Fully Automated Smart Crop Field Monitoring and Protection System Against Numerous Behaviours Of Wild Animals

Dr.Prabhavathi S[1], Manasa V[2]

[1]Professor,Department of E & CE,RYMEC,Ballari

[2]M.Tech Student,DCN,RYMEC,Ballari

Abstract. The automated smart agricultural field monitoring and protection system prototype was created utilising easily available hardware and firmware to assist farmers in avoiding several aspects that typically result in crop yield loss. It is typically challenging to continuously monitor the weather and environment, so we have proposed a project in the crop field to use IOT, including Arduino and sensors like temperature sensors, moisture sensors, and humidity sensors that measure the key parameters throughout the day, to supervise the weather and any environmental changes. IOT is also used to transmit parameters that are measured by sensors. Using determined parameters, we can spray insecticides to identify and prevent loss in the crop yield.

Keywords: Arduino,supervise,Iot.

1 Introduction

Farm crops are often attacked by local animals such as buffalo, elephants, goats and some type of birds. The farmer loses a lot because of this. Deforestation occurs as a result of overcrowding, which leads to food shortages, water shortages, and protection in forest areas. As a result, the involvement of animals in the domestic environment is growing daily, posing a threat to human health and property, resulting in conflict between humans and animals. However, according to the laws of nature, all living things on our planet play an important role in the ecosystem. Elephants and other animals that come in contact with humans are affected in a variety of ways, including the destruction of crops, damage to grain reserves, water, buildings, and other objects, as well as injuries and deaths.

India's economy is based on agriculture. As the world's population grows rapidly, agribusiness is increasingly important in solving human problems. It plays an vital role in the country's economy and the growth of farmers. It also provides a large number of job opportunities for the general public.

The Automated Smart Agricultural Protection System assists in the construction of a safety system to protect the farm and prevent the entry of animals. The system uses an IoT module to inform the farmer. It also helps to protect plants from wildlife. The system prevents the alarm from being triggered by a person 's presence within the arena or by any random movement. The device is able to turn on / off automatically and avoid predators, protecting the stadiums from damage. We can also set the timer according to the needs of the farmer. In addition, by generating energy in rainwater and solar panels and providing information to an authorized person, this approach eliminates crop damage caused by heavy rainfall and extreme weather.

2 Related Work

[1] Shaik Imam suggested that the Automotive Environmental Monitoring System uses IoT Technology. The aim is to design a smart system that will provide the right location monitoring. Temperature, gas, and humidity are sensed, and digital data is transmitted to a remote computer via WI-FI.

[2] Abhinav V.Deshpande et al. introduced a sensory-based fence project. When the animals come in contact with the exposed cable, the circuit is stopped, and we receive an input signal indicating the animal's presence on the phone. After receiving the first input signal, it is sent to the amplifier circuit for further processing. It will then be sent to a microcontroller. The system would be turned on, the buzzer would sound, the light would flash at night, and a message would be sent to the farmers.

[3] Prof. Megha Yaligar, Shaini H Nagur, Nehaparveen Binkadakatti, Pavitra Go-kavi, and Mouneshwari Shinde have launched the Android and IoT-based Agriculture System. The project aims to improve agricultural performance by bringing ag-riculture-related knowledge and problem solving. When the soil is really dry, the buzzer will sound an alarm or a notification will be sent to the user. The user also receives a notification that the soil is dry and that you need to irrigate. All data is stored in the cloud. The reader can find information in this section by following the step-by-step method.

As Multiple Methodology and Techniques nowadays evolve, the goal and goal is to provide farmers with the backbone of the country, a smart system that keeps an eye on the farm from many limitations such as irrigating the field according to soil moisture content, Protection from pests and water, This ingenuity makes it all the more profitable for the farmer.

3 Methodology

The working of this system is divided into two parts. With the help of the Arduino compiler, we use the AVR Atmega328 microcontroller to perform the general functions of the circuit.

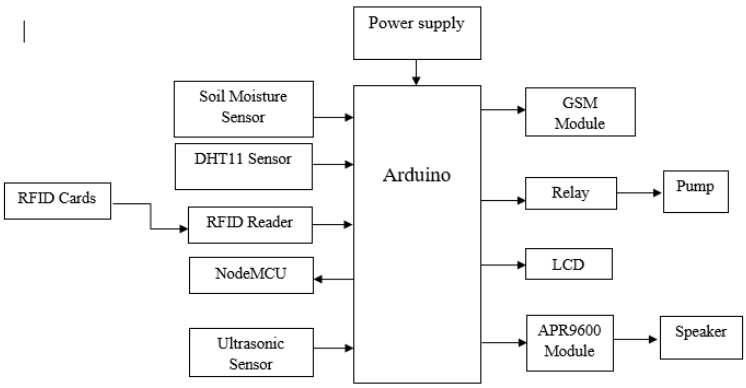

Fig 1: Block Diagram of Proposed Model

Due to water shortages, agriculture is currently facing a number of challenges. A high-quality irrigation system is developed to help farmers overcome their problems. Various sensors are attached to the input ports of the Arduino microcontroller in the system, which includes soil moisture and Ultrasonic (import detection system). The LCD displays the sensor values obtained. The farmer will be notified of current environmental conditions by the GSM module if the value exceeds the system limit settings. The farmer can get information about the condition of the field at any time using this technology. We use RFID reader and cards to concentrate the pesticides, and when you swipe the card, the concentration of water and solvents are displayed. Data from sensors will be sent to the cloud server via the Node MCU. A diagram of the proposed Model block is shown in Figure 1.

3.1 Arduino

Arduino is a tool that receives feedback from different detectors and performs calculations on board issues. Microcontroller development board for writing software for tackle circuit. Includes AVR Atmega328 microcontroller. It is a powerful 8-bit CMOS microcontroller based on the RISC advanced AVR Armature Armature. It has 14 digital I / O legs, 6 analog input, 16 MHz oscillator demitasse, USB connection, power connector, ICSP header, and reset button. It contains everything you need to support your microcontroller. Just connect it to your computer with a USB cable or connect an AC plug or battery.

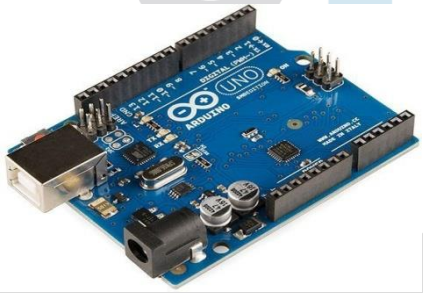

Fig 2: Arduino

3.2 LCD

LCD technology is used in the display of the scrub pad and other low-end PCs. LCDs, such as LED technology and gas-tube, allow for much smaller contributions than cathode ray tube technology (CRT). A 16x2 TV display is a standard set with a variety of biases and circuits. These modules, which include more than seven corridors, as well as multi-fragment LEDs, are popular. The reasons for this are that LCDs are affordable; they are perfectly organized; they have no restrictions on displaying unique and custom characters (as opposed to seven parts), movement, and so on. A 16x2 LCD can display up to 16 characters per line, and there are two of them.

3.3 Node MCU

NodeMCU is an open source platform and developer kit that allows you to create your own IoT product with a few lines of Lua text. PWM, I2C, SPI, and UART connections are all possible with a few GPIO board pins. The module interface is divided into two parts: firmware and hardware, the first based on ESP8266 Wi-Fi SoC and the last on the ESP-12 module.

The firmware is in Lua, an easy-to-read text that provides a straightforward editing environment integrated with a fast script that connects you to a large engineering community.

4 Proposed System

The use of embedded systems is almost limitless because it uses embedded com-puters in a new way to introduce a new product to the market every day. In recent years, devices such as microprocessors, microcontrollers have become much cheaper. For embedded systems, the GPRS Module is one of the most widely used communication modules. The GPRS Module is a device that allows a small controller (or microprocessor) to communicate with the GPRS Network.

GSM and GPRS terms refer to the Global System for Mobile and General Packet Radio Service, respectively.), power supply, and indicators. We can connect to the GSM GPRS Module in GPRS MODEM via an external device using this interface (or sub-controller). Microcontrollers can wirelessly communicate with other devices and devices using GPRS modules. Automation, security systems, disaster management, medical support, vehicle tracking, online banking, and e-commerce, to name a few, can all benefit from wireless microcontroller connections.

4.1 Arduino IDE

Integrated Development Environment, or Arduino IDE, is a system officially released by Arduino.cc and is primarily used to

authorize, compile, and upload code to Arduino devices. With this open source program, easy to install and use to begin compiling codes while on the go, almost all Arduino modules are compatible. technology can make their feet wet in the learning process. Arduino IDE is an open source program used primarily for writing and compiling codes in the Arduino Module. Works on Java Platform, easily accessible on OS such as MAC, Windows, and Linux. This forum has built-in functions and important instructions for debugging, fixing, and compiling code locally. Several Arduino modules are available, including Uno, Mega, Leonardo, Micro, and many more. On the board of all of them is a microcontroller that is configured and captures data in the form of a code.

Arduino's main website has a software download link. Make sure you get the right software version that is really compatible with your operating system because, as I said, it is available on popular operating systems like Linux, Windows, and MAX. Make sure you have Windows 8.1 or Windows 10 before trying to download the Windows app version because it is not compatible with previous versions of this application.

Three key areas make up the IDE area: menu bar, text editor, and exit window. The IDE software will look like the image below once you have downloaded and presented it.

Using a code containing all the previously defined Thresholds, the code is discarded to arduino and integrated with all hardware components working simultaneously to provide the desired results that produce the best crop benefits.

5 Outcomes

The Below Figure 3 shows the prototype of the project with title. It consists of all the hardware components that are described in the previous chapters, that is a combination of both hardware and firmware.

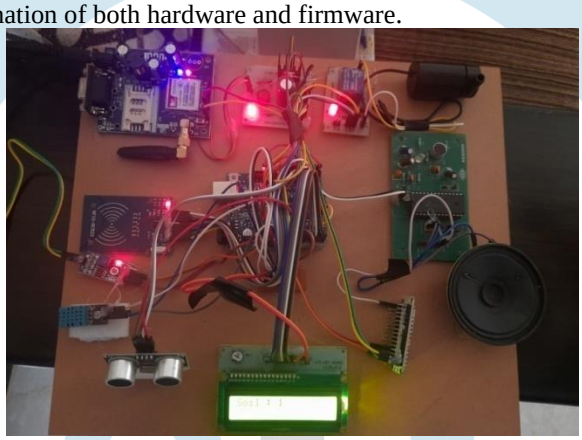

Fig 3: Prototype of the Work.

When the circuit is switched on, All the Components receive power and start functioning, with the arduino IDE code that has been dumped into the device, the GSMA module starts collecting data with the help of WIFI module. All the sensors start activating and sense the parameters. Soil Moisture Sensor as placed inside soil (Earth), keeps checking for the parameters whenever the moisture content is dry, it means that the soil or land and in particular the field/Crop requires water. This is when the System becomes alert and sends a SMS to the mobile number of the owner saying land is dry, this can be seen in Figure 4.

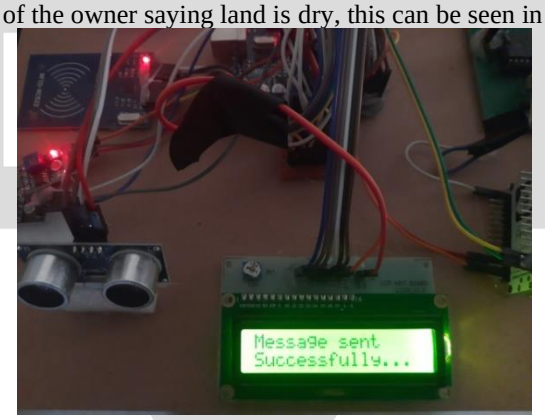

Fig 4: Prototype of SMS sent.

When the SMS is sent to the owner stating that land is dry, as per the code that is pre-defined, the next step to take in action is power on the DC water pump for the purpose of irrigating the field. The DC water pump starts taking water from the inlet valve and irrigate the field until required moisture content of soil is met. Once the requirement is met, the DC water pump gets off. The System also checks for the Humidity count value in the atmosphere and this is shown in Fig 5.3. The parameters that the System checks is for Temperature in degrees in the environment, Humidity factor, Whether the soil is dry or moist, the distance of any suspected wild animal present that may destroy the crop yield. In case the distance is found to be a near value, then with the help of ultrasonic sensor the message gets detected and a voice module gets activated thereby repeating the message “Animal Detected”. This can alarm the nearby farmers so that they can take action accordingly.

All the data collected by the system is uploaded to cloud via IOT. Things speak Software does this by representing a clear picture of all the parameters over a scale of months or days.

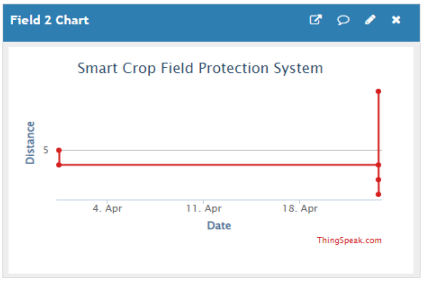

Fig 5 : Chart showing variations of distance of animal in crop in ThingSpeak.

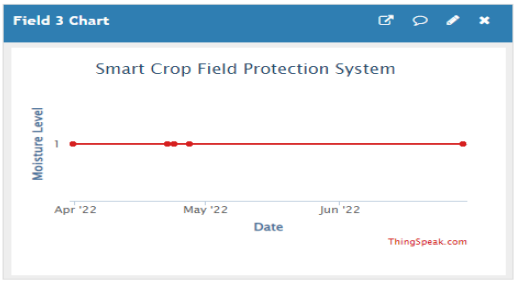

Fig 6 : Chart showing variations of Moisture level in crop in ThingSpeak.

6 Conclusion

This method states that fast data transfer via IoT makes irrigation systems independent. The main advantage of IoT is that the data is transmitted even when users are not connected to the node network, and whenever the user is connected to that node, they are able to view the data already delivered. To increase plant production, they can monitor daily changes in the atmosphere. Additionally, it reduces the need for pesticides by 30 to 40 percent. Currently, the most important issue for the community is the issue of wildlife and plant fires. As there is currently no effective solution to this issue, it needs urgent attention. As a result, this project has significant social significance because it seeks to solve this problem. This work will help farmers to protect their fields and fields, protect them from financial losses, and prevent them from making futile efforts to protect their fields. They will also benefit from higher crop production, which will improve their economic prosperity.

The concept can be constructed based on image processing in the future, where wildlife can be seen with cameras and, as they approach the farm, the system will work faster with wireless networks. Wireless networks, such as laser wireless sensors, can also be used to identify wildlife, and a security system will be involved if this happens.

References

1. V. Bavane, A. Raut, S. Sonune, A. Bawane, and P. Jawandhiya, “Protection of crops from wild animals using intelligent surveillance system.”
2. R. Vigneshwar and R. Maheswari, “Development of embedded based system to monitor elephant intrusion in forest border areas using internet of things,” International Journal of Engineering Research, vol. 5, no. 7, pp. 594–598, 2016.
3. T. Day and R. Mac Gibbon, “Multiple-Species Exclusion Fencing and Technology for Mainland Sites.”, Project Report published by National Wildlife Research Centre, 2007.
4. www.wikipedia.com
5. https://www.arduino.cc