

IMPLEMENTATION OF IOT BASED ANIMAL DETECTION SYSTEM ILLUMINATION BY USING ULTRASONIC SENSOR

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ABSTRACT

The main aim of our research paper 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 research, we used PIR and ultrasonic sensors to detect the movement of the animal and send signal to the controller. It diverts the animal by producing sound and signal further, this signal is transmitted to GSM and which gives an alert to farmers and forest department immediately.

Keywords: PIC 16F877A, PIR Sensor, Ultrasonic Sensor, APR Board, GSM.

I. INTRODUCTION

Rapid increasing of population it occurs deforestation, this results in shortage of food, water and shelter in forest areas. So, animals' interference in residential areas is increasing day by day which affects human life and property causes human animal conflict but as per nature's rule every living creature on this earth has important role in eco-system. Agriculture is the backbone of the economy but because of animal interference in agricultural lands, there will be huge loss of crops. Elephants and other animals coming in to contact with humans, impact negatively in various means such as by depredation of crops, damaging grain stores, water supplies, houses and other assets, injuring and death of humans. Farmers in India face serious threats from pests, natural calamities and damage by animals resulting in lower yields Traditional methods followed by farmers are not that effective and it is not feasible to hire guards to keep an eye on crops and prevent wild animals. Since safety of both human and animal is equally vital. So, animal detection system is necessary in farm areas.

Now days, several methods of detecting animals from the certain distance close to the paddy fields and farms include the use of human eyes to witness animal movements. It is not possible for human beings to monitor animal movements continuously throughout the day. So there is a need for specialized detection of animals particularly which enter the paddy fields and farm land of human beings. Due to the unavailability of any detection system these attacks kill villagers and also destroy their crops. The methods used for the recognition of the animals include Image Processing technique. Animal attacks are a common stories in nowadays. Due to the unavailability of any detection system these attacks kill villagers and also destroy their crops. 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. By using Image Processing we can protect the field and the lives of people. This project is also used in tourist places. Its main objective is to detect the presence of the animal using sensors. It compares the image with the pre - stored image using image processing techniques. It send alerts to the authorized person about their entry and in addition it starts a sound buzzer to deny their entry. In this system the animals are composed of automotive electric fence using light sensor and Thermal sensor. The light sensor will activate the fence when the sun goes down and the thermal sensor will detect the elephant and activate the fence during the daytime. When the elephant breaks the fence and enter, laser sensor will activate the siren. By geo point location system (GPS) technology, control room officer can view the exact place where the fence was breached. The electric fence was not controlled by any external factor so a high voltage of electric current is passed in the electric fence it may lead wild animals to dead. The farm fields are protected from elephants only. The electric current passed in the fence makes the animals drive to the unconscious state. The farm fields are protected from all kinds of wild animals. It consumes less power compared to other systems. It provides Security to the farm with the safety of animal. It does not harm the animal in any ways.

1. Specification of Tools & Techniques

a) PIC16F877A: The microcontroller that has been used for this project is pic series. PIC microcontroller is the first RISC based microcontroller fabricated in CMOS (complementary metal oxide semiconductor) that uses separate bus for instruction and data allowing simultaneous access of program and data memory. The main advantage of CMOS and RIC combination is low power consumption resulting in a very small chip size with a small pin count. The main advantage of CMOS is that it has immunity noise than other fabrication techniques. Program flash:8k; Data memory: 368 bytes; Data EEPROM: 258 bytes.

b) PIR SENSOR: A passive infrared sensor (PIR sensor) is an electronic device that measures infrared (IR) light radiating from objects in its field of view. Apparent motion is detected when an infrared source with one temperature, such as a human, passes in front of an infrared source with another temperature, such as a wall. PIR sensor detects a human being moving around within approximately 10m from the sensor. This is an average value, as the actual detection range is between 5m and 12m Power is usually up to 5V.

c) ULTRASONIC SENSOR: Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules include ultrasonic transmitters, receiver and control circuit. When an electrical pulse of high voltage is applied to the ultrasonic transducer it vibrates across a specific spectrum of frequencies and generates a burst of sound waves. Whenever any obstacle comes ahead of the ultrasonic sensor the sound waves will reflect back in the form of echo and generates an electric pulse. It calculates the time taken between sending sound waves and receiving echo working voltage of 5V.

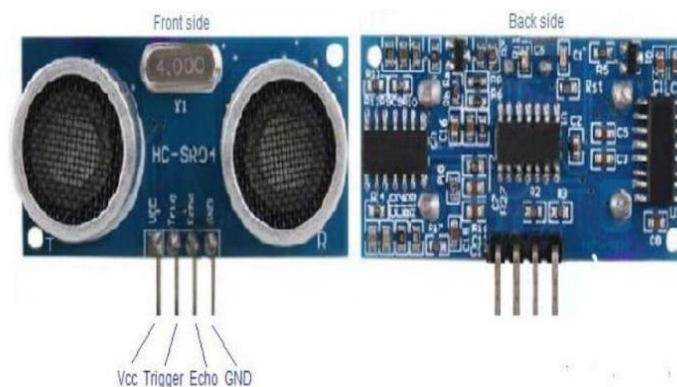


Fig 1: Ultrasonic Transmitters

d) LCD DSPLAYS: There are many display devices used by the hobbyists. LCD displays are one of the most sophisticated display devices used by them. Once you learn how to interface it, it will be the easiest and very reliable output device used by you. More, for micro controlled based project, not every time any debugger can be used. So, LCD displays can be used to test the outputs. Obviously, for last possibility, you need to know how to use this stuff pretty well. Hitachi has set up a mile stone by its LCD controller IC. one of the IC s based upon the architecture introduced by Hitachi.

e) LIGHT DEPENDENT RESISTORS: An LDR or light dependent resistor is also known as photo resistor, photocell, photoconductor. It is a one type of resistor whose resistance varies depending on the amount of light falling on its surface. When the light falls on the resistor, then the resistance changes. These resistors are often used in many circuits where it is required to sense the presence of light. These resistors have a variety of functions and resistance. For instance, when the LDR is in darkness, then it can be used to turn ON a light or to turn OFF a light when it is in the light. A typical light dependent resistor has a resistance in the darkness of 1M Ω m, and in the brightness a resistance of a couple of K Ω m. These devices depend on the light, when light falls on the LDR then the resistance decreases, and increases in the dark. When a LDR is kept in the dark place, its resistance is high and, when the LDR is kept in the light its resistance will decrease.

f) GSM SIM900A MODE: GSM SIM900A Modem SIM900A, works on frequencies 900/ 1800 MHz. The Modem is coming with RS232 interface, which allows you connect PC as well as microcontroller with RS232 Chip (MAX232). The baud rate is configurable from 9600-115200 through AT command. The GSM/GPRS Modem is having internal TCP/IP stack to enable you to connect with internet via GPRS. It is suitable for SMS, Voice as

well as DATA transfer application in M2M interface. The onboard Regulated Power supply allows you to connect wide range unregulated power supply. Using this modem, you can make audio calls, SMS, Read SMS; attend the incoming calls and internet through simple AT commands.

g) APR (AUDIO VOICE RECORDER & PLAYBACK): The aPR33A3 are powerful audio processor along with high performance audio analog-to-digital converters (ADCs) and digital-to-analog converters (DACs). The aPR33A3 incorporates all the functionality required to perform demanding audio/voice applications. High quality audio/voice. Systems with lower bill-of-material costs can be implemented with the aPR33A3 because of its integrated analog data converters and full suite of quality enhancing features such as sample-rate convertor. The aPR33A3 is specially designed for simple key trigger,

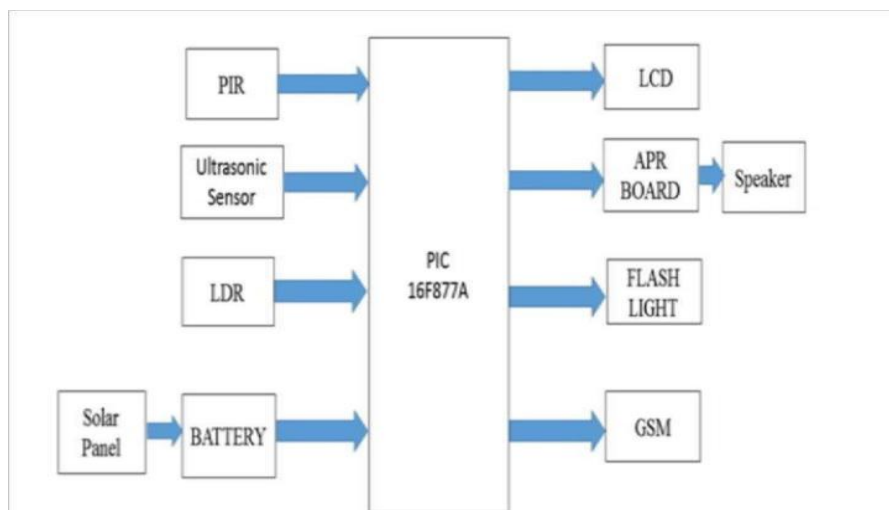


Fig 2: Ultrasonic Transmitters

user can record and playback the message averagely for 1, 2, 4 or 8 voice message(s) by switch, It is suitable in simple interface or need to limit the length of single message.

II. WORKING OF PROPOSED METHODOLOGY

In our proposed work, when the animal entered into the farm area. The PIR and ultrasonic sensor detect the presence of the animal and send an input signal to the controller. Immediately, the APR board will be on, and the sound is played to divert the animal. During night time the flash light will be on and the message will be send to the forest department and a call to the farmer. Power supply will be given by the solar panel or from regulated power supply. The LCD displays the presence of animal and LDR readings. The GSM module is used for sending SMS and make call. PIR sensor testing is done using equipment consisting of computer unit, microcontroller, and PIR sensor. The measurement system is configured as shown in Figure 4. This test aims to determine the sensitivity level of PIR sensors to the detection of objects in the form of wild animals.



Fig 3: Animal Image

The result of sensitivity measurement of PIR sensor shows that the voltage of the sensor PIR sensor to wild animal variation is the same that is 4.3 V. This is because the PIR sensor has an output of digital level. This 4.3 V

voltage is a digital level for high logic, while 0 V is a digital level for low logic. The range reaches the object indicating that the PIR sensor can still detect at a distance of 10 m for all types of animals tested. Ultrasonic signal testing is performed by making several variations of ultrasonic frequency within the range of hearing of wild animals. Several variations of ultrasonic frequency were tested against four wild animal species including 25 kHz, 30 kHz, 35 kHz, and 40 kHz. This signal is formed through programming on a microcontroller as a wave generator. Ultrasonic signal with a frequency of 25 kHz has a period of 4×10^{-5} s. Then this period of time is divided into two parts, that is, 85% for low signal and 35% for high signal.

III. CONCLUSION

After implementation design of wild animal detection and rescue system with PIR and ultrasonic sensor based on microcontroller. PIR sensor is used to detect animals in the form of cow, goats, monkeys and civets with a voltage output of 4.3 V up to a maximum distance of 5 m. Ultrasonic signal with a frequency of 40 kHz is the highest frequency that can be produced on this wild animal repellent device because of the limitations of ultrasonic speakers used with frequency response 2–50 kHz. Frequency 50 kHz is the most disturbing frequency of hearing of all wild animals that are tested at distances up to 10 m. In rural parts of India, farmers encounter severe threats such as damage done by animals. Hence, to overcome this issue we have designed a system in which sound is played and by using LDR it detects light intensity, if it is less, it will focus the light. So that wild animals will not enter into the farm. It will run away. GSM module sends message to the farmer to alert him. From this it is concluded that the design system is very useful and affordable to the farmer. The design system will not be dangerous to animal and human being, and it protects farm. In the future, there will be very large scope, this project can be made based on wireless networks. Wireless sensor network and sensors of different types are used to collect the information of crop conditions and environmental changes and this information is transmitted through network to the farmer that initiates corrective actions. Farmers are connected and aware of the conditions of the agricultural field at anytime and anywhere in the world.

IV. REFERENCES

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