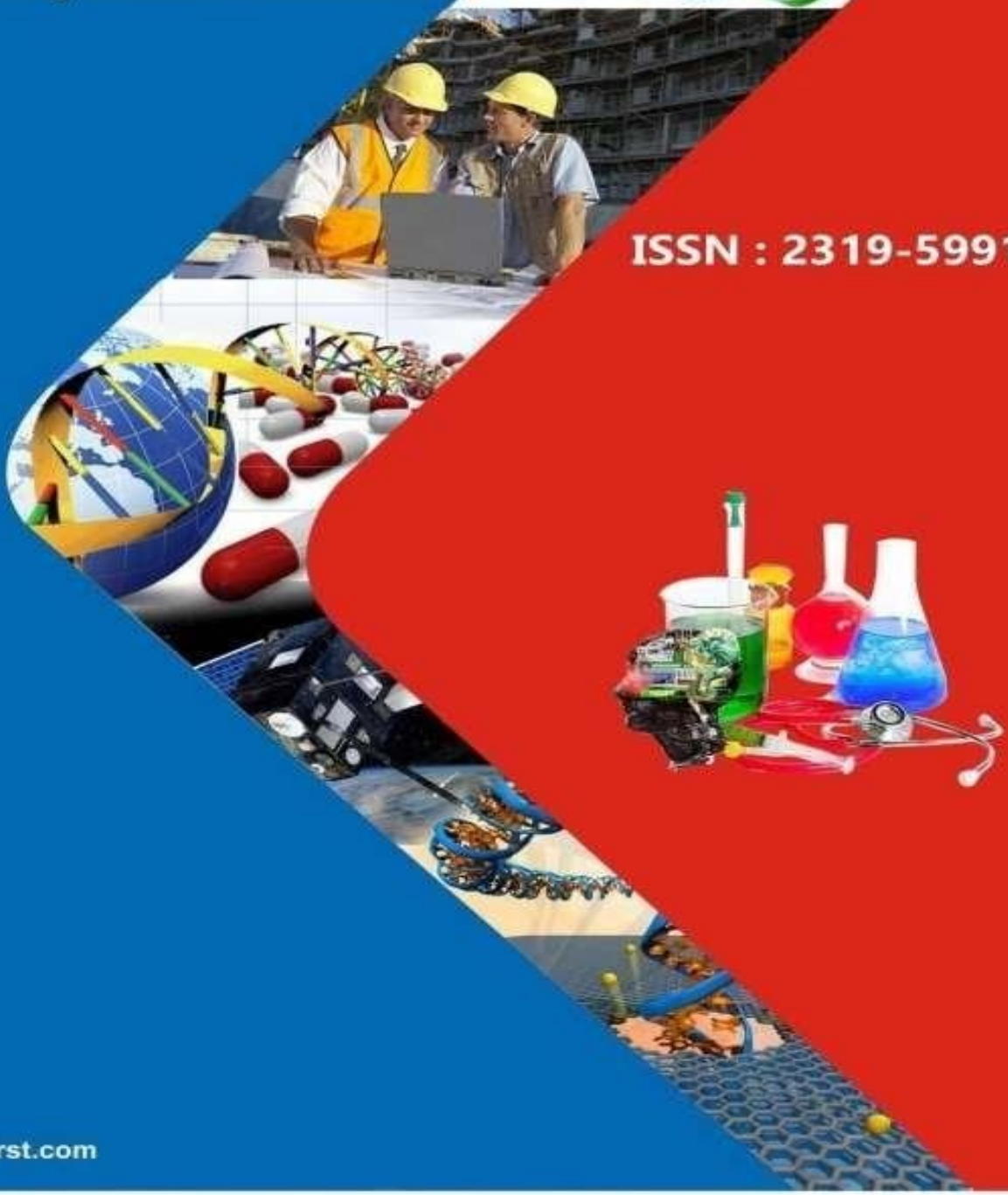
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ECO-FRIENDLY SOLAR FENCING USING IOT

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ABSTRACT

Solar-based virtual fences use the principle of converting solar energy into electrical energy and giving electric shock while touching the fences. Electronic fence systems are used at many places such as forest areas, farms, etc. To protect those places against animals and thefts solar energy is converted to electrical energy to provide the necessary voltage for electrical fences As the Unregulated DC voltage from the solar energy is converted to regulated DC voltage and further converted to AC voltage using an inverter. Electric fences can be used to protect farmhouses, farmlands, forest bun glows, etc from animals. In a way, these simulate the job of a cowboy or forest guard. Already popular in countries where manpower is expensive, electric fences are slowly becoming popular in India as well. These control the animals by giving them a short, sharp but safe shock that teaches them to stay away from the fence. Thus electric fences are economical and practical solutions to maximize field production through controlled grazing. Electric fencing is safe, as its output is discrete (not continuous). There is certain time duration between two pulses that prevents prolonged shocking to animals or people. In addition, the short 'on'-time (normally 1/5000th of a second) prevents heat build-up. This project works on stable multi vibrator principle. A free running oscillator is designed to generate square wave and the output is given to push-pull amplifier. This square wave is stepped up to high voltage level and can be connected to the fence. This fence system is powered by a 12V rechargeable battery. A solar panel is connected to the battery to charge on day time. A normal PN junction diode is used for unidirectional low of charge current. The battery also can be charged from house hold AC supply of 230V, 50 Hz. The battery charger circuit is designed to charge the battery with the help of house hold AC supply for emergency conditions. This circuit uses regulated 12V, 750mA power supply. 7812 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/18V step down transformer.

Keywords: Microcontroller, Solar Fencing, Camera, Buzzer, LCD, IOT

I. INTRODUCTION

1.1 INTRODUCTION

Microcontroller are widely used in Embedded Systems products. An Embedded product uses the microprocessor (or microcontroller) to do one task & one task only. A printer is an example of Embedded system since the

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processor inside it perform one task only namely getting the data and printing it. Although microcontroller is preferred choice for many Embedded systems, there are times that a microcontroller is inadequate for the task. For this reason, in recent years many manufactures of general-purpose microprocessors such as INTEL, Motorola, AMD & Cyrix have targeted their microprocessors for the high end of Embedded market. One of the most critical needs of the embedded system is to decrease power consumptions and space. This can be achieved by integrating more functions into the CPU chips. All the embedded processors have low power consumptions in additions to some forms of I/O, ROM all on a single chip. In higher performance Embedded system, the trend is to integrate more & more function on the CPU chip & let the designer decide which feature he/she wants to use.

1.2 EMBEDDED SYSTEM

Physically, embedded systems range from portable devices such as digital watches and MP3 players to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure

In general, "embedded system" is not an exactly defined term, as many systems have some element of programmability. For example, Handheld computers share some elements with embedded systems such as the operating systems and microprocessors which power them but are not truly embedded systems, because they allow different applications to be loaded and peripherals to be connected. Embedded systems span all aspects of modern life and there are many examples of their use. Telecommunications systems employ numerous embedded systems from telephone switches for the network to mobile phones at the end-user. Computer networking uses dedicated routers and network bridges to route data.

EXAMPLES OF EMBEDDED SYSTEM:

Automated teller. machines (ATMS). Integrated system in aircraft and missile. Cellular telephones and telephonic switches. Computer network equipment, including routers timeservers and firewalls. Computer printers, Copiers. Disk drives (floppy disk drive and hard disk drive). Engine controllers and antilock brake controllers for automobiles. Home automation products like thermostat, air conditioners sprinkles and security monitoring system. House hold appliances including microwave ovens, washing machines, TV sets DVD layers/recorders. Medical equipment. Measurement equipment such as digital storage oscilloscopes, logic analysers and spectrum analysers. Multimedia appliances: internet

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radio receivers, TV set top boxes.Small hand-held computer with P1M5 and other applications. Programmable logic controllers (PLC's) for industrial automation and monitoring. Stationary video game controllers.

1.3 CHARACTERISTICS:

Embedded systems are designed to do some specific tasks, rather than be a general-purpose computer for multiple tasks. Some also have real-time performance constraints that must be met, for reasons such as safety and usability; others may have low or no performance requirements, allowing the system hardware to be simplified to reduce costs. Embedded systems are not always standalone devices. Many embedded systems consist of small, computerized parts within a larger device that serves a more general purpose. For example, the Gibson Robot Guitar features an embedded system for tuning the strings, but the overall purpose of the Robot Guitar is, of course, to play music. Similarly, an embedded system in an automobile provides a specific function as a subsystem of the car itself.

The software written for embedded systems is often called firmware, and is usually stored in read- only memory or Flash memory chips rather than a disk drive. It often runs with limited computer hardware resources: small or no keyboard, screen, and little memory.

1.4 MICROPROCESSOR (MP):

A microprocessor is a general-purpose digital computer central processing unit (CPU). Although popularly known as a "computer on a chip" is in no sense a complete digital computer. The block diagram of a microprocessor CPU is shown, which contains an arithmetic and logical unit (ALU), a program counter (PC), a stack pointer (SP), some working registers, a clock timing circuit, and interrupt circuits.

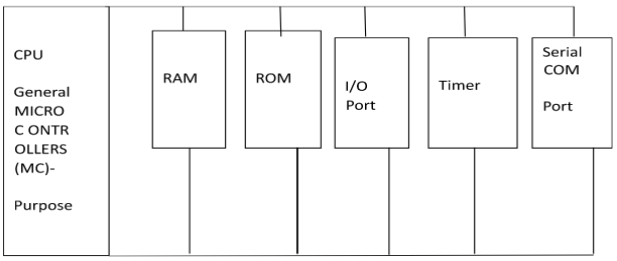


Fig 1.1 Block diagram of microprocessor

1.5 MICROCONTROLLER (MC):

Figure shows the block diagram of a typical microcontroller. The design incorporates all of the features found in micro-processor CPU: ALU, PC, SP, and registers. It also added the other features needed to make a complete computer: ROM, RAM, parallel I/O, serial I/O, counters, and clock circuit.

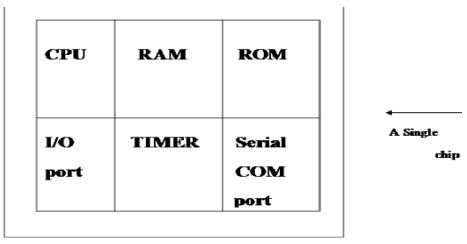


Fig 1.2 Microcontroller

1.6 COMPARISION BETWEEN MICROPROCESSOR AND MICROCONTROLLER

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The microprocessor must have many additional parts to be operational as a computer whereas microcontroller requires no additional external digital parts. The prime use of microprocessor is to read data, perform extensive calculations on that data and store them in the mass storage device or display it. The prime functions of microcontroller is to read data, perform limited calculations on it, control its environment based on these data. Thus the microprocessor is said to be general-purpose digital computers whereas the microcontroller are intend to be special purpose digital controller. Microprocessor need many opcodes for moving data from the external memory to the CPU, microcontroller may require just one or two, also microprocessor may have one or two types of bit handling instructions whereas microcontrollers have many.

II. LITERATURE SURVEY

2.1 INTRODUCTION

In The World, the Economy of Many Countries Is Dependent Upon Agriculture. InSpite 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. Agriculture In India Is The Broadest Economic Sector And Plays A Significant Role In The Overall Socio-Economic Factor Of India. In Such Areas Electric Fencing System Can Be Employed In Which The Animals Experience A High Voltage Low Current Shock For A Very Short Time. The Ever-Evolving Landscape Of Security Systems Necessitates Innovative Solutions To Address Emerging Challenges. In This Context, The Integration Of Advanced Technologies Has Become Imperative To Fortify Perimeters Effectively.

This Paper Introduces An Integrated Solar Fencing System, Incorporating A Trifecta Of Cutting-Edge Technologies: A Camera For Visual Monitoring, An Ultrasonic Sensor For Proximity Detection, And A Flame Sensor For Identifying Potential Fire Hazards. As Concerns About Environmental Sustainability And Energy Efficiency Intensify, The Integration of Solar Power Into Security Systems Is A Timely And Pertinent Consideration. This Integrated Approach Not Only Enhances Security Measures But Also Aligns With The Global Shift Towards Eco-Friendly Solutions. The Multifaceted Nature of This System Stems From Its Ability To Detect Intrusion Through Visual And Proximity Cues, While Also Addressing The Critical Issue of Fire Prevention. By Amalgamating These Technologies, The Integrated Solar Fencing System Endeavors To Provide A Comprehensive And Resilient Solution To Safeguard Perimeters, Offering Heightened Security And Peace Of Mind In An Ever-Changing Security Landscape. This Paper Delves Into the Intricacies of The System's Design, Functionality, And Potential Applications, Contributing to The Discourse on

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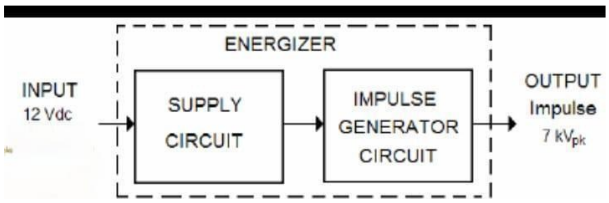
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Innovative Approaches To Perimeter Security.

III. PROBLEM STATEMENT

Current systems for protecting agricultural areas from animals often rely on physical barriers or traditional electric fences powered by non-renewable energy sources

3.1 BLOCK DIAGRAM OF EXISTING SYSTEM



Block diagram of Existing System

3.1 Disadvantages of Existing System:

High Energy Costs: Traditional electric fences rely on non-renewable energy sources, leading to higher operational costs. Environmental Impact: Non-renewable energy sources Contribute to environmental pollution. Maintenance: Physical barriers require regular maintenance and can be easily damaged by animals. Limited Coverage: Traditional systems may not cover large areas effectively.

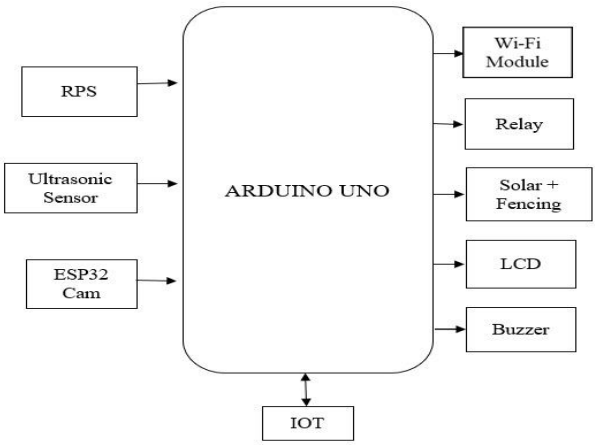
IV. PROPOSED SYSTEM

Solar Fencing integrates various sensors such as Ultrasonic Sensor and Camera to enhance security measures. Ultrasonic Sensors are strategically placed along the fence to detect physical proximity by emitting Ultrasonic waves. They measure the time taken for these waves to bounce back, identifying attempts to climb or breach the barrier. This feature proves valuable in identifying unusual activities like attempts to cut through the fence using heat-producing tools. Additionally, Cameras capture images or video footage of the surroundings, offering visual confirmation and Aiding in the identification of potential threats. Powered by solar panels, the system ensures continuous operation without relying on external Power Sources.

In operation, when any of the sensors detect an abnormal condition, such as proximity or heat, the system can trigger alarms, alert a monitoring station, or activate deterrents like lights or sirens. The camera footage further contributes to real-time monitoring and retrospective analysis for comprehensive security coverage.

4.1 BLOCK DIAGRAM OF PROPOSED SYSTEM

The proposed system contains different modules consisting of both hardware and software components



V. BLOCK DIAGRAM OF PROPOSED SYSTEM

HARDWARE COMPONENTS

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Power Supply, Arduino UNO, Ultrasonic Sensor, ESP32 Cam,Solar Fencing, LCD, Buzzer

SOFTWARE COMPONENTS

The following software tools used in the proposed system

Arduino IDE, Proteus

VI. RESULT AND DISCUSSION

6.1 PROTOTYPE (THROUGH KIT)

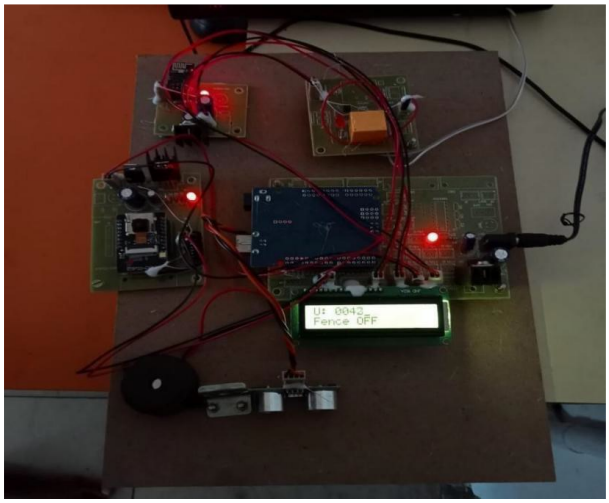
shows the prototype of the project

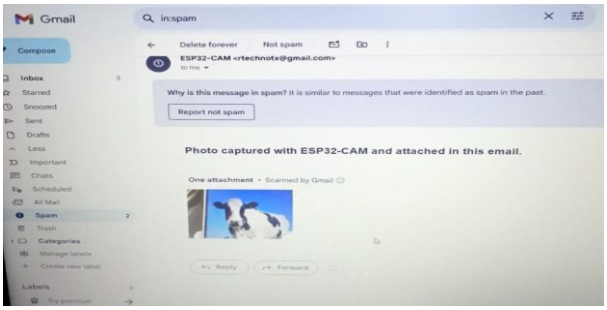


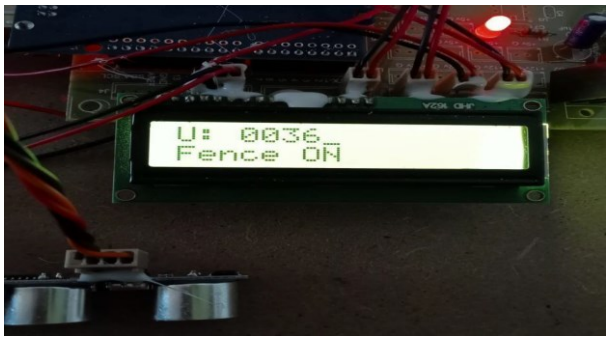
Prototype of the Project

EXPERIMENTAL RESULTS

shows the real-time monitoring of the ESP32 camera







The system detects obstacles using ultrasonic sensor. The ESP32 Cam captures images for verification, the system triggers the buzzer and sent alert to mobile app. Data is uploaded via IOT for remote monitoring. The solar powered fencing system might activate to enhance security

VII. CONCLUSION AND FUTURE SCOPE

In conclusion, integrating ultrasonic sensors for proximity detection and cameras for surveillance enhances the effectiveness of solar fencing systems. This innovative combination not only provides robust security by detecting intruders through ultrasonic waves but also minimizes the risk of fire incidents with flame sensors. Additionally, the inclusion of cameras adds an extra layer of monitoring, allowing for real-time visual assessment and improved overall security management. The synergistic integration of these technologies makes solar

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fencing a comprehensive solution for heightened
security and safety..

VIII. FUTURE SCOPE

Moreover, the scalability and adaptability of the "Laser Fencing" system make it well-suited for deployment across diverse agricultural and environmental settings, offering a versatile solution that can be tailored to meet the specific needs and challenges of different regions and ecosystems. By leveraging machine learning algorithms, statistical analysis, and pattern recognition techniques, the system can continuously optimize its performance and adapt to changing environmental conditions, enhancing its effectiveness in deterring wildlife intrusion while minimizing false alarms and maximizing resource efficiency

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