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Solar based electric fencing for deterring cattle

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***Abstract*— The project exhibits an arrangement that could be used as a solution to prevent animals from entering our fields, farmhouses, gardens etc. and destroying them. This type of fencing arrangement are more economical as compared to manpower .When any animal tries to cross the fencing it gives them a short(1/5000th part of a second) and a safe shock that teaches them to stay away from the fields. The shock is safe since the current in fencing is discontinuous as there is certain time duration between two pulses It prevents the flow of current for long and avoid prolonged shocking to the animal.**

I. INTRODUCTION

An electric fence usually consists of several conductors of bare wire, supported on insulators and connected to a fence energizer which in turn is connected to a power source. Electric fencing provides an electrical shock when an animal comes into contact with the electrically charged wires of the fence. People unfamiliar with electric fencing often are afraid that it will injure, permanently damage, or kill an individual or pet that contacts the fence. But this is not the case everytime.A properly constructed electric fence is safe to people, pets, and bears. For electricity to flow in a system, such as an electric fence, there must be a complete and closed circuit. The electrical current must travel from its source through the circuit and back to the source. This flow only occurs when a charged wire of the fence becomes grounded. Under normal operating conditions, an electric fence functions as an incomplete or open circuit with repeating pulses of electricity generated by the energizer sent through the charged wires of the fence. When an animal touches charged wire, it grounds the fence, creating a closed circuit. An electrical pulse travels through the animal and back to the energizer, delivering a shock to the animal. The electric shock is unpleasant but is not lethal.

II. WORKING PRINCIPLE

The basic working of the fencing is as follows. Photovoltaic energy from the sun is absorbed with the help of solar panels which are made up of photo voltaic cells. These photo-voltaic (PV) cells are used to convert solar energy to electrical energy. This energy is stored in batteries through charge controller during the day time in order to be utilized whenever required .The battery supplies a MOSFET based Inverter and a step up transformer that produces 50 Hz 220V AC from the direct current (DC) output of a photovoltaic solar panel .This AC is then allowed to flow through fence that is installed around the farmer field to give a slight electric shock to cattle that tries to enter the field for grazing so as to protect the crops from damage.

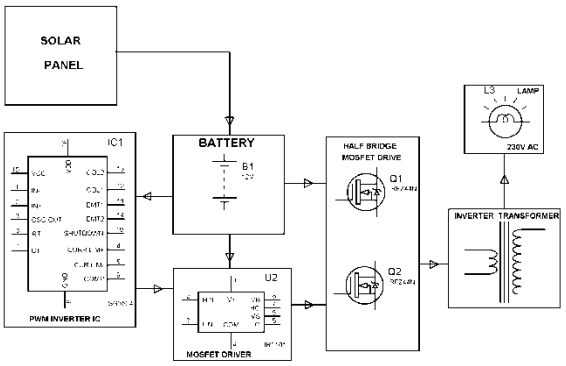

Fig1:Block diagram of a solar fencing

III. CALCULATION OF MAXIMUM OUTPUT VOLTAGE THAT CAN BE RECEIVED FROM PV MODULES OF A SOLAR PANEL

.It is known that the output voltage of a PV module is influenced by the ambient temperature. The range of the voltage output due to the extreme temperature should be within the specification of the charge controller. The temperature data from ASHRAE handbook is normally used along with open-circuit

voltage (Voc) and the temperature coefficient of Voc (TCVoc) to calculate the range of the output voltage from the PV module [1].

(a) The range of DC output voltage from PV modules

From the electrical specifications of Solar World Sun module Plus SW 265 mono at STC (Standard Test Conditions):

Open-circuit voltage Voc = 39.0 V

Temperature coefficient of Voc = – 0.30% / ºC

The low temperature history at Hill AFB, Ogden [2]:

ASHRAE Extreme Annual Mean Minimum Design Dry Bulb Temperature = – 16 ºC

Tmin = – 16 ºC – 25 ºC = – 41 ºC

V1 = Voc x { 1 + [(– 41 ºC) x (– 0.30% / ºC)]}

= 39 x 1.1312 = 43.8 V

(b) The maximum output current from PV modules

Short-circuit current Isc = 9.31A

Temperature coefficient of Isc = 0.04 % / ºC

ASHRAE 2% High Temperature = 34 ºC

Tmax = 34 ºC – 25 ºC = 9 ºC

Imax = I1 = Isc x { 1 + [9 ºC) x (0.04% / ºC)]}

= 9.31 A x 1.0036 = 9.34 A

IV. ADVANTAGES

Since this fencing is based upon renewable solar energy for electricity generation in fencing around the field, it do not add any cost to our installation in terms of power source which is conventionally a power plant. Power in power plants is generated by burning of fossil fuel in turn release harmful gases like carbon dioxide and various other effluents in the environment whereas solar energy is a clean and green source of energy and thus poses no threat to the environment. Thus using the abundant and renewable solar energy that too free of cost is a great advantage.

V. CONCLUSION

Our project 'Solar powered electrical fencing for deterring cattle' is based upon the concept of renewable solar energy.It uses solar energy to power the fencing around our fields so that cattles are not able to enter and destroy our crops.

Solar energy is a resource that is not only sustainable for energy consumption, it is indefinitely renewable (at least until the sun runs out in billions of years). The main benefit of solar energy is that it can be easily deployed by both home and business users as it does not require any huge set up like in case of wind or geothermal power. Solar energy not only benefits individual owners, but also benefit environment as well.

Solar energy can be of great boon in areas which have no access to power cables. It works great in remote locations where running power lines would be difficult or costly. Solar panels can set up to produce solar energy there as long as it receives the sunlight..Solar power can be used to generate electricity; it is also used in relatively simple technology to heat water (solar water heaters).

This type of fencing is of immense help to the farmers who tends to have a loss due to the destruction caused by the cattle to their field.

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