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Enhancement of Smart Crop Protection from Animals Using GSM Module

R.Praveen Kumar [1], S.D. Vijayakumar [2] , T. Indhumathi [3]

G. Harini[4] , A. Indhumalini[5]

Assistant Professor [1], Associate Professor [2], UG Student [3,4,5]

Electronics and Communication Engineering [1,2,3,4,5]

Builders Engineering College-Trippur [1,2,3,4,5]

Email id:rpk.ece@builderscollege.edu.in, sdv.ece@builderscollege.edu.in, indhu.mathi9916@gmail.com , harinihnasivan@gmail.com, indhumalini26332@gmail.com

ABSTRACT

The prime basis of this project is to create a harmless, alarm system to detect trespassing animals into crop fields and thus by protecting the crops from damage created by animals in a better cost effective manner which should be work for both small area and large area fields. The sensors used in this project such as PIR Sensor and Ultrasonic Sensor ,makes an alert to farmers as well as forest department by means of making a detection of animals and sound generation respectively.We designed the system, which will be very useful and it can be used in both the network Coverage area and also in the out of coverage area.

INTRODUCTION

Though industry has been playing an important role in the Indian economy, still the contribution of agriculture in the development of the Indian economy cannot be denied. Agriculture is an important sector of the economy, so there is an essential need to improve agricultural production in many ways. Nowadays crop vandalization by animals is the most common factor that affects the field crops and the farmers are suffering a lot due to this. In most cases, some people lost their lives. In rare cases, the animals were also harmed due to its violent behaviour in the crop field. This horrible situation is due to over population which leads to deforestation.

Fig.1. Destruction by wild animals

Fig.2. Destruction by domestic animals

In this Scenario, the problem is not only the wild animals, the domestic animals also damage the crops sometimes. It is not possible for farmers to barricade entire fields for 24 hours and protect it. This project is a remedial solution to avoid this hazardous situation. The main objective of this proposal is to gain more crop yield and thus save the lives of the farmers and also prevent misspending.

The world is pervaded with Embedded systems and the microcontroller has paved a way for these embedded applications and it is a significant one to make our lives easier. The embedded system is used in this application due to its undesirable characteristics including speed, power, adaptability and its size. Hence this can be implemented for different situations. By using this embedded system we should find a way to protect the field crops.

PROPOSED ARCHITECTURE CONCEPT

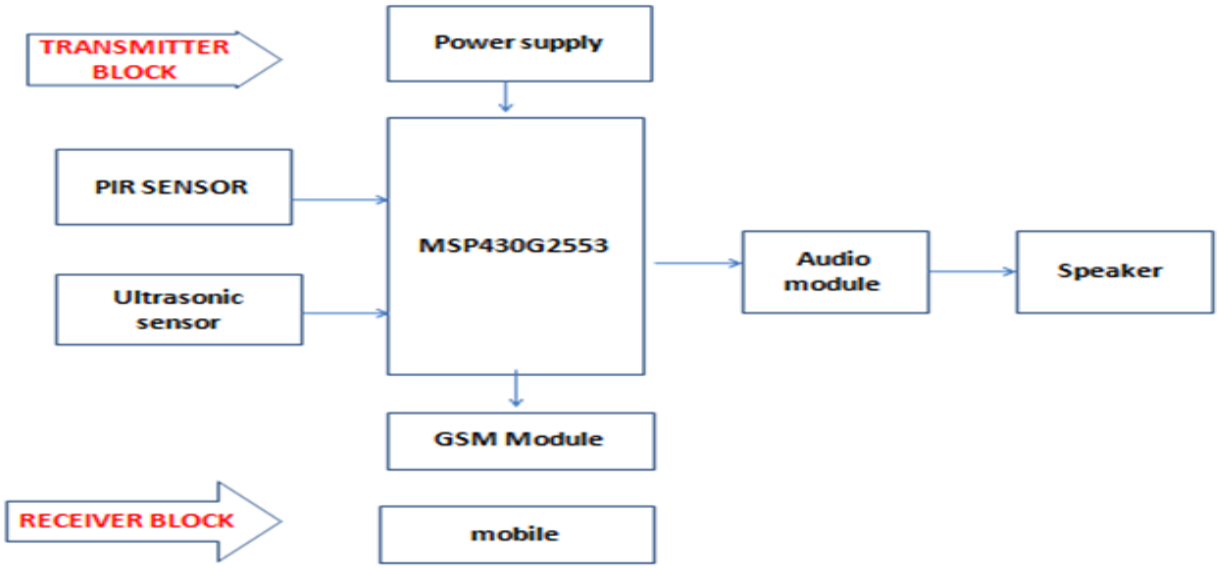

Fig.3. Architecture of crop protection system using GSM

In this architectured system, the sensors implemented play the crop monitoring in the field., it contains two blocks which include a transmitter block and a receiver block.when the animals enter into the field it is detected by the PIR sensor.It is given as input to the microcontroller and it operates the audio module which makes the sound and animals will get diverted.The GSM module employed in this makes an sms/ call alert to the farmers[4].

3. SPECIFICATIONS

3.1. PIR SENSOR

PIR Sensor - Passive Infrared Sensor. It is one of the electronic sensor devices which measures infrared (IR) light radiating from objects in its field of view. It is commonly explored in motion detecting systems as well as in security systems.To detect the animals is not possible to employ the video surveillance method,

because it is high cost efficiency [2].Hence the PIR sensors are employed. If animals pass in front of this source and it detects the objects which are moving around it.Range average of this sensor is around 5m-12m[7].

Fig.4. PIR Sensor

3.2. ULTRASONIC SENSOR

Ultrasonic Sensors have been used throughout many applications and also in industries. It measures the distance of the object around 10-30cm through emitting the ultrasonic sound waves.It transmits ultrasonic sound waves around 40KHz from its sensor[6].These sound waves fall on the object and get reflected. Later, the reflected ultrasonic sound waves can be converted into electric signals. Here, the reason for the use of ultrasonic waves is because it travels faster than the audible sound which means that sounds that humans can hear. Usually, these sensors contain modules which include transmitter, receiver and the control circuit. Whenever the obstacles come, the sound waves reflected are converted to electrical signals like as above said and when the electrical pulse is applied to the ultrasonic transducer, it vibrates across a specific spectrum of frequencies and generates the sound waves.

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Fig.5.Ultrasonic Sensor

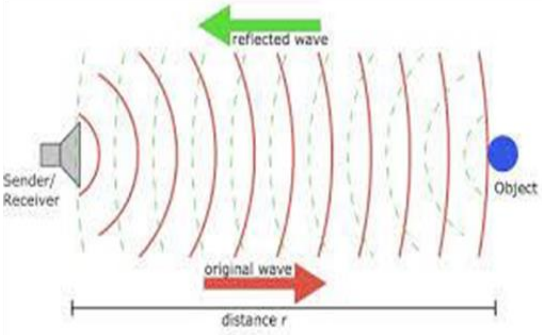

Fig.6.Ultrasonic sensor radiations

3.3. APR MODULE

APR - Audio Voice Recorder and Playback. The APR33A3 voice module is one of the powerful audio processor which contains the high performance audio analog-to-digital converters(ADCs) and digital-to-analog

converters(DACs).It can offer single-chip voice recording, non volatile storage, and capability of playback upto 8 to 20 seconds.

Fig.7.APR Module

3.4. GSM MODULE

GSM Module is one of the hardware device that uses GSM mobile telephone technology to provide a data link to a remote network.SIM900 is the most popular GSM/GPRS module.It comes in 3 variants namely - SIM900, SIM900A, SIM900D.Here we use SIM900A module,which works on frequency 900/1800Mhz.

Fig.8.GSM Module

The GSM Module is having internal TCP/IP stack which enables us to connect with the internet[3].By using this modem we can make audio calls, SMS, etc..,

3.5. MSP430G2553

MSP-Mixed signal Processor, which is ultra low power microcontroller with 16-bit timers, upto 24 I/O capacitive touch enabled pins and built in communication capability using the universal serial communication interface.

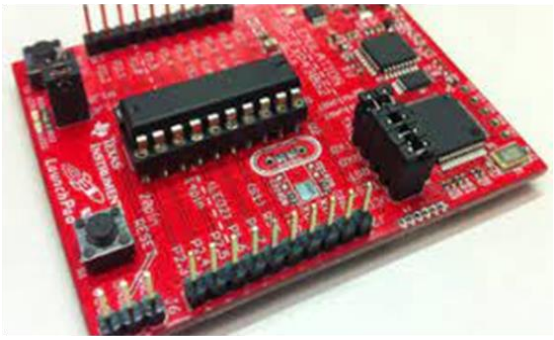

Fig.9.MSP430G2553

3.6. LED

LED- Light Emitting Diode is the semiconductor light source that emits light when current flows through it. Electrons in the semiconductor recombine with the electron holes, releasing energy in the form of photons.

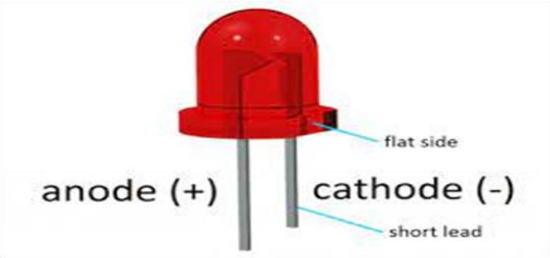

Fig.10. LED

3.7. SPEAKER

The speaker is one of the most common devices which are the transducers that convert electromagnetic waves into sound waves. Here the speaker is used to making sounds frequently which makes animals leave the field.

Fig.11. Speaker\

3.8. POWER SUPPLY

The power supply is an electrical device that supplies electric power to an electrical load.

3.9. SOLAR PANEL

A solar panel, solar electric panel, photovoltaic (PV) module is an assembly of photo-voltaic cells mounted in a framework. Solar panels use sunlight as a source of energy to generate direct current electricity. There are many practical applications for the use of solar panels.It can be first used in agriculture as a power source for irrigation and in many applications.

Fig.12. Solar Panel

4. REAL TIME SCENARIO

The farmer group from karnataka has demanded the remedial solution to prevent their crops from attack of animals such as monkey, elephant and birds.These animals are mainly increasing the risk to the farmers whose field is around the national parks, sanctuaries .These animals inflict crop loss to the farmers.There is a remedial solution given by the government is PMFBY (Prime Minister Fasal Bima Yojana) to compensate their loss by the wild animals.About 30-35 percent of the output gets suffered by the truculent attack of these animals.Crop damages inflicted by the animals is one of greatest challenge faced till now and it makes loss of other lives[8].

5. FUTURE ENHANCEMENT

In the future, there will be very large scope on this project, because it can be made based on wireless technology. In addition to this, some advancement futures can be implemented, like information on crop conditions and environmental changes are transmitted to the farmer through the network that initiates the further actions. Also Farmers are connected and aware of the conditions of the agricultural field at any time and anywhere in the world.

Fig.13. Crop Field

6. CONCLUSION

In the rural parts of India, farmers are encountered with severe threats such as damage done by both the wild and domestic animals.This leads to great economic loss and yield loss to the farmers.It becomes a major social problem in current time. It is an urgent attention as no effective solution exists till date for this problem.This system carries a great social relevance as it aims to address the problem and also the above designed system generates a sound in a particular period and LED lights during night time to avoid the animals which trespass in the field and cause crop damage. Finally, this designed system will be very useful and it can be used in the network Coverage area and also in the out of coverage area.

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