HELMET DETECTION AND BIOMETRIC BASED VEHICLE SECURITY USING MACHINE LEARNING

AIM:

Design and development of Helmet detection and biometric based vehicle security using machine learning.

PURPOSE:

In recent years, the rise in road accidents and vehicle thefts has become a serious concern, urging the need for innovative solutions to enhance road safety and vehicle security. This paper presents a novel approach combining helmet detection and biometric-based vehicle security using machine learning techniques to address these issues. This system provides two steps of security in first step it validates biometric (fingerprint scanning), in second step it identifies helmet wearing. If any one of these two will fail then vehicle will not start or stop. This proposed project title is helmet detection and biometric based vehicle security using machine learning with Arduino and ESP32 camera.

DESCRIPTION:

Biometric module (R307) and ESP32 camera are connected to Arduino UART port. Assume motor as vehicle engine and it will control by relay. Relay connected with Arduino digital pin.

WORKING:

Arduino monitors finger print scanner when user pressed ignition key. ESP32 camera enabled with AI and ML program, this will detect helmet wearing. ESP32 camera uses Tensor flow and deep learning techniques to identify helmet wearing. Image classification plays major role to detect and identify particular objects. If user have valid fingerprint and helmet wearing then only vehicle will start. If any of them fails then vehicle will stop automatically.

TECHNICAL SPECIFICATIONS:

HARDWARE:

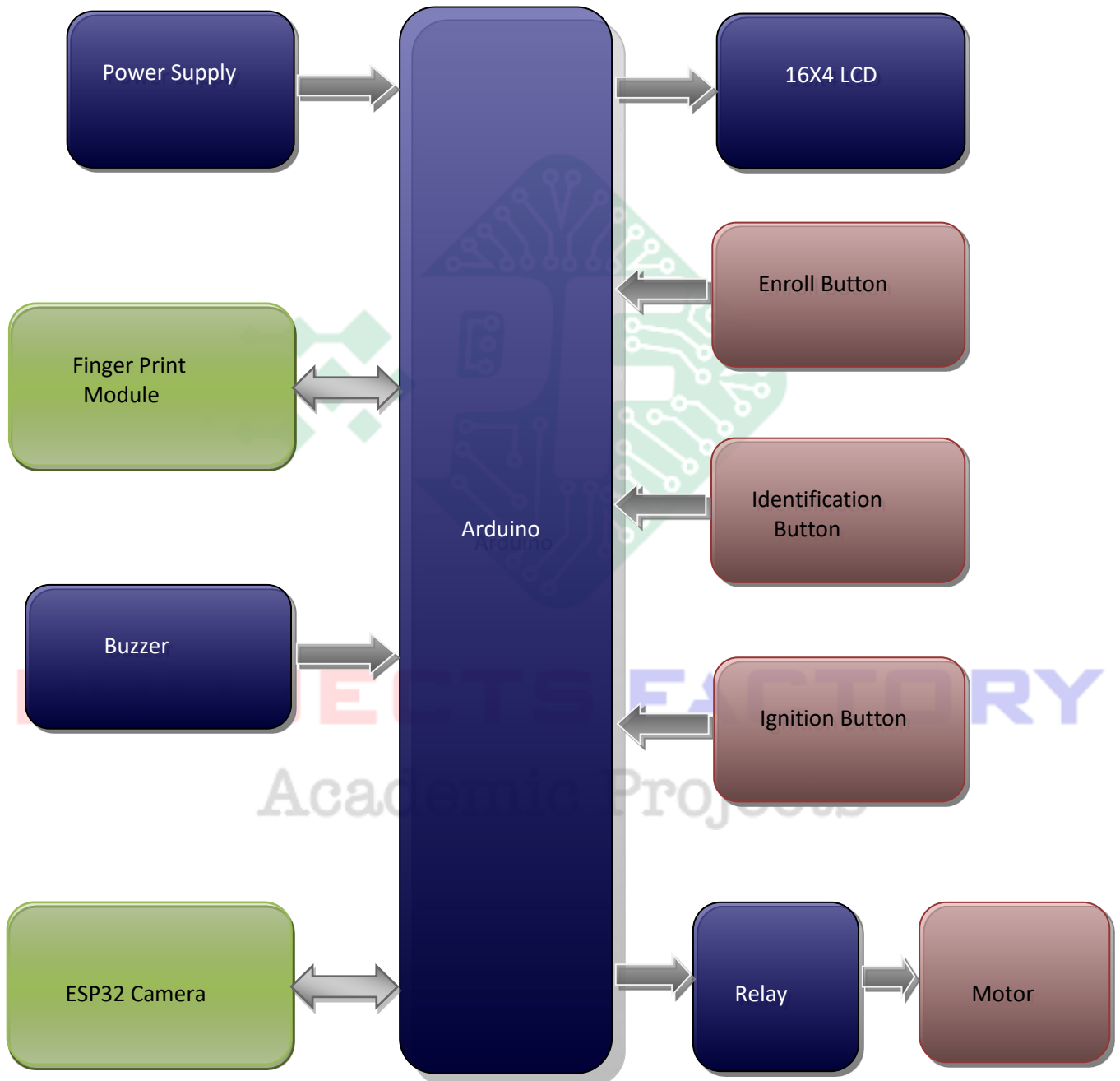|		
Microcontroller	:	Arduino uno controller
Crystal	:	16 MHz
LCD	:	16x4 LCD display
Camera	:	ESP32 camera
Biometric Module	:	R307 TTL module
Motors	:	DC motor
Relay	:	12V DC
Buzzer	:	5V DC
Power Source	:	12v 1 amp DC adaptor

SOFTWARE:

Arduino IDE
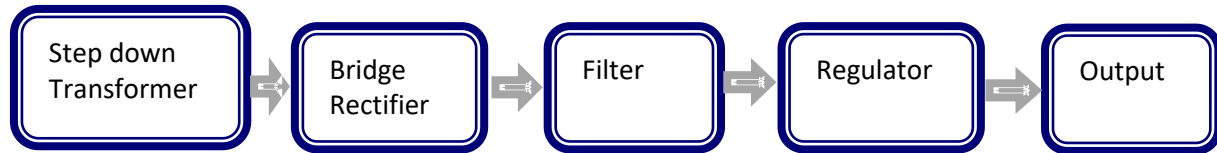
Proteus based circuit diagram

APPLICATIONS:

➢ Vehicle security system

➢ AI in automotive security

➢ Machine learning for secure smart vehicles

➢ Vehicle security using Artificial intelligence and convolution neural network

➢ Biometric based vehicle access system

BLOCK DIAGRAM:

```
Power Supply ──────▶ ┌──────────┐ ──────▶ 16X4 LCD
                     │          │
Finger Print ◀─────▶ │          │ ◀────── Enroll Button
Module               │          │
                     │ Arduino  │ ◀────── Identification
Buzzer ────────────▶ │          │          Button
                     │          │
                     │          │ ◀────── Ignition Button
ESP32 Camera ◀─────▶ │          │ ──────▶ Relay ──────▶ Motor
                     └──────────┘
```

POWER SUPPLY BLOCKDIAGRAM:

```
Step down          Bridge         Filter        Regulator       Output
Transformer  ⇨     Rectifier  ⇨              ⇨             ⇨
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INTERFACES COVERD:

- We have covered Arduino Uno programming and interface
- ESP32 cam and finger print module interface