SMART CROP PROTECTION USING ARDUINO

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Abstract - Agriculture has always been the primary and the most important sectors of Indian economy. Farmers are the back bone of one's country, so it is important for us to make sure he has the access to resources that are essential. Conventional methods like scare crows are used even today in an agricultural field to avoid birds and animals from feeding on growing crops. There are many loopholes in such ideas and so improvising agricultural security has become a major issue these days. Thus, this paper focuses on proposing a system which detects the intruders, monitors any suspicious activity and then reports to the owner of the field. It acts as an adaptable system which provides a practicable system to the farmers for ensuring complete safety of their farmlands from any attacks or trespassing activities.

This is an Arduino Uno based framework utilizing microcontroller. This framework utilizes a PIR sensor to identify intruders close to the field and additional to it a smoke sensor to identify the smoke produced from the fire and a soil moisture sensor to detect the volumetric water content in the soil.

I. INTRODUCTION

India is an agricultural land. Farming has unendingly been India's most critical economical sector. While the greater part of India's population is indulged into farming, the farmers still experience numerous issues.

Accordingly, interruption of creatures in local locations is being raised step by step which is influencing the human existence, property that makes struggle among human and creatures. Agriculture is the foundation of the economy, nevertheless, would bring about gigantic harvest misfortune due to creature interruption in agricultural land. Elephants and other creatures entering into people's place of residence has bought adverse consequence in different ways, for example, crop annihilation, harm to food stores, water supply, homes and other properties, injury and human demise. Struggle between human creatures may likewise be a difficult issue where huge amounts of cash are squandered and life is in danger. Farmers in India have been confronting genuine dangers from natural calamity, bugs and harm by creatures prompting lower yields. Conventional techniques trailed by farmers aren't much viable and it's not achievable to recruit monitors to focus an eye on the yields and prevent nature creatures. Consequently, this zone is to be checked consistently to forestall section of this sort of creatures or the other undesirable.

II. LITERATURE SURVEY

SnehaNahatkar et al,[1] has proposed a home embedded security system which evaluates the development of a low-cost security system using small PIR (Piezoelectric Infrared) sensor built around a microcontroller with ultra- low alert power. PIR sensor detects the presence of individuals not at thermal equilibrium with the surrounding environment. On detecting the presence of any unauthorized person, it triggers an alarm & calls to a predefined number through a GSM module. After the MCU sends the sensor signals to the embedded system, the program starts the Web camera which captures the images that can be viewed and analyzed later.

M. Sathishkumar et al,[2] the proposed surveillance system is based on an embedded system along with GSM module and sensor networks. The movement of the warm body is detected by the PIR sensor. The system triggers an alarm detecting the presence of a warm body and simultaneously sends how many people have intruded via sending a SMS through GSM Module. When the security system is activated, additionally the CCTV camera is activated. This highly reactive approach has low computational requirement. Therefore, it is well suited for home surveillance system. This surveillance system is implemented using PIC micro controller, camera, GSM and sensors.

T. Gayathri et al,[3] proposed a system for monitoring the status of crops growing continuously throughout the year. But in real time, cultivator faces too many problems in the farmland. This paper eases the work of the farmer in cultivated land through the usage of different kind of sensors. The two LDR sensors are interfaced with PIC16F877A embedded system whereas its top array receives solar radiation to supply the charge and the bottom of the LDR array is for measuring leaf area index (LAI). The soil moisture sensor will measure the moisture level in the corn field, if the level decreases, then it automatically turns ON the DC motor. All this information of the cropland is sent to the farmer through GSM and displayed on the LCD screen.

III. RELATED WORK

Most of the farmers in India use electrical fence to guard the crops. However, this system has some issues like occasionally voltage drop occurs and the owners of the fence has to check the voltage however they cannot know it without going there and this system is harmful to the animals.

VI.OBJECTIVE

The main objective of this proposed project is to help farmers protect their crops from animals and fire. PIR sensor detects the animal while crossing it, by sensing the movement of the animal and alerts the owner of the field about the situation created, smoke detector detects the smoke caused by fire and soil moisture sensor which helps them to track the volumetric water content in soil.

V. PROPOSED SYSTEM

In the proposed system, crop monitoring is done where sensors are used to collect information from the agricultural field by our proposed work, PIR, Smoke sensor and GSM is used along with soil moisture sensor providing farmers more information about the water content present in the soil. When animals approach close to the PIR sensor, it detects the movement. After getting the initial input signal from the warm body, it is passed for further processing, then it will be passed on to the microcontroller. Then the system will be activated, immediately the buzzer goes on, and simultaneously it sends an SMS to the owner. Microcontroller (Arduino UNO) is used for reading the inputs from PIR, Soil Moisture Sensor and Smoke sensor. The GSM module is used for sending SMS to farmer when movement or smoke is detected.
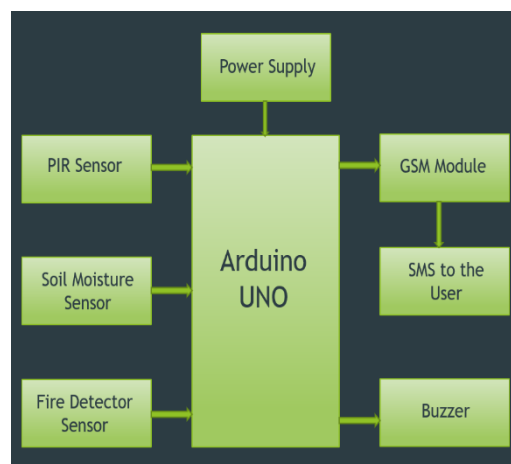

Fig.1 Block Diagram of Smart Crop   Protection System

VI. HARDWARE USED

ARDUINO UNO

The Arduino Uno is an open-source microcontroller board. It is The Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is outfitted with sets of advanced and simple information/yield (I/O) pins that may be interfaced to different expansion boards (safeguards) and different circuits. The board has 14 computerized I/O pins

(six equipped for PWM yield), 6 simple I/O sticks, and is programmable with the Arduino IDE, by means of a sort B USB link. It tends to be powered by the USB link or by an outside 9-volt battery, however it acknowledges voltages somewhere in the range of 7 and 20 volts.

GSM MODULE

A GSM/GPRS modem is a class of remote modem, intended for correspondence over the GSM and GPRS organization. It requires a SIM (Subscriber Identity Module) card actually like cell phones to initiate correspondence with the organization. Additionally, they have IMEI (International Mobile Equipment Identity) number like cell phones for their distinguishing proof. It was made to depict the conventions for second-age (2G) advanced cell networks utilized by cell phones and is presently the default worldwide standard for mobile correspondences.

SMOKE SENSOR

A smoke alarm is an electronic that detects smoke, ordinarily as a pointer of fire. Smoke alarms are housed in plastic fenced in areas, commonly formed like a circle about 150 millimeters (6 in) in measurement and 25 millimeters (1 in) thick yet shape and size differ. Smoke can be detected either optically (photoelectric) or by actual cycle (ionization). Detectors may utilize one of the two, or both detecting techniques. Touchy alerts can be utilized to identify, and prevent, individuals smoking in regions where smoking is restricted. The Analog Smoke/LPG/CO Gas Sensor (MQ2) module uses a MQ-2 as the delicate segment and has an insurance resistor and a movable resistor ready. The MQ-2 gas sensor is

touchy to LPG, I-butane, propane, methane, liquor, Hydrogen and smoke. It very well may be utilized in gas spillage recognizing gears in house and industry. The obstruction of the delicate part changes as the grouping of the objective gas changes.

Features

- Good sensitivity to Combustible gas in wide range
- High sensitivity to LPG, Propane
- Long life and low cost
- Simple drive circuit

PASSIVE INFRARED SENSOR (PIR)

A PIR sensor allows us to sense movement. It accustomed detect whether a warm body has moved in or out of the sensor's range. They're small, inexpensive, low-power, easy to use and do not wear out. For this reason, they're usually found in home appliances and gadgets utilized in business. PIRs are basically manufactured from pyroelectric material (which we can see above as the round-shaped plastic material with a rectangular crystal in the center), which detects the degree of infrared radiation. The sensor is actually split in two halves. The explanation for that is, that we are looking to detect motion (change) not average IR levels. The two halves are wired up so that they cancel one another out. If one half sees more or less IR radiation than the other, the output will swing high or low.

BUZZER

A buzzer is an electronic device that emits loud noise. Most current ones are affable safeguard or air-attack alarms, cyclone alarms, or the alarms on crisis administration vehicles like ambulances, squad cars and fire engines. There are two general types, pneumatic and electronic.

Specifications

- Rated Voltage: 6V DC
- Operating Voltage: 4 to 8V DC
- Rated Current: $\leq$30mA
- Sound Output at 10cm: $\geq$85dB
- Resonant Frequency: 2300 $\pm$300Hz
- Tone: Continuous

SOIL MOISTURE SENSOR

Soil moisture sensor measures the volumetric water content in soil. It is measured by using another property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content. The relation between the measured property and soil moisture must be calibrated and will vary depending on environmental factors such as soil type, temperature, or electric conductivity. Reflected microwave radiation is suffering from the soil moisture and is used for remote sensing. Soil moisture sensors typically refer to sensors that estimate volumetric water content.

VII. SOFTWARE USED

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message Area, a text console, a toolbar with buttons for common functions and series of menus. It connects to the Arduino hardware to upload programs and communicate with them.
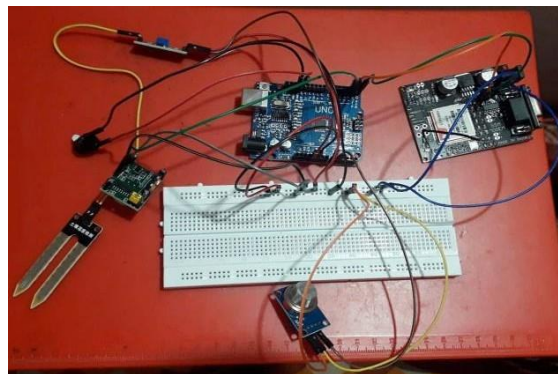
VIII. RESULT

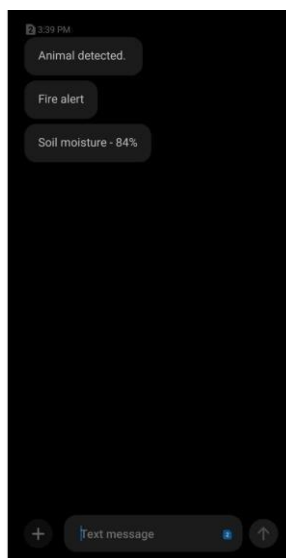*Fig.2 Shows the project prototype.*

Fig.3 Shows the SMS sent to the farmer on the animal detection, fire alert and soil moisture percentage.

IX. CONCLUSION

Farmers encounter severe animal threats in rural parts of India. It requires urgent attention as no effective solution has come into use till date for this problem. Hence, this venture conveys an incredible social significance as it intends to resolve this issue. Although the project does not completely do the needful by reducing the problems faced by the farmers, but it ensures farmers to not suffer from the loss of crops by alerting them in prior about the attack of animals.

X. ACKNOWLEDGEMENT

XI. FUTURE ENHANCEMENT

Later on, there will be exceptionally huge extension, this venture can be made dependent on Image processing in which wild animal and fire can be detected by cameras and in the event that it comes towards field, framework will be straightforwardly initiated through remote organizations. Wild creatures can likewise be recognized by utilizing remote organizations like laser remote sensors and by detecting this, laser or sensor's security framework will be actuated. In such a case the sensor sends signals to the microcontroller to make a move. The microcontroller now sounds an alert to shoo away the creatures from the field just as well as sends an SMS to the owner warning about the situation in the field.

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