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SMART CROP PROTECTION SYSTEM FROM WILD ANIMALS USING ARM

K. Saravanan[1], V. Sharanya[2], S. V. Lakshmi[3]
Department of Electronics and Communication,
CMS College of Engineering and Technology,
Coimbatore, India.

ABSTRACT

The main aim of the paper is to protect the crops from damage caused by animal as well as divert the animal without any harm. Animal detection system is used to detect the presence of animal. And also offer warning. In this paper we used PIR and ultrasonic sensors to detect the movement of the animal and send signal to the microcontroller. 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. Crops in farms are many times ravaged by local animals like buffalos, cows, goats, birds etc. This leads to huge losses for the farmers. It is not possible for the farmers to barricade entire fields or stay on field 24 hours and guard it. So here we used automatic crop protection system from animals. This is an ARM processor based system. This system used a motion sensor to detect wild animals approaching near the field. In such a case the sensor signals the microcontroller to take action. The microcontroller sounds an alarm to woo the animals away from the field as well as sends SMS to the farmer so that he may know about the issue.so the farmer can come to fields and woo the animals This ensures complete safety of crops from wild animals thus protecting the farmers loss.

INTRODUCTION

GSM MODULE

GSM is the global system for mobile communication. It is a mobile communication modem. GSM is widely used mobile communication sytem. This idea was developed at Bell laboratories in 1970.GSM is a didgital cellular technology used for transmitting mobile voice and data services that operate at 850 Mhz, 900Mhz, 1800Mhz and 1900Mhz. Using time division multiple access(TDMA), GSM is developed as a digital system. It is used for communication purpose. GSM reduces and digitize the data and sends down through channel with two different streams od client data, with its own time slot. In GSM there are various cell sizes such as micro, macro, pico, and umbrella cells. The coverage area of cell varies according to the implementation environment.

ISSN- 2394-5125 VOL 05, ISSUE 05,2018

GSM ARCHITECTURE

A GSM network consists of the following components: • A Mobile Station: Mobile station is the mobile phone which consists of the transceiver, display and the processor and is controlled by a SIM card operating over the network. 2 • Base Station Subsystem: Base station acts as an interface between the mobile station and the network subsystem. It consists of the Base Transceiver Station which contains the radio transceivers and handles the protocols for communication with mobiles. It also consists of the Base Station Controller which controls the Base Transceiver station and acts as a interface between the mobile station and mobile switching centre.

• Network Subsystem: Network subsystem provides the basic network connection to the mobile stations. The basic part of the Network Subsystem is the Mobile Service Switching Centre which provides access to different networks like ISDN, PSTN etc. It also consists of the Visitor Location Register and Home Location Register that which provides the call roaming and routing capabilities of GSM. It also contains the Equipment Identity Register which maintains an account of all the mobile equipments where in each mobile is identified by its own IMEI number. IMEI stands for International Mobile Equipment Identity.

FEATURES OF GSM MODULE:

- Improved spectrum efficiency
- International roaming
- Compatibility with integrated services digital network (ISDN)
- Support for new services.
- SIM phonebook management
- Fixed dialing number (FDN)
- Real time clock with alarm management
- High-quality speech
- Uses encryption to make phone calls more secure
- Short message service (SMS)

The security strategies standardized for the GSM system make it the most secure telecommunications standard currently accessible. Although the confidentiality of a call and secrecy of the GSM subscriber is just ensured on the radio channel, this is a major step in achieving end-to- end security.

ISSN- 2394-5125 VOL 05, ISSUE 05,2018

ULTRASONIC SENSORS

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target). In order to calculate the distance between the sensor and the object, the sensor measures the time it takes between the emission of the sound by the transmitter to its contact with the receiver. The formula for this calculation is D = ½ T x C (where D is the distance, T is the time, and C is the speed of sound ~ 343 meters/second). For example, if a scientist set up an ultrasonic sensor aimed at a box and it took 0.025 seconds for the sound to bounce back, the distance between the ultrasonic sensor and the box would be.

INTRODUCTION OF EMBEDDED SYSTEM

An embedded system is a computer system designed for specific control functions within a large system, often with real time computing constraints. It is embedded as a part of complete device often including hardware and software parts. By contrast, a general purpose computer such as Personal Computers it is designed to be flexible and to meet a wide range of end user needs.

CHARACTERISTICS OF EMBEDDED SYSTEM

Embedded systems are designed to do some specific task, rather than to be a general purpose computer for multiple tasks. Some also have real time performance constraints that must be met, for reasons such as safety and usability others may have low or no performance requirements allowing the system hardware to be simplified to reduce costs. Embedded systems are not always standalone devices. Many embedded systems consist of small computerized parts within a large device that serves a more general purpose. Embedded systems have wide variety of applications in almost all fields. The program instructions are written for embedded systems are referred to as firmware and are stored in read only memory or flash memory chips. They runwith limited computer hardware resources little memory, small or nonexistent keyboard or screen. Real time systems based on embedded systems plays a key role in all advanced automated machineries and large scale industries.

CLASSIFICATION OF EMBEDDED SYSTEM

Hardware real time systems have very narrow respond time. The correctness of respond includes a description of timelines. Deadlines are specified as points in time interval following an event. Software real time systems have reduced constraints on lateness but still must operate quickly and repeatable. Soft timelines requirements are specified as time constraints that may be violated. Firm real time system is combination of both hard and soft timelines requirements.

ISSN- 2394-5125 VOL 05, ISSUE 05,2018

APPLICATIONS OF EMBEDDED SYSTEMS

- Communication devices like mobile phones, pager, PDA.
- Medical diagnostics devices such as dialysis machines, blood analysers, protein analysers, etc. • Household appliances, home control systems, microwave ovens, automatic washing machines, digital watch, video game player etc.

AUTOMATIC ANIMAL DETECTING DEVICE

Animal Warning Systems are intended to warn motorists about the potential or actual presence of animals on the road. Animal Warning Systems utilize electronic sensors to detect animals. Once an animal is detected, signs are activated to warn drivers of the presence of an animal.

EXISTING METHOD

Before the beginning of every farm season, most farmers prefer to plan potential yields. On the other hand, some farmers chose to skip planning. Whether a farmer plans the potential yield or not, certain expectations are still present. While hoping for the best, farmers are often presented with various challenges and obstacles that require them to constantly question their productivity and resulting final success.

The greatest importance is usually given to crop protection from diseases, insect pests, and weeds, as well as to protection from unfavorable weather events such as frost or hail,along with other crop maintenance practices. The aforementioned challenges are well-known and often discussed. However, farmers also face another interesting challenge, often forgotten about or not realized; wild animal crop protection.

Wild animals are a special challenge for farmers throughout the world. Animals such as deer, wild boars, rabbits, moles, elephants, monkeys, and many others may cause serious damage to crops. They can damage the plants by feeding on plant parts or simply by running over the field and trampling over the crops. Therefore, wild animals may easily cause significant yield losses and provoke additional financial problems.

Fencing is a popular wild animal protection practice for that can last for many years. Agricultural fences are quite an effective wild animal protection technology. However, utilizing fences as a practice is often regulated. Some local and state entities may restrict or prevent the use of certain types of fences. Therefore, before deciding on a suitable fence, it’s important to check local law regulations.

The quality of fencing depends on the material and structure. Depending on how it is made and what it is made of, some permanent fences can last up to 30 years. Farmers usually use one of the following types of fences:

ISSN- 2394-5125 VOL 05, ISSUE 05,2018

Wire fences; constructed of metal wires woven together forming a physical barrier. The fences are effective, long lasting, and require relatively little maintenance. However, they are expensive and recommended only for the protection of high-value crops.

Plastic fences; polypropylene fences are generally less expensive and easier to install and repair than other types. Additionally, these fences are widely acceptable and meet various regulations. Their disadvantage includes their short lifespan (up to 10 years) and questionable effectiveness in areas with a higher possibility of wild animal crop damage.

Some farmers prefer using natural protection measures instead of mechanical or chemical protective practices. There are various ways to protect crops from wild animals, including:

Smoke; in some areas farmers burn elephant dung or other materials that smolder and create heavy smoke

Fish or garlic natural emulsion; repels rabbits and deer.

Beehive fencing; for instance, elephants are repelled by the sound of honey bees; this practice is beneficial as it serves as an extra source of income

Chili peppers; the chemical Capsaicin makes chili peppers hot; an excellent repellent against elephants, monkeys, squirrels, and some other wild animals; farmers who plant chili peppers will also benefit from an extra source of income

Lavender, soybean, peas, and beans are excellent repellents against rabbits and are also an additional source of income

Egg based repellent; homemade repellent against deer Castor oil; natural repellent that keeps away burrowing animals such as moles Chemical repelents; active substances such as Anthraquinone, Butanethiol, and Methyl Anthranilate can be used to keep wild animals away from cromole Biophysical barriers; fences made of bamboo sticks, coconut tree bunches, or some other available shrubs; low-cost practice but also low efficiency in protecting crops against wild animals Electronic repellents; effective, long lasting, and eco-friendly method for crop protection that repels animals without harming them. Farmers use one of the following two types of electronic repellents Ultrasonic electronic repellent; silent to humans, high-frequency sound waves repel wild animals Sonic electronic repellent; audible noise that scares animals

SUMMARY

By proper analysis of conventional techniques it is clear that the crops in farms are many times ravaged by local animals like buffaloes, cows, goats, birds etc. This system uses a PIR and ultrasonic sensor to detect the wild animals approaching near the field.

ISSN- 2394-5125 VOL 05, ISSUE 05,2018

DISADVANTAGES OF EXISTING SYSTEM

- It needs availability of internet continuously rural part of most of the developing countries donot fulfil this requirement.

- It makes use of high techniques that require technical skill and precision to make it success.

PROPOSED METHOD

In the proposed system,Crop monitoring is done where the sensors are used to collect the information in the agricultural field.

Here the PIR,Ultrasonicsensor,GSM is used. Ultrasonic sensor offer the ability to detect animal over wide range of distance with a high read rate. The widely used range is 40 to 70KHz.Ultrasonic sensors work by emiting sound waves at a frequency too high for humans to hear.It has Rx and Tx.The sound is produced by Tx.

Hence the system will be activated,at the same time it sends an sms or make a call to the farmer,that the animal is detected in the farm area.

The whole process is controlled by the Microcontroller.The GSM module is used for sending SMS and making call to farmer when animal is detected.

During night time the flash light will be on and the message will be send to the Forest Department and call to the farmer.

Power supply wilk be given by the solar panel or from regulated power supply.The LCD display the presence of animal and LDR reading.Our LCD data will be display for SMS sending.

ADVANTAGES

- It allows farmers to maximise yields using minimum resource such as water, fertilizers, seeds etc…

- It is a cost effective method.

- It delivers high quality crop protection.

- Controllable food supply

ISSN- 2394-5125 VOL 05, ISSUE 05,2018

BLOCK DIAGRAM

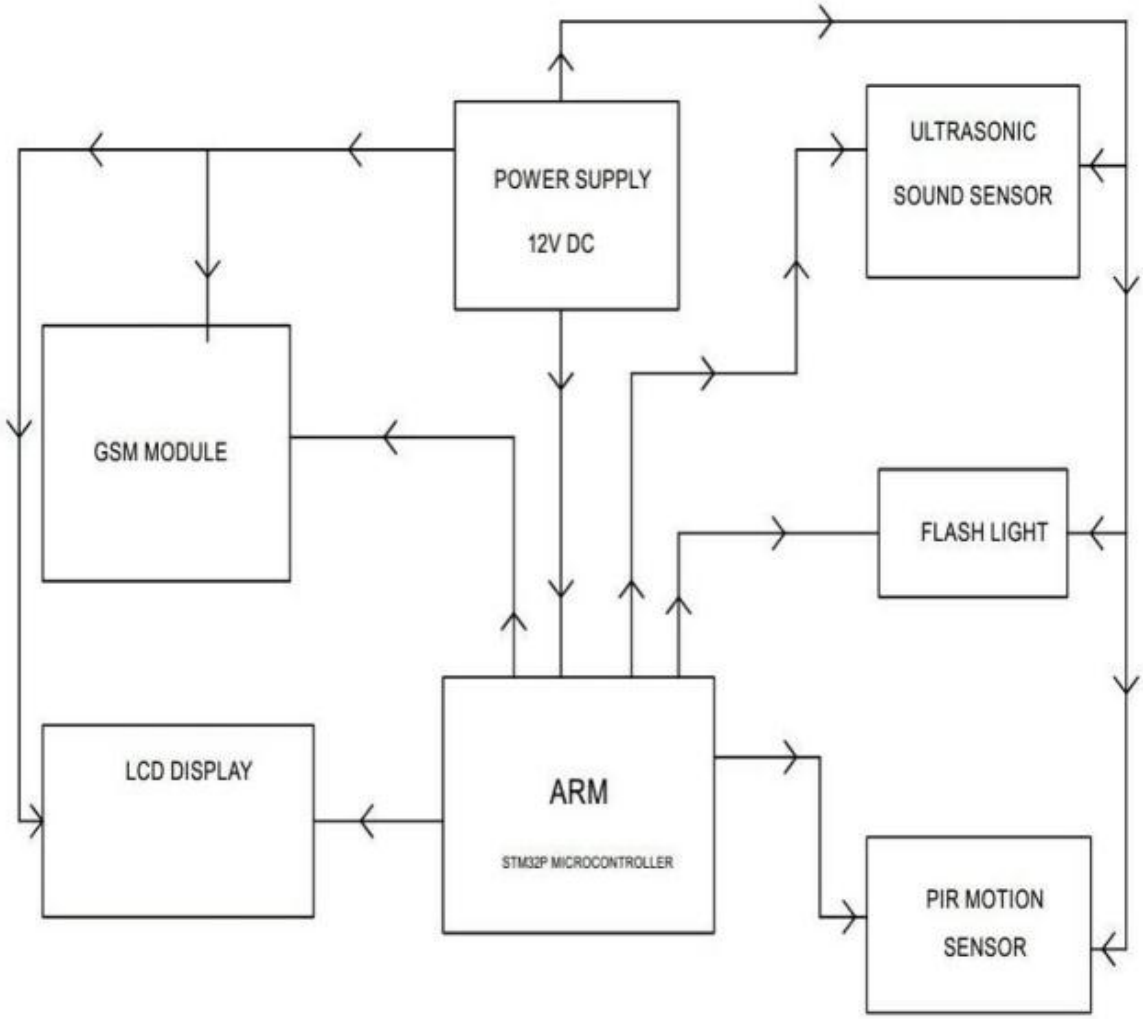

FIG NO: 3.2.1 BLOCK DIAGRAM

FUNCTIONS OF THE SYSTEM

The block diagram mainly consists of the GSM Module, PIR Motion Sensor, Ultrasonic Sound Sensor, ARM Microcontroller, Flashlight, LCD Display and Power Supply.

The ultrasonic sound will distract the animals and will not allow them into the field.They travel faster than the speed of audible sound. The PIR sensors detect the general movement.It is an electdonic sensor that measures infrared light radiating from objects in its field of view.The GSM module is used for sending SMS or making the call.

Crops in the farmlands are damaged by the wild animals. The automatic smart crop protection system has developed against this problem. Here we are using PIR motion sensor, ultrasonic sensor and ARM Micro controller.

ISSN- 2394-5125 VOL 05, ISSUE 05,2018

By implementing this the wild animals will distracted by the ultrasonic sensors which is fixed and also the message regarding the entry of animals. The GSM module is used for sending the Messages. LCD will monitor the functions that take place in the GSM module, that is the message transmission PIR motion sensor measure the infrared light radiating from objects. This automatic method is very useful in agricultural sector.

RESULTS AND DISCUSSION

A simple but useful paper called ― SMART CROP PROTECTION SYSTEM FROM WILD ANIMALS USING ARM‖ using ARM processor is designed and developed here. The PIR and ultrasonic sensors detect the presence of animals so that the wild animals will not enter the farm land. Thus we can eliminate the usage of electric fences and other traditional method which will cause harm to the wild animals which enter the farm land in search of food. In addition to that the owners of the farmland can be able to detect the unwanted trespassing of wild animals in to their field. Also they will get distracted by the ultrasonic sensors provided. Thus conducted this technique in very useful and keeping social responsibility in mind towards farmers because GSM module sends messages to the farmers.

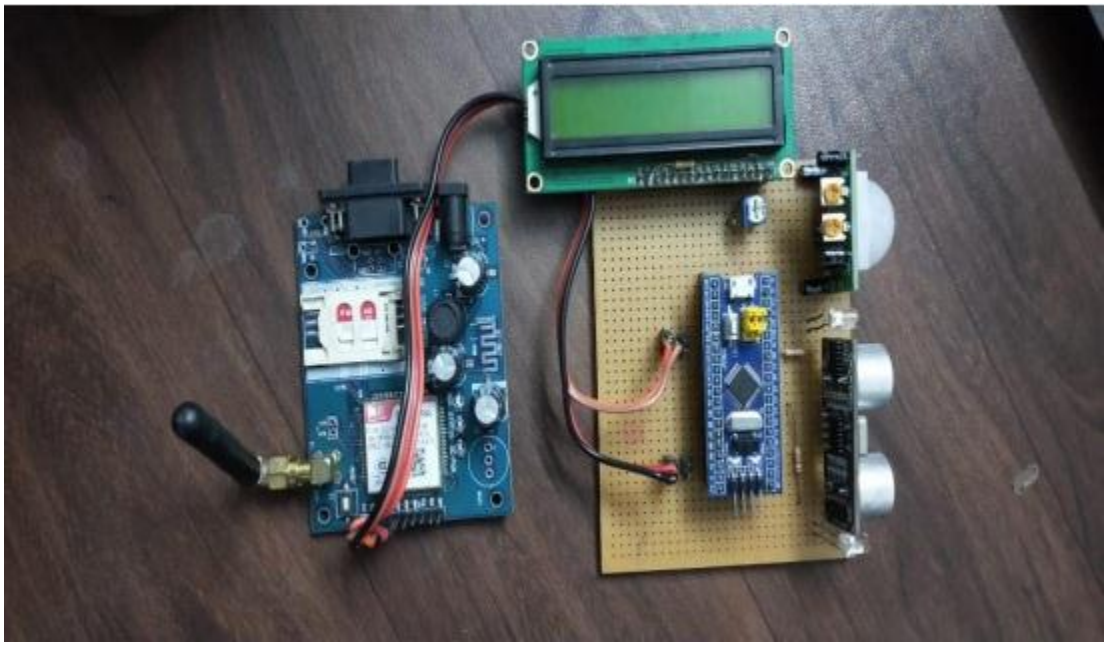

Fig: Experimental Setup

In the future, there will be very large scope for this particular paper idea, this paper 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 these 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.

ISSN- 2394-5125 VOL 05, ISSUE 05,2018

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