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PV Solar based Electric Fencing for Protection of Cage in high Voltage Lab in College

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Abstract - *An Electric fence plays an important role in today's security system. It is used to protect buildings, farm areas, domestic and industrial areas [1]. It works on solar energy with backup facility to run uninterruptedly during all possible conditions for better performance. [3] It's applications suits remote areas to provide an economical and practical solution to achieve maximum protection of field or particular area from an intruders. [4] Energy is required for a wide range of applications in the household as well as in industries. As demand for energy is increased enormously in recent years, the world is opting for nonpolluting renewable sources for energy production. Solar energy is the technology used to harness the sun's energy and make it useable for less-cost. Solar energy is the most abundant, inexhaustible and clean of all the energy resources till the date. New technology is introduced in the field of solar energy production called as a solar photovoltaic cell which known for the production of electricity in a clean, quiet and renewable way which is also responsible for the reduction in greenhouse gases like carbon dioxide This study provides accurate insight into a modern alternative for conventional fencing system for effective protection.*

Key Words: *Renewable energy, Solar Panel, PV material, fencing, photovoltaic cell.*

1. INTRODUCTION

Electric fences are used because they require less maintenance rather than traditional physical barrier. They are also cost-effective. It is activated by energizing one bare conductor which is attached to an insulating fence. First fence energizer technology is introduced in the year 1930.[2] Electric fence is widely used in agricultural use, for wildlife, for industrial and domestic use. The system consists of a capacitive discharge circuit to energize the fence for effective solar fencing.[1] Due to reduced physical pressure, an electric fence has a long life. It is cost-effective and easy to construct than a conventional fence.

Shock in the fence is less, it does not cause serious injury. It is simple and flexible to use. It requires low maintenance. As for battery stores solar energy, therefore, electric fencing does not depend on regular electricity supply.

2. CALCULATIONS

N_1 =primary transformer winding

N_2= secondary transformer winding

V_1=primary winding voltage

V_2= secondary winding voltage

I_1= primary winding current

I_2= secondary winding current

P= power

$$\frac{N1}{N2} = \frac{V1}{V2}$$

$$\frac{1}{166} = \frac{3.3}{V2}$$

$$V_2 = 3.3*166$$

$$V_2 = 547.8\ V$$

Due to voltage Tripler here,

Multiply by 3

$$V_2 = 547.8 \times 3$$

$$V_2 = 1643.4\ V$$

Due to transformer losses, voltage drops takes place

$$\mathbf{V_2 = 1500V}$$

$$\frac{V1}{V2} = \frac{I2}{I1}$$

$$\mathbf{I_1 = 36mA}$$

$$P = VI$$

$$P = 1.5 \times 0.08$$

$$\mathbf{P = 0.12\ watt}$$

3. CIRCUIT DIAGRAM

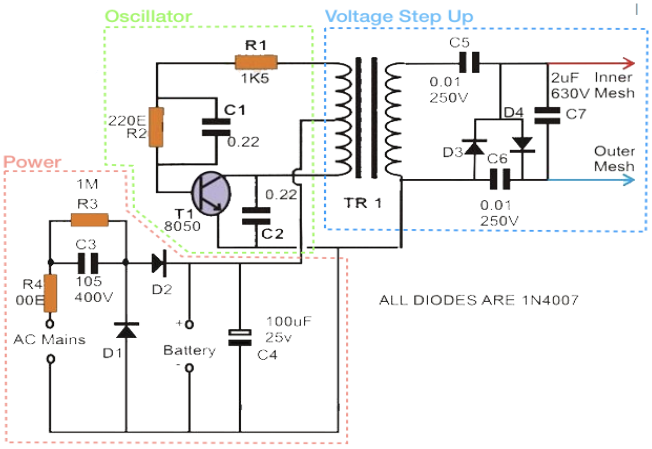

Fig -1: voltage energizer

4. WORKING

As we see the circuit which consist of three stages namely power supply, oscillator, and voltage step up.

4.1 Power supply

The first stage that is power supply that consist of transformer-less power supply, capacitor and diode. For discharge the capacitor R3 is connected across C3 and IN4007 diodes D1, D2 is used for convert AC to DC. It is used for charge the rechargeable battery.

4.2 Oscillator

Oscillator circuit is composed by transistor, resistors and capacitor. It is use for converting the DC to AC voltage.

4.3 Voltage stepup

Oscillator AC voltage step up by using step up transformer and also step up the oscillating frequency

4.4 Voltage multiplier

It converts from AC voltage to higher DC voltage using diodes and capacitor network. Voltage Tripler increase secondary side of voltage by triple time.

4.5 Capacitor bank

Pulsating dc high voltage is stored in capacitive bank. When any conductive object comes in contact with fencing wires at that instant circuit is completed and energy will pass through the object.

5. RESULT

Power rating and Voltage of proposed system is 0.12 watt and 1.5 KV respectively. Thus, shock provided by system is sufficient enough to keep intruders away from designated area.

6. CONCLUSION

In this paper, a proper analysis of solar fencing installed in a laboratory of **PES Modern college, Pune** is done. From this, we conclude that the designed solar fencing system is easy to assemble, cost-effective and energy efficient. The solar fencing system proposed in the paper requires less maintenance in comparison to other conventional methods of fencing.

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