

# Solar Power Fencing System using GSM Technology

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**Abstract**— Asian country, with very vast agricultural lands has completely different crops. But few crops are destroyed due to animals that's why a protection is needed to avoid wasting the crops from animal. Solar Fencing Perimeter Protection is the need of modern-day to the growing security threat in denying, detection whereas having the inbuilt capability to serve as deterrent. In this project, we design and implement Fencing Perimeter Protection for agriculture. . It works on Solar Energy with backup facility to run uninterruptedly during the nights as well as cloudy days. When any object is touched by fencing then immediately controller sends the message to the authorized person through the GSM modem, and it is interfaced with the controller. At the same time buzzer and light will on. . Solar Powered Fence is scientific Fen.

**Keywords:** GSM Modem, Sensor, Fence, Agriculture

## 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 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. Main purpose this is to develop prohibitive fencing to the farm, to avoid losses due to animals. These prohibitive fencing 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. Solar energy can be utilized to energize such fence arrangement. Solar power has been chosen for this application due to which the dependency on the conventional power supply can be reduced and problem of energy crisis can also be overcome. In comparison with the non-renewable energies such as coal, gasoline and oil, solar power is becoming increasingly popular as it produces no pollution and requires minimum maintenance. The energy from the sun is free and it also has the advantage of reducing the power losses when converting the energy. An energizer converts 120-volt electrical power or power from a battery into high voltage, short duration electrical pulses. These electrical pulses typically range from 2000 to 20,000 volts with durations of 1/1000 to 3/10,000 of a second. These short duration pulses may cause avoidance behaviour but are not harmful to the animal. The power circuit (60Hz) carries 120-volt electrical power from a service panel to the energizer. The primary function of the grounding system is to conduct

fault current and quickly operate protective devices The second circuit is between the energizer and the fence. The low voltage power coming into the energizer is converted to very short duration electrical pulses. The energizer pulse flows out through the high voltage lead-out from the energizer to the fence only if an animal or something else touches the wire to complete the circuit back through the earth. Once the current is in the earth it flows to an earth-return rod and earth return wire back to the energizer. Then alarm activated and it produce high frequency sound and gsm sends text message on your mobile somewhere near on you

## II. PROPOSED SYSTEM

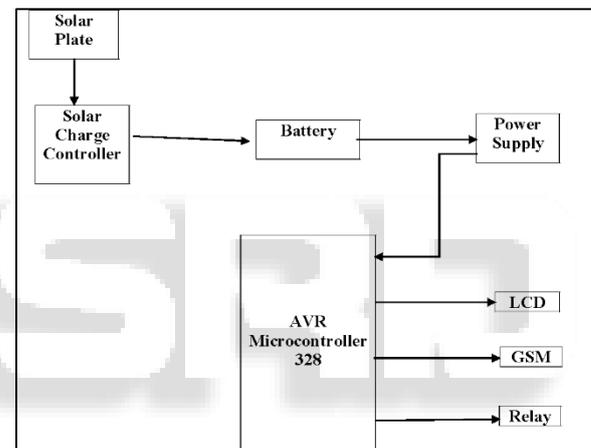


Fig. 1: Block Diagram of solar fencing system using GSM The solar energy (light) is converted into D.C electricity by using the solar panel. Battery is connected to the solar panel. Further stored in the rechargeable battery. The output of battery is 12 volt. The one of the supply of battery is connected to the GSM. & second is connected to the flipunit. When we give 12 volt to the circuit that time switch is ON-OFF, then we converted supply voltage regulator from 12v to 5v and we give it to the AVR Microcontroller 328. Microcontroller is connected to the 16 MHz crystal oscillator. Capacitor is also connected to the microcontroller. For operated relay we used there BDA139 transistor.

For relay transistor worked as a driver, we provide 12v to the relay. The voltage regulator is connected to the relay. Then 6v output of voltage regulator is supply to the capacitor. Which is worked do as a filter. Then it gives output to the 2L4 MOSFET. It is connected to the MOSFET Ferrite transformer. Which is used for convert voltage from 6v to 1000v then it is converted voltage doubler circuit from 1000v to 4000v. There we used four diode, from this four diode each diode is generating 1000v. Then we give output to the zero crossing circuit. We used there Optocoupler circuit, further the output of optocoupler passing through the IC LM358. Then two transistors are connected across to IC. After that we take one zero cross supply over. There are three connections

are present as: VCC, GND, Output. The output pin is connected to the controller. When the microcontroller sense any object at that time Gsm get informed. The microcontroller have transmitter pin which is connected to the receiver Pin of Gsm. Whenever it sense something for e.g. any object, body etc. after that microcontroller is give the command to Gsm & Gsm send the message to the registered mobile no. that “something has been trapped in the solar electric fence at your farm”, and buzzer is on as well.

### III. HARDWARE DESCRIPTION

#### A. Microcontroller 89s52

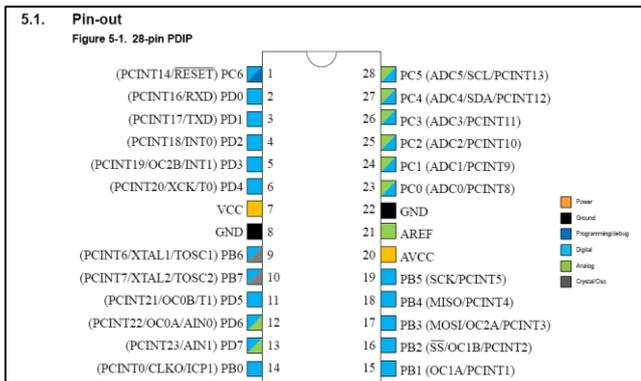


Fig. 2: microcontroller 328 pin diagram

ATmega-328 is basically an Advanced Virtual RISC (AVR) micro-controller. It supports the data up to eight (8) bits. ATmega-328 has 32KB internal builtin memory. This micro-controller has a lot of other characteristics. You should also have a look at Introduction to PIC16F877a (it’s a PIC Microcontroller) and then compare functions of these two Microcontrollers.

ATmega 328 has 1KB Electrically Erasable Programmable Read Only Memory (EEPROM). This property shows if the electric supply supplied to the micro-controller is removed, even then it can store the data and can provide results after providing it with the electric supply. Moreover, ATmega-328 has 2KB Static Random Access Memory (SRAM). Other characteristics will be explained later. ATmega 328 has several different features which make it the most popular device in today’s market. These features consist of advanced RISC architecture, good performance, low power consumption, real timer counter having separate oscillator, 6 PWM pins, programmable Serial USART, programming lock for software security, throughput up to 20 MIPS etc. ATmega-328 is mostly used in Arduino. The further details about ATmega 328 will be given later in this section.

#### B. Solar Panel



Fig. 3: solar panel

Photovoltaic solar panels absorb sunlight as a source of energy to generate electricity. A photovoltaic (PV) module is a packaged, connected assembly of typically photovoltaic solar cells. Photovoltaic modules constitute the photovoltaic array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications. The most common application of solar energy collection outside agriculture is solar water heating systems. Photovoltaic modules 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. The structural 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 modules are rigid, but semi-flexible ones based on thin-film cells are also available. The cells must be connected electrically in series, one to another. A PV junction box is attached to the back of the solar panel and it is its output interface. Externally, most of photovoltaic modules use MC4 connectors type to facilitate easy weatherproof connections to the rest of the system. Also, USB power interface can be used. Module electrical connections are made in series to achieve a desired output voltage or in parallel to provide a desired current capability (amperes). The conducting wires that take the current off the modules may contain silver, copper or other non-magnetic conductive transition metals. Bypass diodes may be incorporated or used externally, in case of partial module shading, to maximize the output of module sections still illuminated. Some special solar PV modules include concentrators in which light is focused by lenses or mirrors onto smaller cells. This enables the use of cells with a high cost per unit area in a cost-effective way. Solar panels also use metal frames consisting of racking components, brackets, reflector shapes, and troughs to better support the panel structure.

#### C. GSM Modem



Fig. 4: GSM Modem

GSM module is used to establish communication between a computer and a GSM system. Global System for Mobile communication (GSM) is an architecture used for mobile communication in most of the countries. Global Packet Radio Service (GPRS) is an extension of GSM that enables higher data transmission rate. GSM/GPRS module consists of a GSM/GPRS modem assembled together with power supply circuit and communication interfaces (like RS-232, USB, etc) for computer. The MODEM is the soul of such modules.

### IV. ADVANTAGE

- 1) Designed to work on solar and hence independent of grid power.

- 2) Significantly reduces man and animal conflicts
- 3) Effective wildlife management tool for park managers.
- 4) Cost effective and return on investment starts from day one.
- 5) Protection of crop.
- 6) No electric connection required, no electric bill.
- 7) Automatic operation.
- 8) Low maintenance.
- 9) Reliable yet safe operation.

#### V. FUTURE SCOPE

- 1) High definition camera installation:-Camera is interfaced with the fencing system. Snapshot of the person and text messages are sent to the authorized person who tried to get inside land. Ultrasonic wave can be sent, to give pain to the intruder
- 2) To protect Wild Animals-This project is very beneficial for the wild life .Now a days we can see that many tigers and others wild animals are killed by hunters rapidly for money .With using of this project the animal are get protected and safe in forest.

#### VI. RESULTS

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. 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. . after that microcontroller is give the command to Gsm & Gsm send the message to the registered mobile no. that “something has been trapped in the solar electric fence at your farm”, and buzzer is on as well.

#### VII. 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. Using gsm module we establish long distance communication with your farm .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.

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