Microcontroller based Smart Crop Protection System to Detect Fire and Animals

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Abstract:- The problem of wild animal attacks on crop fields i.e. crop vandalization is becoming a very common phenomenon in all states. Animals cause a lot of damage to crops either by running over them or eating them and vandalizing them completely. This leads to poor yield of crops. These animals attack on fruit orchards and destroy the flowerings and fruits. In both cases, this leads to significant financial loss to the farmers and orchard owners. The problem is so pronounced that sometimes farmers decide to leave the area barren. It is not possible for farmers to barricade entire fields or stay on field 24 hours and guard it.

In this project we are designing automatic crop protection system from animals and fire. This is the smart system using microcontroller. This system uses a motion sensor to detect wild animals approaching near the field and smoke sensor to detect the fire. In such a case the sensor will take action to give loud scary siren sound which make animals not to enter into the farm as well as sends SMS to the farmer. So, that farmer may know about the issue and come to the spot in case the animals don't turn away by the alarm. If there is a smoke then with the help of GSM module it will send SMS to the owner and the fire department. The proposed work also includes GPS device which sends location of the field to the fire department.

Keywords:- Radio Frequency Identification technology.

I. INTRODUCTION

Nowadays the economy of many countries is dependent upon agriculture. Agriculture is the backbone of the country. It produces several raw materials for industries to meet the requirements of the people. Because of the animals interference and fire the agriculture lands are getting spoiled. This leads to huge loss to the owner of the farm. And the farmers are deciding to leave the area barren. To overcome this problem we are proposing a microcontroller based smart crop protection system. Which is used to prevent the entry of animals into the farm. It sends an alert message to the owner of the farm. By using this system we can avoid losses to the farmer.

The designed project is a high level security system to protect the farm.

II. RELATED WORK

➤ In First Paper.

Sneha Nahatkar. In the proposed project is developed with a low cost security system. It consists of passive infrared sensor and smoke sensor. It sense the signal generated by the PIR sensor and it transmits the data to microcontroller. It also consists of siren. The smoke sensor detects the fire and it will turn the DC motor On. Automatically, it also consists of GSM module which is used to detect the location of the field [1]

➤ In second Paper.

T. Gayathri, this proposed system is an agriculturist using wireless sensor network that is facing lot of difficulties in the production of farmland. The microcontroller consists of 2 LDR sensors which are interfaced. It also consists of humidity sensor which will read the moisture level in the corn field. If the moisture level is decreased, then it will switch on the DC motor automatically to pump the water into the field. [2] Salha M.Alzahrani's sensing for the "Internet of Things and is Applications". Which gives the understanding of the IoT concept, components and its applications. In which the technology that allows the different things to communicate through the Internet and understanding the both. To process the collected data from the various sensors and taking the actions on those IOT uses the Artificial Intelligence technology [3].

S,R.Choury P.A.Amale, N.B. Bhawakar's "IoT based wireless sensor networks for prevention of crop from wild animals". Which provides the security for only users forming lands. That is the system is detect the presence of

wild animals that are near the forming land which has defect in taking the precautions because in case animals present near the form then it's difficult take the immediate actions on them [4].

In our project, we are using PIR and Smoke sensors along with microcontroller. By using GSM module, we will send an alert message to the field owner. The newly added feature to this proposed system is to detect the animals during night times also. The smoke sensor is also implemented to detect the smoke and fire and to immediately switch on the DC motor. It pumps the water to the field. For farmers living far away from the fields this proposed system is very useful [5].

III. METHODOLOGY

After the literature study on the crop protection against bird and animal attack and simulation of tools the next task was development of different gadgets for this application. For the development of the Perimeter control system, the first and prior most segment was Intruder detection system. Various components were used to build an intruder detection system. Opto-interrupter circuit was built to form an Intruder detection system. Different opto-interrupter circuit was built using various components such as PIR sensor, IR transmitter- Receiver and Laser source and detector pair. The performance of these opto-interrupters was studied in the laboratory and suitable option was used in the Perimeter Control System. The perimeter control system uses Intruder detection circuit and deterring devices such as Light flashers and Sound busters. This system was tested in the Laboratory for its effectiveness using animal robot. The field trials of this Perimeter control system were carried out at a test field selected near Saswad (Pune, Maharashtra, India). Initially the system had few technical issues which appeared after the installation of the system on the field. However, the problems were identified and rectified so as to resume its functioning till the date.

A wireless sensor network based perimeter control system is developed which uses sensor nodes detection the presence of an intruder in the field by analysing their trajectory and diverting them out of the field by activating the siren sound as per the requirement on the field.

In our project we are using microcontroller block for reading the inputs from PIR sensor and smoke sensor. The PIR sensor that detects the animals that are entering into the crop area and sends the data to microcontroller which intern triggers the circuit to send a message through GSM module to the owner of the farm. The GSM module and GPS device is used for sending the SMS to the owner and the fire department when smoke is detected, it turns on the motor to pump the water into the field.

It is always difficult to send data during night times when farmers are away from the field. This system is very useful to reduce manual activities. Designing the microcontroller based smart crop protection system is one

of the affordable processes and is a major concern in this project.

This would save the precious crop and prevent starvation of the animals, thus help maintaining ecological balance. The nodes in the neighborhood of the attack zone at the boundary will be activated by the central node and all other nodes in safe area are set in sleep mode in order to save power. Laboratory level system testing was conducted using animal robot. The trajectory of this Arduino based animal robot was changed through a software program. The laboratory level trials of this system have been successful. Such system can be installed easily and can be cost effective if planned appropriately.

This system will reduce the extra guarding load on the farmers to a major extent and can save their crops to enhance the overall yields. Finally, this research work has attained the baseline of the development and application of different crop security techniques showcasing the proof-of concept. There is still a scope of modifications in the crop protection systems in order to reach the sustainability of the system with respect to easy handling, cost effectiveness and reliability of these systems.

IV. WORKING

In this proposed project, Microcontroller Based Smart Crop Protection System to Detect Animals and Fire. We will use our project in field crop areas. We are using smoke sensor which detects the smoke in the crop area and sends current data to microcontroller and the motor will get activated automatically and pump the water to stop the fire. Microcontroller Block is used for reading the inputs from PIR and Smoke sensor. The entire process is controlled by the microcontroller. The GSM module and GPS device is used for sending SMS to owner and the fire department when smoke is detected it turns ON the motor to pump the water to the field.

To implement this project, we are using PIC microcontroller. In this we have more flash memory for project operation. When the object is detected the GSM module will send a message to the owner of the farm and it will be seen on the 16X2 LCD display.

The PIR sensor that detects the animals that are entering into the crop area and sends the data to the microcontroller which intern triggers the circuit to send a message through GSM module to the owner of the farm.

8MHz crystal is used to provide the required clock for the PIC 16F877A microcontroller. 22pF capacitors are used to stabilize the oscillation of the crystal. The first pin of the microcontroller (MCLR) is the Reset pin (stands for Memory Clear) which is tied to VDD since it is an active low input. LEDs are connected to PORTB via 470Ω resistors to limit current through them.

IN1 and IN2 are connected to RB0 and RB1 of PIC Microcontroller respectively which are used to provide control signal to the DC Motor. DC Motor is connected to OUT1 and urgent attention as no effective solution exists till date for this problem. Thus, this project carries a great social relevance as it aims to address this problem. This project will help farmers in protecting their orchards and fields and save them from significant financial losses and will save them from the unproductive efforts that they endure for the protection their fields. This will also help them in achieving better crop yields thus leading to their economic wellbeing.
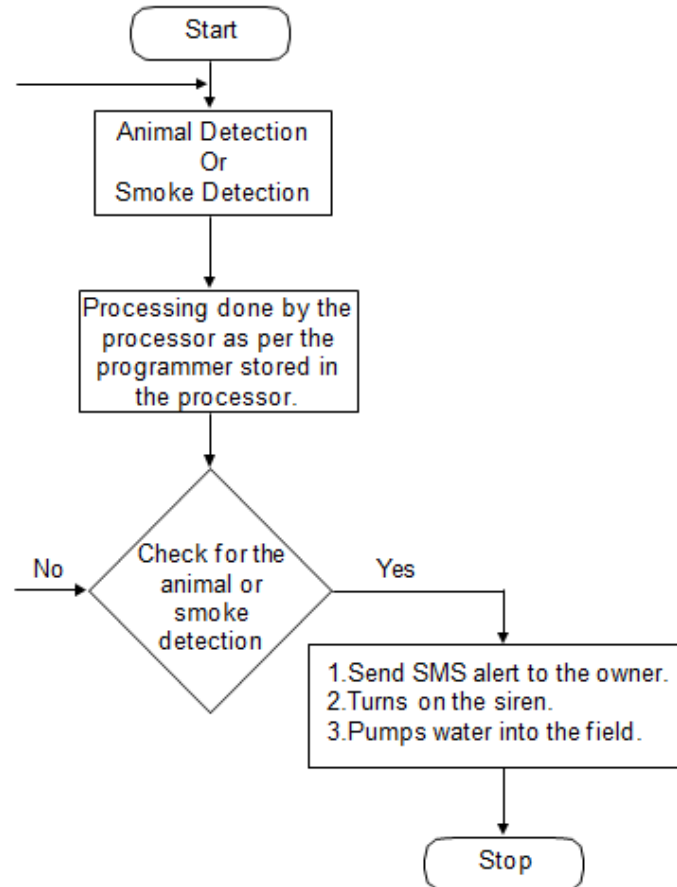

Fig 1

V. CONCLUSION

The problem of crop vandalization by wild animals and fire has become a major social problem in current time. It requires OUT2 of the L293D. By connecting the EN pin to a PWM pin of a PIC Microcontroller, the speed of the motor can be controlled.

REFERENCES

[1]. Ms. Sneha Nahatkar, Prof. Avinash Gaur, Prof. Tareek M. Pattewa "Design of a Home Embedded Surveillance System with Pyroelectric Infrared Sensor & Ultra-Low Alert Power" International Journal of Advanced Research in Electronics and Communication Engineering (IEEE) Volume: 1, Issue 3, September 2012.

[2]. T.Gayathri, S.Ragul, S.Sudharshanan, Corn farmland monitoring using wireless sensor network, International Research Journal of Engineering and Technology (IEEE), e- ISSN: 2395-0056, Volume: 02 Issue: 08, November 2015.

[3]. Salha M.Alzahrani's sensing for the "Internet of Things and is Applications (IEEE)". On Future Internet of Things and Cloud Workshops 5th International Conference 2017.

[4]. S,R.Choury P.A.Amale, N.B. Bhawakar's "IoT based wireless sensor networks for prevention of crop from wild animals"`IEEE Zonal Seminar "Recent Trends in Engineering & Technology" 2017.

[5]. Pooja G,Mohmad Umair Bagali "A smart farm land using microcontroller based crop vandalization prevention and intrusion detection system"(IEEE).