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Effective Stun Gun for Women Safety using IOT

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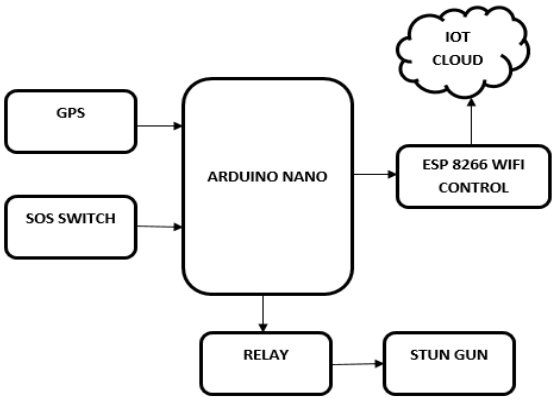
***Abstract*— The device features a microcontroller, SOS switch, GPS module, and IoT connectivity through Thing Speak, allowing real-time location tracking and alerting. Upon activation of the SOS switch, the device sends an immediate alert with GPS coordinates to designated contacts, ensuring timely assistance. A unique double-click feature allows users to activate a stun gun, providing an additional layer of self-defense in critical situations.**

***Keywords*—Arduino Nano, ESP 8266 Wi-Fi Controller, NEO- 6M GPS and Stun Gun**

I. INTRODUCTION

SecureHer is an IoT-based safety device designed specifically to enhance personal security for women. The device is compact, wearable, and equipped with advanced features to ensure quick response in emergency situations. At the core of SecureHer is its ability to send SOS alerts with real-time GPS location to pre-registered contacts and emergency services at the press of a button. This ensures that help is dispatched promptly, reducing the response time in critical moments. Additionally, with the integration of stun gun, it can incapacitate a rapist by delivering a high voltage electric shock, as it primarily disrupts muscle functions and also inflicts pain without causing significant injury. SecureHer addresses multiple scenarios where women may feel unsafe or at risk, such as traveling alone at night, working in remote areas, or commuting in unfamiliar environments. The device's ability to provide instant alerts, real-time tracking, and proactive threat detection makes it a comprehensive safety solution that goes beyond traditional method

II. PROPOSED BLOCK DIAGRAM



III. DESIGN METHODOLOGY AND WORKING

As soon as the switch is pressed the Lead-Acid battery give a 5V Direct Current (DC) to NPN Transistor which acts as an inverter circuit and coverts to DC to pulsating high voltage and low current AC. After which the AC voltage is passed through a Step-up Transformer which takes that Step-up the voltage from 5V to 15KV.Thus producing a very high voltage AC which is used as the output to immobilize an attacker without causing serious injury.

The additional security that our project provides is that if ever our user fails to aim at the correct target point, the switch of the stun gun pressed sends a distress signal to the GPS which is used to send emergency alert message to the predesigned emergency numbers like nearby police station, friends or family.

IV. HARDWARE REQUIREMENTS

A. Arduino Nano:

The Arduino Nano is a compact, open-source microcontroller board based on the Microchip ATmega328P, designed for breadboard use. It features 30 male I/O headers, operates at 16 MHz, and has 32 KB of flash memory and 2 KB of SRAM. The board can be powered via a Mini-B USB or external power supply (6-20V) and supports serial communication through an FTDI chip. It is compatible with the Arduino IDE for programming, making it suitable for various DIY projects12. Its small size (45mm x 18mm) makes it ideal for space-constrained applications.

B. ESP 8266 Wi-Fi Controller:

The ESP8266 is a low-cost Wi-Fi microcontroller widely used in Internet of Things (IoT) applications. It features a 32-bit processor, supports IEEE 802.11 b/g/n, and can operate as either a standalone device or as a Wi-Fi adapter for other microcontrollers.

Key features include:

- GPIO Pins: Up to 17 GPIOs, with support for PWM and ADC.
- Networking: Full TCP/IP stack for internet connectivity.
- Development: Compatible with Arduino IDE and various SDKs, allowing easy programming.

Applications: Used in smart home devices, industrial automation, and health monitoring systems.

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C. NEO-6M GPS

The NEO-6M GPS module is a compact and efficient GPS receiver, ideal for various applications such as robotics and tracking systems. It can track up to 22 satellites and provides a position update rate of 5 Hz, with a horizontal accuracy of about 2.5 meters.

Key Features:

- The NEO-6M is popular among hobbyists for its ease of integration Power Consumption: Operates at 3.3V with a current draw of approximately 45 mA.
- Communication: Uses UART for data transmission, supporting baud rates from 4800 to 115200 bps (default 9600).
- Built-in Antenna: Comes with a ceramic antenna for improved satellite reception.
- Battery Backup: Includes a rechargeable battery to retain data during power loss with microcontrollers like Arduino, making it a go-to choice for GPS-related projects.

D. SOS Switch

An SOS switch typically refers to a device or circuit that signals an SOS distress signal, often using Morse code. In Arduino projects, this can be implemented using a button to activate an LED that blinks the SOS pattern: three short flashes (dot), three long flashes (dash), and three short flashes again.

Key components include:

- Microcontroller: Often an Arduino board.
- LED: To indicate the SOS signal.
- Button: To start/stop the SOS signaling.

For example, pressing the button can trigger the LED to flash in the SOS pattern repeatedly until pressed again to stop it.

E. Relay Module

A relay module is an electronic device that allows a low-voltage microcontroller, like an Arduino, to control high-voltage devices such as lamps or motors. It operates using electromagnetism to mechanically switch circuits on and off.

Key Features:

- Channels: Available in configurations of 1, 2, 4, or more relays.
- Control Logic: Typically uses active-low logic, where a LOW signal activates the relay.
- Isolation: Some modules provide Opto-isolation to protect the microcontroller from high voltages.

Basic Connections:

- GND: Connects to Arduino ground.
- VCC: Connects to 5V power.
- IN1: Connects to a digital pin on the Arduino for control

F. Stun Gun

A stun gun is a type of electroshock weapon designed to incapacitate a person by delivering a high-voltage electric shock. It primarily disrupts muscle functions and inflicts pain without causing significant injury.

Key Characteristics:

- Direct Contact: Stun guns require direct contact with the target to deliver the shock, affecting the sensory nervous system.
- Duration: Effective stunning typically requires 3-5 seconds of contact.
- Applications: Used for self-defense and law enforcement, stun guns are often compared to Tasers, which can incapacitate from a distance using projectiles.
- While stun guns can cause temporary paralysis and pain, they are generally considered less lethal than firearms.

G. Stun Gun Safety Switch

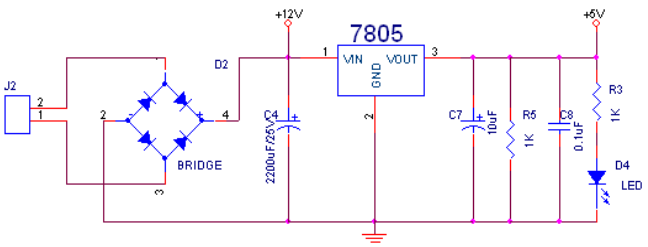
A stun gun safety switch is a crucial feature designed to prevent accidental discharge of the device. It typically functions as an on/off switch that must be activated before the stun gun can be used. Understanding this feature enhances user safety and ensures effective operation in emergencies

Key Points:

- Location: The safety switch is often located on the side or back of the stun gun, ensuring it's not easily triggered accidentally.
- Functionality: When engaged, the safety switch prevents the discharge button from functioning, allowing safe handling and storage.
- Usage: To use the stun gun, the safety switch must first be turned off, enabling the user to activate the shock by pressing the discharge button.

H. Power Supply

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.



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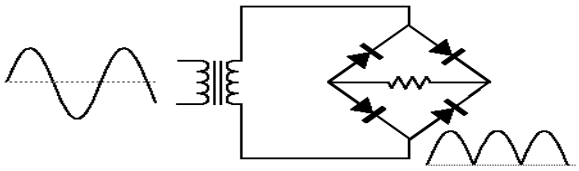
A 230v, 50Hz Single phase AC power supply is given to a step down transformer to get 12v supply. This voltage is converted to DC voltage using a Bridge Rectifier. The converted pulsating DC voltage is filtered by a 2200uf capacitor and then given to 7805 voltage regulator to obtain constant 5v supply. This 5v supply is given to all the components in the circuit. A RC time constant circuit is added to discharge all the capacitors quickly. To ensure the power supply a LED is connected for indication purpose.

I. Bridge Rectifier

A bridge rectifier makes use of four diodes in a bridge arrangement to achieve full-wave rectification. This is a widely used configuration, both with individual diodes wired as shown and with single component bridges where the diode bridge is wired internally.



V. SOFTWARE REQUIREMENTS

A. Arduino Software

Arduino is a prototype platform (open-source) based on an easy-to-use hardware and software. It consists of a circuit board, which can be programmed (referred to as a microcontroller) and a ready-made software called Arduino IDE (Integrated Development Environment), which is used to write and upload the computer code to the physical board.

The key features are:

1) Arduino boards are able to read analog or digital input signals from different sensors and turn it into an output such as activating a motor, turning LED on/off, connect to the cloud and many other actions.
2) You can control your board functions by sending a set of instructions to the microcontroller on the board via Arduino IDE (referred to as uploading software).
3) Unlike most previous programmable circuit boards, Arduino does not need an extra piece of hardware (called a programmer) in order to load a new code onto the board. You can simply use a USB cable.
4) Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program.
5) Finally, Arduino provides a standard form factor that breaks the functions of the micro-controller into a more accessible package.

B. Embedded C++

Embedded C++ is a specialized subset of C++ tailored for embedded systems, retaining essential features while eliminating those that could lead to inefficiencies.

Key Features:

- Object-Oriented Programming: Supports classes and encapsulation, enhancing code reusability and maintainability.
- Resource Management: Excludes features like multiple inheritance and exceptions to minimize memory overhead and ensure deterministic performance.
- Performance: Allows for low-level hardware manipulation while maintaining high-level abstractions, making it suitable for complex systems.

Advantages:

- Scalability: Facilitates the development of larger projects through modular design.
- Ease of Use: Simplifies complex tasks with templates and standard libraries, promoting cleaner code.
- Embedded C++ is increasingly favored in applications requiring both efficiency and advanced programming capabilities, such as robotics and IoT devices124.

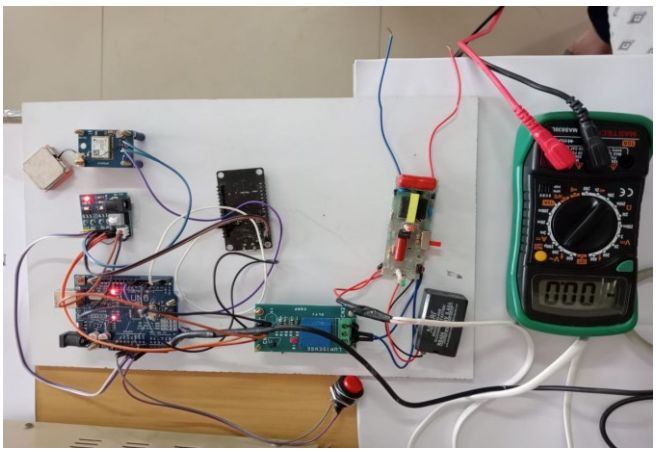
C. ThingSpeak IoT Cloud

ThingSpeak is an IoT analytics platform from MathWorks that enables users to aggregate, visualize, and analyze live data streams in the cloud. It supports data collection from various devices using REST and MQTT APIs, making it suitable for IoT applications without the need for server setup. ThingSpeak is widely used for prototyping and educational purposes in IoT projects.

Key Features:

- Data Channels: Each channel can store up to 8 fields of data, along with status and location fields.
- MATLAB Integration: Users can execute MATLAB code for advanced data analysis and visualization.
- Real-time Monitoring: Capable of processing data in near real-time, with options for alerts and automated responses based on incoming data.

VI. HARDWARE IMPLEMENTATION



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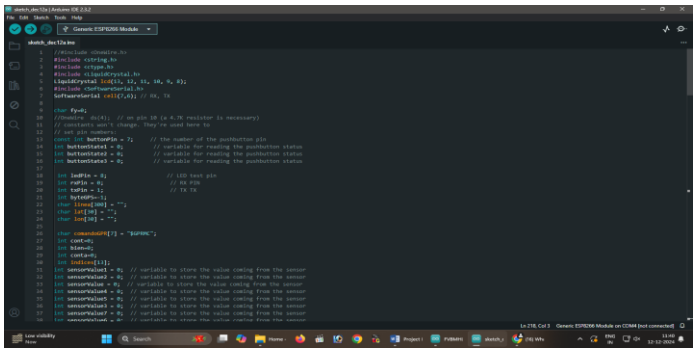
VII. SOFTWARE IMPLEMENTATION



VIII. FUTURE SCOPE

The integration of IoT (Internet of Things) with stun guns opens up several exciting possibilities for enhancing personal safety and security. Here are some future scopes and potential applications:

1. Smart Stun Guns: IoT-enabled stun guns can be connected to a smartphone app, allowing users to control and monitor the device remotely. This can include features like real-time tracking, usage logs, and automatic alerts to emergency contacts.

2. Wearable Safety Devices: Combining stun guns with wearable technology, such as smart jewelry or clothing, can provide discreet and immediate protection. These devices can include GPS tracking, automatic distress signals, and integration with emergency services.

3. Community Safety Networks: IoT-enabled stun guns can be part of a larger community safety network, where multiple devices communicate with each other and with local authorities. This can help create safer neighborhoods by providing real-time updates and alerts.

4. Data Analytics for Safety: By collecting data from IoT-enabled stun guns, patterns and trends in safety incidents can be analyzed to improve personal safety measures and inform public safety policies.

5. Enhanced Self-Defense Training: IoT devices can be used to provide feedback and training for self-defense techniques, helping users improve their skills and response times in dangerous situations.

6. Integration with Smart Home Systems: IoT-enabled stun guns can be integrated with smart home security systems, allowing for seamless activation and monitoring of home security measures.

These advancements can significantly enhance personal safety and provide more effective tools for self-defense and emergency response.

CONCLUSION

IoT-based safety solutions hold immense potential in revolutionizing women's personal security. With ongoing advancements in technology and the refinement of these systems, they are poised to become integral tools in safeguarding women against threats, providing them with the peace of mind and confidence to navigate the world more securely.

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REFERENCES

[1] IoT-based Smart Safety Device for Women in Emergency Situations. International Journal of Advanced Research in Computer Science, Singh, P., & Yadav, S. (2020). 11(3), 25-30.
[2] A Review on IoT-Enabled Personal Safety Systems for Women. Journal of Electrical Engineering & Technology, Reddy, P., & Kumar, R. (2021) 16(4), 1534-1541.
[3] Smart Wearable Safety Devices for Women: A Review of Technologies and Applications. IEEE Access, 9, Lee, H., & Park, J. (2021).
[4] Women Safety Using IoT and Machine Learning Techniques. International Journal of Computer Science and Information Security, Kumar, S., & Shah, D. (2022)
[5] IoT-based Safety System for Women: A Real-Time Approach. Journal of Smart Systems, 8(2), Gupta, A., & Mishra, R. (2020).
[6] Emergency Response System for Women's Safety Using IoT .International Journal of Advanced Technology, 14(5),
[7] IoT-Integrated Wearable Devices for Women's Safety: A Comprehensive Survey. International Journal of IoT and Distributed Systems, 13(3),Rao, S., & Mehta, N. (2022).
[8] Women Safety and Monitoring Systems: IoT Solutions for Personal Security. Journal of Computing and Security, 31(2), Patel, S., & Kaur, S. (2023).
[9] A Smart Wearable IoT System for Women's Safety. Procedia Computer Science, 182, 165-172. Tiwari, A., & Rani, R. (2021).
[10] IoT-based Smart Alert System for Women's Safety. Journal of Internet of Things, 4(2), 92-101.Chopra, A., & Singh, R. (2023).