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Electric Fence for High Security

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ABSTRACT

Once the electric fence is installed correctly, and the animal comes in contact with an electrically charged fence wire, it will feel a shock because the electric current will pass through the animal to earth ground, thus completing the electrical circuit. Before you start building your fence, make sure to check out our advice centre to see what will work best for your fencing needs. The fence must be well-designed and constructed to absorb some pressure from animals, snow and wind. The fence's charger, also known as an Energizer or Fence Controller, must have enough power for the length of the fence and for the animals being controlled.

I. INTRODUCTION

Building a good electric fence is like anything else, you get out what you put in. If you use the proper equipment and maintain the fence the result will be a permanent structure just like the barb wire you use to use. The advantage of using 'electric' or 'high tensile' fences is on average they cost less than a barb wire fence, since less materials are required (ie posts, staples and wire) and they take less time to install. The electric fence option is also more versatile; you can take it down quickly and re-install somewhere else. This is particularly useful during times of drought when there are pasture shortages and producers are looking for additional grazing options. Electric fences are mental barriers not physical barriers for all classes of cattle and grazing situations. When livestock are trained properly and the fence is working the way it was designed to (ie with the proper voltage on the fence), cattle will touch the fence once and than leave it alone. This includes all seasons of grazing or pasture confinement such as spring, summer, fall and winter.

II. DESIGN AND COMPONENTS

To design a schematic, simply select and place components onto your document and connect. them together using the wire and bus tools. Multisheet design is supported. Then select the menu option 'Switch to Board' to convert the schematic to PCB. Layout can be updated from Schematic in a few clicks at any time. When you create or edit design objects, they are highlighted to improve your work. Step-by-step tutorial available from web-site guides you through the design process and allows to get started with ease

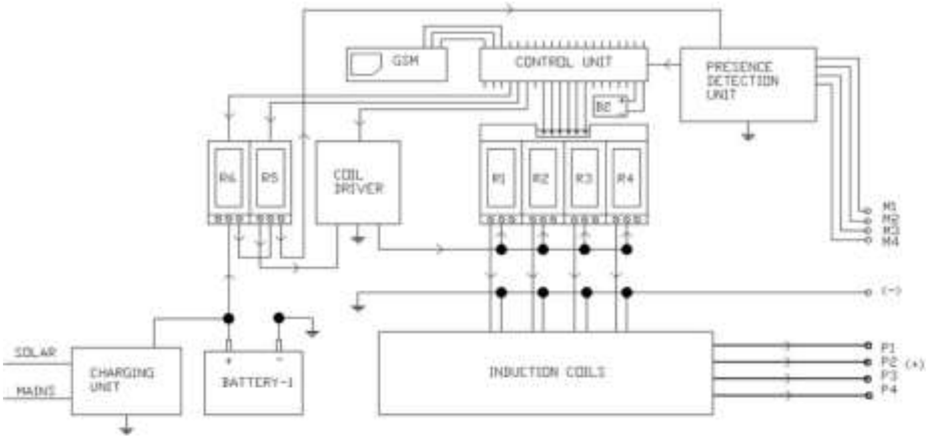
Hardware components:Temperature sensor, 20x4 LCD display and supporting electronics (PCB, Resistors, Capacitors, Diode, Switches, CT, Energy metering IC, Connectors & connecting wires).Support and Fencing wiresADXL335

Software components: Altium, Carr and CAPHRA.

III. PROBLEM STATEMENT

In modern security infrastructure, perimeter protection plays a critical role in preventing unauthorized access to sensitive areas such as military installations, industrial facilities, and government buildings. Traditional perimeter fences are often easily breached, necessitating the development of more robust and deterrent security measures.The objective of this project is to design an electric fence system capable of providing high-security perimeter protection. The system should deter and prevent unauthorized access while minimizing false alarms and ensuring the safety of authorized personnel and wildlife.

IV. BLOCK DIAGRAM & WORKING



Q1, R1 and the primary of T1 are self-oscillating blocking oscillator running at a frequency of about 6KHz. The positive pulses at the base of Q1 have a width of about 10us and a peak voltage of about 12V. T1 has a secondary winding with about 100x the amount of turns of the primary and acts as fly back transformer, generating high voltage pulses of 10us with a frequency of 6KHz at the secondary winding. This means that we have a duty cycle of about 16%. D1 rectifies the voltage at the secondary winding, so only the positive pulses pass. C1 is grounded via the primary winding of T2 and is slowly charged with the 16% duty pulsed current. The interesting part of the circuit is D3, which is a reverse-biased regular 1N4148 diode, that will break down at minimum 100V reverse voltage. So when C1 reaches about 100V, D3 will break down and will provide the gate of thyristor THY1 (SCR - Thyristor) of enough current to start conducting. The SCR used here is a sensitive gate type, meaning it will trigger (start conducting) at gate currents of 40 to 200uA. When THY1 conducts, it will connect C1, that is charged to 100V, across the primary of T2. This means that C1 will discharge into the low resistance primary of T2, causing a huge but very short current spike in the primary of T2. The turns-ratio of T2 is about 50x. At the secondary winding of T2, we find a voltage peak of 4 to 5KV. C2 is added to form a LC-resonance circuit with the inductance of the secondary winding of T2. So the output voltage is not a sharp peak, but rather stretched out due to the self-resonance of the LC circuit. Due to C2, the energy at the output is available for a longer time-span, generating brighter sparks.

To finish the story: when C1 is completely discharged and the current is lower than the hold current of THY1, THY1 will stop conducting, so C1 is not 'paralleled' with the primary winding of T2 anymore and can start charging again. It takes about 50ms to charge C1 to 140V (in my lighter, the break down voltage of D3 was 140V), so we have a repetition rate of about 20Hz between the high voltage pulses at the secondary of T2. The flash of a camera works in a similar way, by generating a high voltage with a flyback transformer from a single 1,5V battery. A capacitor is charged to this high voltage and its energy released into the triggercoil of the xenon flash tube when the flash is activated. This generates a short high voltage pulse that ignites the xenon flash tube. Tasers also work in a similar way to generate high voltage pulses. Fascinating how you can generate any voltage from a 1,5V battery using rather simple electronics. The energy that can be delivered in these short high voltage pulses is limited and not life-threatening. The energy at the output is the energy stored in C1, which is released into T2 and is equal to 1/2 * C

= 0.5 * 100nF * 140V = about 0.001 Joule. 10 Joules is considered hazardous. 50 Joules is considered lethal, independent of the time in which this energy is released [6]

V. RESULTS

Upon implementation, the high-security electric fence system demonstrates significant improvements in perimeter protection, with a notable decrease in unauthorized access attempts and breaches. The system effectively deters intruders through its visible presence and the threat of a non-lethal electric shock upon contact. Integration with alarm systems and surveillance cameras ensures prompt notification of security breaches, enabling rapid response by security personnel. Compliance with safety standards and incorporation of safety features mitigate the risk of injury to authorized personnel and bystanders. Furthermore, the system's reliability in various environmental conditions, scalability, and minimal environmental impact contribute to an overall enhancement of the security posture for protected areas. As a result, the high-security electric fence system proves to be a robust and effective solution for bolstering perimeter security in critical infrastructure and high-security facilities.

VI. REAL-WORLD APPLICATIONS AND FUTURE DIRECTIONS

Military bases and installations require robust perimeter security to safeguard sensitive assets, equipment, and personnel. High-security electric fences provide an effective deterrent against unauthorized access and intrusions, enhancing overall security readiness.Electric fences play a crucial role in securing prisons and correctional facilities, preventing escapes and unauthorized entry. The electrified perimeter acts as a formidable barrier, reducing the risk of inmate disturbances and enhancing staff and public safety.

Critical infrastructure such as power plants, refineries, and manufacturing facilities rely on electric fences for perimeter protection against theft, sabotage, and unauthorized entry. The high-security electric fence serves as a deterrent to potential intruders and helps maintain operational continuity.Data centers and server farms house valuable digital assets and sensitive information. Electric fences help safeguard these facilities against physical threats, unauthorized access, and potential cyber-attacks by establishing a secure perimeter around the premises.

. a. Electric Fence can be built alongside existing fences except in case of barbed wire fences. b. Existing posts can be made use of provided the comer/ end poles are strong c. The shock does not physically harm animals or human beings d. It is not dependent on regular electricity supply as it operates on battery e. A long life as the fence is not subjected to physical pressures of wear and tear. f. Selective barriers possible. For example, cattle barriers can be designed to allow smaller.

VII. CONCLUSION

The project Farmer friendly IOT controlled solar fence for agriculture purpose is based upon the concept of IOT control and renewable solar energy. It uses solar energy as well as electrical energy to power the fencing around our fields so that cattle's are not able to enter and destroy our crops. With the implementation of IOT control and IR obstacle sensor there will be the assurance of high security and safety for the human beings. With the implementation of IOT control the process have become still an easy process to control the ON/OFF controls by the owner of the farm

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