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Development of Solar Operated Smart Fencing System for Agriculture

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Abstract -
India, with vast agricultural lands has different crops ranging from paddy to tomato. But few crops are destroyed due to animal menace and hence a protection is required to save the crops from animal. Solar Fencing Perimeter Protection is the modern day need to the growing security threat in denying, detecting while having the in built capability to serve as deterrent. In this project, we design and implement Fencing Perimeter Protection for agriculture. It is the modern day need to the growing security threat in denying, detecting while having the in built capability to serve as deterrent. It works on Solar Energy with backup facility to run uninterruptedly during the nights as well as cloudy days. when any object is sensed by Ultrasonic sensor, Immediately controller sends the message to the authorized person through the GMS modem, and it is interfaced with the controller. At the same time buzzer and LCD (Liquid Cristal Display) display will on. The authorized person can see message on LCD. Solar Powered Fence is scientific Fence and works on Solar Energy with backup facility to run uninterruptedly during the nights as well as cloudy days.

Keywords: Agriculture, Farmers, Protection system, Smart Fencing , Sensor etc.

1. INTRODUCTION

Agriculture in India is the broadest economic sector and plays a significant role in the overall socio-economic factor of India. The increasing news articles in television and newspaper on wild animals raiding agricultural crops during harvest season shows that these animals can destroy a farmer's livelihood. In such areas Electric fencing system can be employed in which the animals experience a high voltage low current shock for a very short time. Because of the small magnitude of current there is no threat to the animal's life at the same time the large magnitude voltage scares away the animals. Usually, 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. They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors. A photoelectric sensor, or photo eye, is a device used to detect the distance, absence, or presence of an object by using a light transmitter, often infrared, and a photoelectric receiver. They are used extensively in industrial manufacturing. There are three different functional types: opposed (through beam), retro-reflective, and proximity-sensing (diffused).

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 main stay 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 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. To overcome this problem, in our proposed work we shall design a system to prevent the entry of animals into the farm.

In this project, the current severe shock is given, only when someone is trying to enter through fence. Its only normal shock so that, no one can harm. In such cases, only the shock is given to the fence while human/animal is entered in the land. The solar energy

obtained is stored to a battery. The battery supply is fed voltage regulator IC7805 and in turn to a microcontroller. Sensor which is capable of generating ON/OFF pulses to controller. This is fed to a buzzer, and send message to LCD display and GSM module.

2. OBJECTIVE

- Objectives of this project are to develop an embedded system, which is a used to identify the fencing security system automatically using ultrasonic Sensor and fencing shock.
- To indicate animal or person near to fencing , ultrasonic sensor detect them and buzzer in ON.
- To design for updating information of LCD display use.
- To learn the GSM system required for project.
- After detecting animal or person fence energizer is active give dc shock.
- All operation is control via Arduino controller, its development is required.

3. WORKING METHODOLOGY

- **Block Diagram**

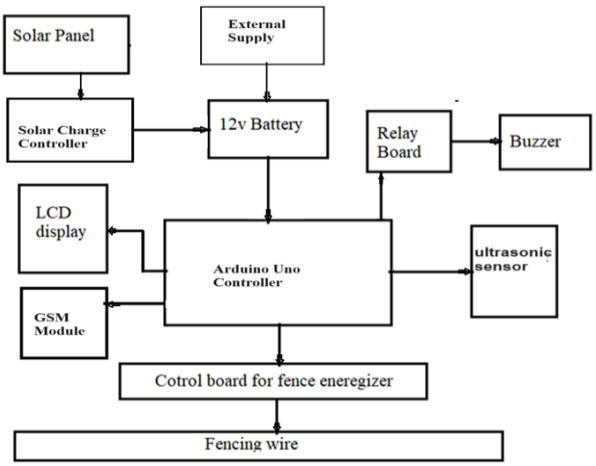

Fig 1. Block Diagram of System

From the above block diagram it is clearly shows that, A solar panel (also solar module, photovoltaic module or photovoltaic panel) is a packaged, connected assembly of photovoltaic cells. The solar panel can be used as a component of a larger photovoltaic system to generate and supply electricity in commercial and residential applications. The efficiency of a panel determines the area of a panel given the same rated output an 8% efficient 230 watt panel will have twice the area of a 16% efficient 230 watt panel. A photovoltaic system typically includes an array of solar panels, an inverter, and sometimes a battery or and interconnection wiring.

Solar panels use light energy (photons) from the sun to generate electricity through the photovoltaic effect. The majority of modules use wafer-based crystalline silicon cells or thin-film cells based on cadmium telluride or silicon. The structural (load carrying) member of a module can either be the top layer or the back layer. Cells must also be protected from mechanical damage and moisture. Most solar panels are rigid, but semi-flexible ones are available, based on thin film cells.

In this project, control the fencing by using IOT technology. Initially the power is drawn from the solar panel and it is stored in the battery. From the battery, take the power for all the components. The components including fence. Here the sensor is used to detect the object. A sensor is a device that measures a physical quantity and converts it into a signal which can be read by an observer or by an instrument. For example, a mercury-in-glass thermometer converts the measured temperature into expansion and contraction of a liquid which can be read on a calibrated glass tube. A thermocouple converts temperature to an output voltage which can be read by a voltmeter. For accuracy, most sensors are calibrated against known standards.

- **Working**

This fence system is powered by a 12V rechargeable battery. A solar panel is connected to the battery to charge on day time. A normal PN junction diode is used for unidirectional low of charge current. The battery also can be charged from house hold AC supply of 230V, 50 Hz. The battery charger circuit is designed to charge the battery with the help of house hold AC supply for emergency conditions. This circuit uses regulated 12V, 750mA power supply. 7812 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/18V step down transformer. To every system, there is a requirement of one or more control units.

In the block diagram of transmitter, only one control system is use. It contains Arduino microcontroller which belongs to the AVR family of microcontrollers. The blocks shown in fig are put-up in such a way that, a most important block is Power supply. The power supply should be regulated DC. The IR sensor detects a motion. This sensing output is feed to the control unit i.e. 8051 microcontroller and after siren on automatically. Similarly if any one break the fencing then automatically message display on LCD

display to owner that someone break fencing. Send information to user via, IOT system. And send signal to microcontroller after siren ON automatically.

- **Generate Buzzer Sound And Glow Lcd Display:**

A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or electronic. Typical uses of buzzers and beepers include alarms, timers and confirmation of user input such as a mouse click or keystroke. Early devices were based on an electromechanical system identical to an electric bell without the metal gong. Similarly, a relay may be connected to interrupt its own actuating current, causing the contacts to buzzer. Often these units were anchored to a wall or ceiling to use it as a sounding board. The word "buzzer" comes from the rasping noise that electromechanical buzzers made A piezoelectric element may be driven by an oscillating electronic circuit or other audio signal source. Sounds commonly used to indicate that a button has been pressed are a click, a ring or a beep. Electronic buzzers find many applications in modern days.

A **relay** is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically, but other operating principles are also used. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits, repeating the signal coming in from one circuit and re-transmitting it to another. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

- **Circuit Diagram**

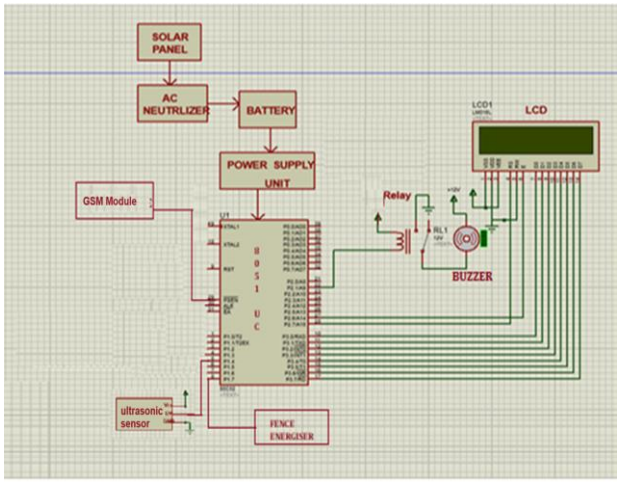

Fig 2. Circuit Diagram of System

4. RESULTS AND ANALYSIS

If any object cross the entrance and surrounded area then the corresponding signal will be given to the microcontroller. After getting this signal the alarm will make a sound to indicate some interruption in the farm. At the same time IOT modem is activated and send message to user and LCD display. The solar panel is used to generate the electric supply and store it to battery, battery will give to supply to fence wires, the extra high threshold voltage generates the equivalent shock voltage.

- ***Validation***

Due to presents of lot of animals the farms are often destroyed by them, so the human has to protect and secure their farms. But now-a-days there is no time for the human beings to do the work. Hence to avoid the human interface (security) and also to protect the farms, we provide a system called automatic electric farm protection system.

- **Project Image :**

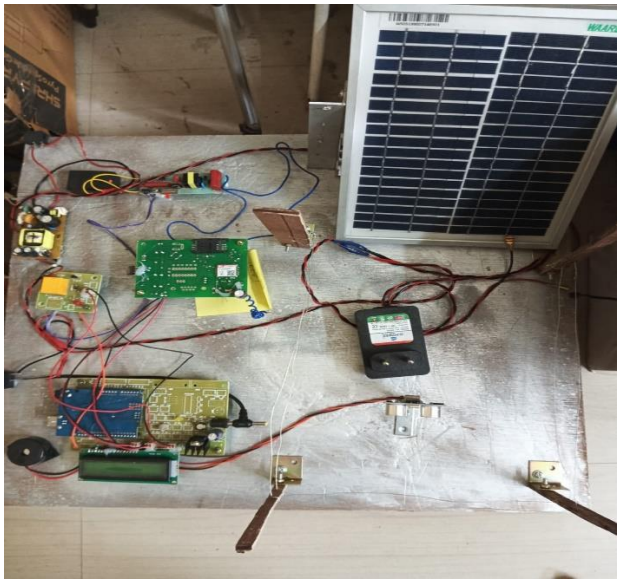

Fig 3. Project Image

5. CONCLUSION

The progress in science & technology is a non-stop process. New things and new technology are being invented. As the technology grows day by day, we can imagine about the future in which thing we may occupy every place. The proposed system based on Atmel microcontroller is found to be more compact, user friendly and less complex, which can readily be used in order to perform. Several tedious and repetitive tasks. Though it is designed keeping in mind about the need for industry, it can extended for other purposes such as commercial & research applications. Due to the probability of high technology (Atmel microcontroller) used this "solar fencing unit and alarm for animal entry prevention" is fully software controlled with less hardware circuit. The feature makes this system is the base for future systems. The principle of the development of science is that "nothing is impossible". So we shall look forward to a bright & sophisticated world.

Thus we are concluded the solar fencing system was designed and fabricated successfully. The experiment shows that the proposed system is simple and efficient one. We are save cost in order to implement this project for security purpose as well as less time consume.

The authorized person get message from LCD, when any object is detected by PIR or IR sensor. It sends to the controller by IC 7805 regulator. Though relay driver the buzzer will on and LCD display will glow. By using these techniques, we can save small birds as well as the things which is placed inside the fencing areas. This is the solution to the protection of agriculture areas from robberies, interruption and creatures. At the same time the user can sent message to the LCD in order to operate motor for pumping applications.

6. FUTURE WORK

In the existing system, the fencing is operated by passing continuous electric power supply. Due to continuous power flow in the fencing system, the living beings are affected. Disadvantage of existing system is the Electric power loss. There is need for government approval for giving current shock on the fence. Affect the human beings. Instead of electric power supply, using sensor and IOT Modem to reduce power level. Fence works on Solar Energy with backup facility to run uninterruptedly during the nights, as well as the cloudy days. Motor can be controlled by IOT system. Advantage of our proposed system are Solar energy is used, Easy to control and maintain the fence, Less time consuming.

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