

PROTECTING CROPS FROM DAMAGE CAUSED BY ANIMALS/BIRDS IN FARM LAND

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Abstract - Agriculture is an important field for cultivation of crops / grains, as food is the need of human being the cultivation of food in agriculture land should be protected from any damage being caused to the growth of plants / grains. A system is to be developed which will protect the farm field from animals / birds which enter the farm field to destroy the crops which are ready to yield. For this a fence to be implemented around the agriculture land and this fence should be supplied by solar energy call it solar fence, so that whenever an animal touches the field should receive a short pulse which will be not harmful for them it is to threaten them to stay away from field and an ultrasonic bird repel which transmit ultrasonic wave so that birds do not enter the field and destroy grains. For watering plants / crops an automatic water supply system to be used which will perform operation by sensing the moisture level of the soil to water plants / crops. By developing such system it will be helpful for farmers, from manual monitoring it will help to system level monitoring and inform farmer about the system operations in farm land through GSM.

Keywords - Solar Fence, Ultrasonic Bird Repel, Moisture, GSMI.

I. INTRODUCTION

Due to over population it take place a deforestation this outcomes in shortage of food, water and shelter in forest areas. So, Animals interference in residential areas is growing day by day which disturbs human life and property causes human animal conflict as per nature's law every single living creature on this earth has key role in eco-system. Agriculture is the strength of the economy but because of animal interference in agricultural lands, there will be massive loss of crops. Elephants and other animals coming in to contact with humans, impact harmfully in various means such as by damage of crops, damaging grain stores, water supplies, houses and other resources, injuring and death of humans. Farmers in India face serious fears from pests, natural disasters & damage by animals resulting in lower profits old-style methods followed by farmers are not that operative and it is not feasible to employ guards to keep an eye on crops and avoid wild animals. Since safety of both human and animal is similarly vital. So, animal detection system is essential in farm areas. Most countries have an economy dependent on agriculture – either in a small or big way. From employment generation to the contribution to National Income, agriculture is very important. It contribute to the gross domestic products. Agriculture meets food requirement of the people and produces several raw materials for industries. Due to the animal interference in agriculture land / farms, there is a huge loss of crops, as animals / birds destroy crops making a large amount of loss to the farmers. To avoid these financial losses to the farmers it is important to protect farms from wild animals and birds. In today's scenario there is not such importance given to the

field of agriculture, due to this negligence there is lot of decrement in agriculture. Most of the crops are destroyed due to sudden climatic changes this climatic change gives a great loss to farmers, as most of the crops get destroyed. The climatic problems yielding to the loss to agriculture cannot be overcome by humans because it is natural. The loss occurred in the farm due to animals / birds can be overcome, the crops are destroyed by animals / birds entering into the farm field, this loss of crops due to animals / birds can be reduced by providing a fence around the farm field.

To overcome this issue, this research is proposed to design a system to prevent the entry of animals and birds into the farm. Main purpose is to develop a fencing to the farm, this control the animals by giving them a short pulse just to be away from the fence, these fencing protect the crop from the damages by animals / birds. The system will not be harmful and injurious to animals / birds as well as human beings.

II. LITERATURE SURVEY

Saranya, "Design and Fabrication of Solar Panel" [1] has presented construction of Solar tracking system using DC gear motor. A solar tracker is a device into which solar panels are fitted which tracks the indication of the sun across the sky confirming that the extreme amount of sunlight strikes the panels all through the day. The solar tracker will try to navigate to the best angle of contact of light from the sun. A detailed introduction to solar panel and solar tracker is described. Mostly the solar tracker is divided into two main classes, hardware and software. It is further sub divided into four main functionalities: method of

Tracker Mount, Drivers, Motors, and Power supply of the solar tracker is also described.

Parasnis, "New Method of Solar Tracking System" [2] has presented a new technique of automatic solar tracking system. Light dependent resistors (LDRs) are used to sense the strength of sunlight and hence the sun's location in the sky. Microcontroller is used for monitoring the movement of solar panel. The appliance used geared DC motor to rotate the solar panel. DC motor are organized by the microcontroller with respect to signal from LDR.

AmanGarg, et al, "Concept of Mechanical Solar Tracking System" [3] reports a study of numerous sorts of solar tracking systems has been presented. To boost the overall effectiveness of solar panels by keeping them aligned along with the sun position, Solar tracking system is used nowadays. Solar tracking is one of the most suitable technologies so as to increase the efficiency of solar panels. Somewhat than purchasing additional solar panels, they can help to bind solar energy in more efficient way even with detail to cost.

TusharRaut, "Solar Powered Smart Fencing System for Agriculture Protection using GSM & Wireless Camera" [4] this paper presents how the solar energy supplied to the fence for crop protection from animals. A GSM module is used to alert the farmer about any interference occurred in the farm. The advancement in science and innovation is a constant procedure. New things and new innovation are being created. As the innovation develops step by step, we can envision about the future in which thing we may involve each spot. The proposed framework dependent on Atmel microcontroller is observed to be progressively reduced, easy to use and less unpredictable, which can promptly be utilized so as to perform. A few dreary and redundant errands. In spite of the fact that it is structured remembering about the requirement for industry, it can reached out for different purposes, for example, business and research applications. Because of the likelihood of high innovation (Atmel microcontroller) utilized this "sun oriented fencing unit and caution for creature section aversion" is completely programming controlled with less equipment circuit.

Krishnamurthy B, "The Solar Fencing Unit and Alarm for Animal Entry Prevention" [5] has reported that the aim of this paper is to Design and implementation of an intelligent security system for farm protection from wild animals. An electric fence is used as a barrier to protect a farm from wild animals. An electric fence firstly used in Texas in 1888. Electricity from generator using an overshot wheel was used to charge the top two wires of a four-wire fence. Often solar-powered, the fences were used extensively in the Panhandle to prevent cattle

wandering onto farmlands. It is important to keep the area near the fence cleared of any such vegetation. It should be ensured that the grounding has been done properly. Failure to do so might create the electric fence ineffective.

Dr. R. Ramaprabha, "Design of Power Converters for Solar Fencing System Employed in Agriculture"[6] has presented use of power converters for solar fencing system to be applied in agriculture. Wild animals destroys farmer's year of hard work in few hours. Solar fencing can be used which the animals experience a high voltage low current shock for a very short time. This paper presents a design and analysis for fencing system for very low current, high voltage converters.

Tasneem Khan Shifa, "Moisture Sensing Automatic Plant Watering"[7] presents Automated plant watering system evaluate and measure the existing plant and then supplies desired amount of water needed for that plant. It minimizes the excess water used as well as keeping plants healthy. The increasing demand of food requires the speedy improvement in food production technology. In a country like India, where the economy is mainly dependent on agriculture and the climatic conditions, still we are not able to make full use of agricultural resources. The main reason is the lack of rains & scarcity of land reservoir water. Very important reason of this is due to unplanned use of water to which a significant amount of water goes to waste. So, in modern irrigation system, plants can be easily monitored and can be taken care of by automatic plant irrigation system.

EZEONU Stella Ogochukwu, "Ultrasonic Bird Repeller" [8] in this paper it is described about the ultrasound used for repelling birds from the farm area to reduce the loss in crops due to birds. Many attempts have been made to develop a bird deterrent systems with only a few achieved desired results. The ultrasonic frequency range 15-25 kHz is known to be disturbing for birds and a device operating at that range was developed. The devices were tested and the results obtained proved that the ultrasonic beam from the piezo speakers was able to drive birds away from areas. Further tests were conducted with the unit showed a wider reach of the waves on dull day than on sunny day. About 5-6 of device is expected to cover one hectare of field. The system is solar powered, to reduce the cost of fuel, it is eco-friendly.

Atul R. Dange, "Performance of solar power fencing system for agriculture" [9] in this paper Solar power fencing system provides control for all type of animal. The application suits remote areas providing an economical and practical solution to achieve maximum protection in field or areas. The stated solar power fence system works on the solar energy

the daily observation like solar radiation, panel voltage, panel current, battery voltage, fence voltage and current were noted and were plotted on graphs among these parameters. The average input/output energy from solar panel were found 172 and 23 watt respectively. Voltage in the fence live wiring ranges from 2 to 11 kV. The range of pulsating current through the fence wire was 0.005 to 0.008 Amp. Each pulse in the fence wire is for 0.0003 of second and pulses spaced about 1.0 seconds. One panel of 35 kW and 12 V battery was set up effective for 3.5 km fence line. As sunshine hours during day decreases and battery which is charged get discharged. As results fence wire voltage decreases which gives poor performance to control animals from entering farm.

VenkatIyer, “Sensor-based Breakage Detection for Electric Fences” [10] presents how breakage is detected, there exists a number of fault detection circuits for fence that are available commonly. However, there are certain limitations for them which inhibit their suitability to our problem. For example, a system is described which is best used for less rugged environments such as airports. The fault detection system uses a hand held device which points to the direction where the fault is located. Workers must then cross along the fence holding the fault detection device until they found the fault location. This is the currently used method by the department of wildlife conservation in Sri Lanka, this fault finding procedure sometimes may take days. In this likely event of an elephant breach, such a delay can be harmful. These devices usually uses high impedance voltage dividers where the device get grounded through the user. Fault detection system uses radio for communication, and are not viable because of effective low cost radios are not yet available commercially. The system describes uses a separate communication line parallel along with the fence, to detect faults. The system identifies the breaks in the communication line rather than in the wire itself. This solution is also not cost effective because it requires an extra wire dedicated for the fault detection.

DavideAdami, “IOT Solutions for Crop Protection against Wild Animal Attacks” [11] this paper describes the synchronization among heterogeneous sensors and actuators interacting with cloud to provide a supporting platform for new services in the domain. In particular the peripheral part, a wireless technologies such as 6LoWPAN, WiFi, Zigbee etc., cooperating with the data center by an advanced IOT gateway. Another important feature that had considered is the lifespan of the device before placement. As such a selected low energy consuming bits equipped with batteries and solar panels for energy bring in, in order to achieve farm protection.

P. Rama Rao, “Protecting Crops from Birds, Using Sound Technology in Agriculture” [12] this presents

the range of hearing defines the range of frequency that is heard by humans or animals, although it can also refer to the range of levels. The human range is from 20 to 20 KHz, while humans have significant difference, mostly at high frequencies, and the gradual loss of sensitivity to higher frequencies with age is considered normal. The sensitivity also varies with frequency. Normal transmission for hearing loss usually includes an audiogram that shows the threshold levels relative to normal. Several species of animals can hear rate of recurrence that go beyond the limit of human hearing. For example, some dolphins and bats can hear frequency up to 100,000 Hz. Elephants can hear at a range of 14-16 Hz, while some whales can hear infrasound sound up to 7 Hz (in water).

Animals	Range in Hertz
Humans	20 – 20,000
Bats	2000 – 110,000
Elephant	16 – 12,000
Fur Seal	800 – 50,000
Beluga Whale	1000 – 123,000
Sea Lion	450 – 50,000
Harp Seal	950 – 60,000
Harbor Porpoise	550 – 105,000
Killer Whale	800 – 13,500
Bottlenose Dolphin	90 – 105,000
Porpoise	75 – 150,000
Dog	67 – 45,000
Cat	45 – 64,000
Rat	200 – 76,000
Opossum	500 – 64,000
Chicken	125 – 2,000
Parakeet	200 – 8,500
Horse	55 – 33,500

First of all, the number of birds is collective. Many farmers are using chains to harvest rice and wheat. Relatively a large number of grains obtained in this way are left behind in the field. This gives birds an ample and high-quality food supply that adds to the increase in numbers, and keeps it stable. Furthermore, many farmers are starting to plant rice through seeding rather than by transplanting. The sown seed is a resource of food for ducks if the paddy fields are swamped and for sparrows and pigeons if the fields are drained. In some cases, loss has occurred to first-hand crops. One example is the brown eared bulbul, which started to eat the leaves of various kinds of leafy vegetables. Bulbuls were once migratory birds, which overwintered in the southern part of Japan and raised in the hilly and northern regions of Japan. In the 1970s, these became year-long residents and started to cause severe damage to winter cabbage and other leafy vegetables. In the case of Japanese pear, bird damage became worse after the

cultivation / invention of new varieties such as Kosui, which is having a higher sugar content than traditional varieties.

Mr. Vikram M. Kakade, "Design and Implementation of an Advanced Security System for Farm Protection from Wild Animals" [13] demonstrated the various reasons for crop-raiding, comprising the devastation and destruction of habitats due to development projects. De-fence methods are activities taken by farmers to discourage wildlife from attacking crops. Harvesting plans are specific arrangements taken by farmers to overcome the effects of crop raiding as well as to evade crop raids on their farms. Automatic animal monitoring system with energy efficient wireless devices attached on the animals can advance efficiency of farming industry and rise its profitability. The practical distribution of delay lenient store and forward cattle monitoring planning that offers data retention, sensing custom events, notification issuing, remote and in-situ queries answering.

III. PROPOSED METHODOLOGY

As most of the crops in agriculture land are not getting the sufficient environment for their growth due climatic condition and the loss made by animals / birds in the farm land. Many problems regarding growth of the crops / grains are related to animals / birds interference, when the crops are ready to be harvested at that time these animals / birds enter the farm field and destroy the crops which creates a huge loss to farmers. To protect these farm lands a system needs to be designed.



Solar Energy is used to energize such fence arrangement, as solar energy is abundant and free and problem of energy crisis can be solved. Solar energy is converted to electrical energy and the electrical power to high voltage short duration electrical pulse. These short duration pulse causes avoidance of animals but are not harmful for them. For more protection to the crops an ultrasonic sound / audio

generator is being used to repel the birds, as most of the cereals are destroyed by birds by eating the grown cereals and grains in the farm. To avoid them audio generator is used to generate an ultrasound which are not audible to human hearing but animals and birds have some hearing range which is irritable to them, such ultrasound frequency is emitted so that animals / birds remain far from the field and there will be no loss in farming.

The Solar module produces the DC energy and controls the Battery. The output of the battery is attached to Energizer or Controller or Charger or Fencer. The energizer will yield a short, high voltage pulse at steady rate of one pulse per second. The live wire of the energizer is attached to the fence wire and the earth terminal to the Earth system. Animal / Intruder touching the live wire makes a path for the current over its body to the ground and back to the energizer via the earth system and completes the circuit. Thus the animal / intruder will receive a shock, the bigger the shock the animal / intruder receives the more.

The Energizer has to be established up with its earth terminal attached to an adequate earthing or grounding system. The live terminal is coupled to the live shielded wires of the fence. Energizer will direct an electric current along the shielded steel wire. An animal or intruder touching the live wire makes a path for the electrical current over its body to the ground and back to the Energizer through the earth or ground system, thus completing the circuit. The greater the shock the animal obtains the more long-term the memory will be and the more the fence. The shock handled is a grouping of fence voltage and pulses time or energy. The higher the *joule grade of the energizer the bigger the shock and the larger the fence performance.

As in this system solar energy is used to utilize the energy efficiently, this system added a Pump, this pump supply water to the crops if the soil moisture level is low, a GSM modem is used to inform the farmer if any unusual issues occur and an alarm / buzzer is used for any alerts. Thus the whole agriculture / farm protection system is build.

IV. CONCLUSION

In this way, a fence is provided across the field, so whenever an animal tries to enter the field will receive shock the fence should be grounded properly. Protecting the farms, animal definite frequency spectrum signals are produced. The animals are warned with these signals of danger and effectively ran away. System can be added on vehicles or trains in its place of mounting poles on road side. Buzzer will be activated. So that wild animals will not come in into the farm. It will run away. GSM module

guides message to the farmer to alert him, after the initiation of system. From this it is determined that the design system is very beneficial and cheap to the farmer. The design system will not be hazardous to animal and human being, and it protects farm.

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