SMART CROP PROTECTION SYSTEM FROM LIVING OBJECTS AND FIRE USING ARDUINO

Dr.M. Chandra Mohan Reddy  
Professor, Electronics & Comm. Engg  
(Narayana Engineering College, Nellore, India)  
libraryecn@narayanagroup.com

Keerthi Raju  
Electronics & Comm. Engg  
(Narayana Engineering College, Nellore, India)  
keerthireddyraju@gmail.com

Kamakshi Kodi  
Electronics & Comm. Engg  
(Narayana Engineering College, Nellore, India)  
kodikamakshi@gmail.com

Babitha Anapalli  
Electronics & Comm. Engg  
(Narayana Engineering College, Nellore, India)  
babithreddy2298@gmail.com

Mounika Pulla  
Electronics & Comm. Engg  
(Narayana Engineering College, Nellore, India)  
mounipulla99@gmail.com

ABSTRACT: This paper aims at designing and executing the advanced development in embedded system for Crops in farms are many times ravaged by local animals like buffaloes, cows, goats, birds, and fire etc. This leads to huge losses for the farmers. It is not possible for farmers to barricade entire fields or stay on field 24 hours and guard it. So here we propose automatic crop protection system from animals and fire. This is a arduino Uno based 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 signals the microcontroller to take action. The microcontroller now sounds an alarm to woo the animals away from the field as well as sends SMS to the farmer and makes call, 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, it immediately turns ON a motor. This ensures complete safety of crops from animals and from fire thus protecting the farmer’s loss.

KEYWORDS: GSM, Smoke Sensor, PIR Sensor, DC Motor, Buzzer Arduino Uno.

I. INTRODUCTION

In the world, the economy of many countries is dependent upon agriculture. In spite of economic development agriculture is the backbone of the economy. Agriculture is the mainstay of economy. It contributes to the gross domestic product. Agriculture meets food requirements of the people and produces several raw materials for industries. But because of animal interference and fire in agricultural lands, there will be huge loss of crops. Crop will be totally getting destroyed. There will be large amount of loss of farmer. To avoid these financial losses it is very important to protect agricultural field or farms from animal and fire. To overcome this problem, in our proposed work we shall design a system to prevent the entry of animals into the farm by using PIR Fig.5 Our main purpose of project is to develop intruder alert to the farm, to avoid losses due to animals and fire. These intruder alert protect the crop from damaging that indirectly increase yield of the crop. The develop system will not harmful and injurious to animal as well as human beings. Theme of project is to design an intelligent security system for farm protection by using Embedded system based arduino as shown in fig.2 Animal attacks in India are a common story nowadays. Due to the unavailability of any detection system these attacks kill villagers and also destroy their crops. Due to lack of proper safety measures, these villagers are left helpless to their fate. Therefore a proper detection system could help save their lives and also to the preservation of crops. Also the crops of villagers are destroyed due to frequent interference of animals. The crops and paddy fields cannot be always fenced. So the possibility of crops being eaten away by cows and goats are very much present. This could result in huge wastage of crops produced by the farmers. To make the best use of mobile communication technology, the objectives of this paper therefore utilizes fig.3 as shown in below global system for mobile communication (GSM) and provide short message service (SMS). This system helps us to keep away such wild animals from the farmlands as well as provides surveillance functionality. It has been found that the odour of rotten egg helps to keep the wild pigs and deer from destroying the crops, hence the farmers manually spray the rotten egg solution on their fields, and firecrackers are used to ward off the wild elephants that destroy the crops. This project is based on surveillance with an animal ward-off system employed in farmlands in order to prevent crop vandalism by wild animals. In addition to providing protection this system distinguishes between an intruder and an authorized person using RFID’s, various fig.3 PIR sensors are deployed in the area to detect any motion and hence turns ON a camera when movement is detected, thereby providing real time monitoring. It involves
automation of certain methods used to prevent the wild animals from entering the farmlands and destroying the crops, an electronic fire cracker (for bigger animals, like elephant) and a rotten egg spray (for smaller animals like wild pigs and deer) which have been found useful to ward off the wild animals, we use Haar feature based cascade classifiers for object detection to distinguish between the animal and human.

II. PROPOSED SYSTEM

The main aim of our project is to protect the crops from damage caused by animal as well as divert the animal without any harm. Animal detection system is designed to detect the presence of animal and offer a warning. In this project we used Fig.5 PIR and to detect the movement of the animal and send signal to the controller. It diverts the animal by producing sound by using fig 8 Buzzer and the signal ,this signal is transmitted to Fig.3 GSM and which gives an SMS alert to farmers. And fig4 smoke sensor is used to detect fire in the form and Fig.6 DC motor is used to generate the signal it is consists of a 3v. Fig.7 LCD display is displays the receiving data. Here we are using step-down power supply 230 v as shown in Fig.9

Fig. 1 shows the block diagram of the proposed smart crop protection system from animals and fire using fig.2 Arduino Uno. As shown

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**Fig1 : Block diagram of the system**

III. EXISTING SYSTEM

Traditional electric fence has been helpful as a guard of crops. However, that system has some problems such as it cannot notify the voltage which occasionally drops. Furthermore, the owners of the fence have to check the voltage but they cannot know it without going there. An electric fence management system we develop uses wireless network technology has been developed. The system consists of several observers and a display Fig.7, the farmers are able to measure voltage at the fence, and have an ability to show it. The observers transmit the voltage with the direction of the voltage leak to the display. Here we are using 2*16 display Fig.7 as shown. The display shows the received data and the owners can know the state of the electric fence.

IV. HARDWARE USED

**Arduino Uno Microcontroller AT Mega328P**

ATmega328 is a single chip microcontroller created by Atmel in the mega AVR family. The Atmel 8-bit AVR RISC-based microcontroller combines 32 kB ISP flash memory with read-while-write capabilities, 1 kB EEPROM, 2 KBSRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device achieves throughput approaching 1 MIPS per MHz.

**GSM MODULE**

**Fig3: GSM Module**
SIM800 is a quad-band GSM/GPRS module designed for the global market. It works on frequencies GSM 850MHz, EGSM 900MHz, DCS 1800MHz and PCS 1900MHz. SIM800 features GPRS multi-slot class 12/class 10 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4. SIM800 has 68 SMT pads, and provides all hardware interfaces between the module and customers’ boards. SIM800 integrates TCP/IP protocol and extended TCP/IP AT commands which are very useful for data transfer applications.

SMOKE SENSOR (MQ-2)

![Smoke Sensor](image)

LPG Gas Sensor Module is designed to detect the presence of a dangerous LPG leak in your Home, car or in a service station, storage tank environment by interfacing with Microcontroller without ADC Channels and programming. In this version of LPG Gas sensor module two pots are included, one for trigger level setting and the other for setting sensitivity of the sensor. It allows to determine when a preset LPG gas level has been reached or exceeded. The module uses MQ-2 sensor to sense LPG leak. The MQ-2 can detect gas concentrations anywhere from 200 to 10000 ppm.

MQ-2 GAS SENSOR FEATURES
* High sensitivity to LPG, iso-butane, propane
* Small sensitivity to alcohol, smoke.
* Fast response.
* Stable and long life
* Simple drive circuit

PASSIVE INTEGRATED CIRCUIT

![Passive Integrated Circuit](image)

PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and don't wear out. For that reason they are commonly found in appliances and gadgets used in homes or businesses. Fig. 5 PIRs are basically made of a pyroelectric sensor, which can detect levels of infrared radiation. Everything emits some low level radiation, and the hotter something is, the more radiation is emitted. The sensor in a motion detector is actually split in two halves. The reason 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 each other out. If one half sees more or less IR radiation than the other, the output will swing high or low.

Features
Output: Digital pulse high (3V) when triggered (motion detected) digital low when idle (no motion detected). Pulse lengths are determined by resistors and capacitors on the PCB and differ from sensor to sensor. Fig. 9 shows the Power supply: 5V-12V input voltage formost modules (they have a 3.3V regulator), but 5V is ideal in case the regulator has different specs.

BUZZER

![Buzzer](image)

Specifications
- Rated Voltage: 6V DC
- Operating Voltage: 4 to 8V DC
- Rated Current*: ≤30mA
- Sound Output at 10cm*: ≥85dB
- Resonant Frequency: 2300 ±300Hz
- Tone: Continuous

A buzzer is a loud noise maker. Most modern ones are civil defense or air-raid sirens, tornado sirens, or the sirens on emergency service vehicles such as ambulances, police cars and fire trucks. There are two general types, pneumatic and electronic.
DC MOTOR

Motor is a device that creates motion, not an engine; it usually refers to either an electrical motor or an internal combustion engine. In most common DC motors (and all that BEAMers will see), the external magnetic field is produced by high-strength permanent magnets. The stator is the stationary part of the motor - this includes the motor casing, as well as two or more permanent magnet pole pieces. The rotor (together with the axle and attached commutator) rotate with respect to the stator. The rotor consists of winding (generally on a core), the windings being electrically connected to the commutator. The above diagram shows a common motor layout - with the rotor inside the stator (field) magnets.

LIQUID CRYSTAL DISPLAY

A liquid crystal display (LCD) is a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. Each pixel consists of a column of liquid crystal molecules suspended between two transparent electrodes, and two polarizing filters, the axes of polarity of which are perpendicular to each other. Without the liquid crystals between them, light passing through one would be blocked by the other. The liquid crystal twists the polarization of light entering one filter to allow it to pass through the other. A program must interact with the outside world using input and output devices that communicate directly with a human being. One of the most common devices attached to a controller is an LCD display. Some of the most common LCDs connected to the controllers are 16x1, 16x2 and 20x2 displays. This means 16 characters per line by 1 line, 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively.

POWER SUPPLY

All digital circuits require regulated power supply. In this article we are going to learn how to get a regulated positive supply from the mains supply.

V. RESULT

Result consists of fire alert and also turn ON the motor which is displayed on LCD and also SMS has been sent to the farmer. It also turns ON the buzzer.
VI. CONCLUSION

The problem of crop vandalization by wild animals and fire has become a major social problem in current time. It requires 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.

VII. FUTURE WORK

In the future, there will be very large scope, this project can be made based on Image processing in which wild animal and fire can be detected by fig4 PIR and if it comes towards farm then system will be directly activated through wireless networks. Wild animals can also be detected by using wireless networks such as laser wireless sensors and by sensing this laser or sensor’s security system will be activated.

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