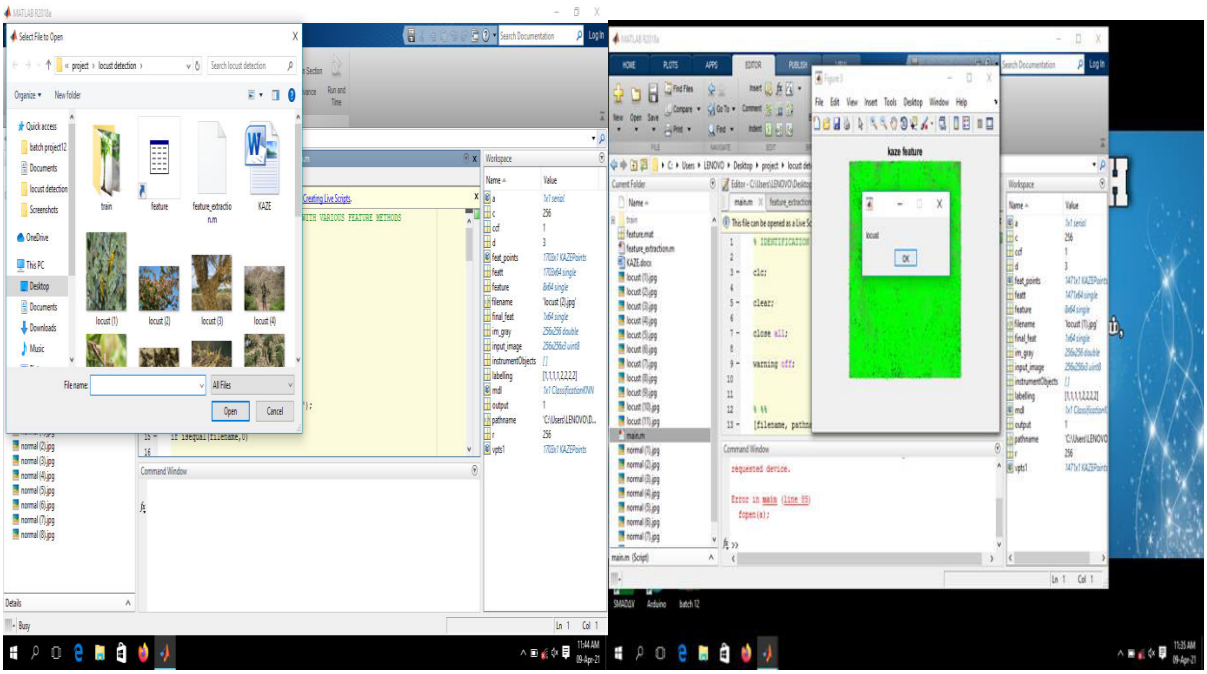
IV. SYSTEM ARCHITECTURE



V. EXPERIMENTAL RESULTS

LOCUST IDENTIFICATION



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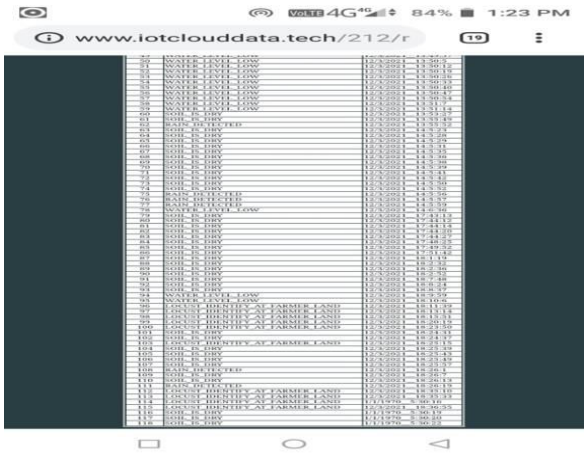
RAIN DETECTION

SOIL MOISTURE

DISTANCE AND TEMPERATURE

WEBPAGE



VI. CONCLUSION

This paper thus explained a empirical model of how the Internet of things can be applied to our Indian agriculture. We initially proposed a model outline of how the IOT concept can be illustrated with respect to our Agricultural practices. Later in the construction of sensors we discuss about the various types of sensors and the type of sensors that will be required for our Agricultural purposes. We also discuss about the types of communication that we have for near and far nodes communication. Thus we propose this idea to the son of the soil to benefit at the most.

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