

Title: *Facial Recognition for Car Security System using raspberry pi*

I. Summary

The project is to build a facial recognition for Car Security System using the raspberry pi. This project offers additional advanced security features for new generation vehicles such as tesla. The raspberry pi will act as a command module for the proposed advanced system. The advanced security system only allows authorized personnel to use the vehicle.

II. Objectives

- 1.) To create an advanced system that will identify the authorized user of the vehicle using facial recognition.
- 2.) To provide students basic knowledge on how digital image processing works.

III. Industry-Based Applications

Digital Image processing is a method used to convert an image into a digital format to perform some operations on an image. Some of these operations are used to enhance, highlight, analyze, optimize image characteristics such as sharpness and contrast, and extract various useful information from an image. It is a type of signal process in which the actual image acts as the input and the output can be an image or characteristics associated with that image. Concerning industry, digital image processing is among the growing technologies for its application in various kinds of fields. It is widely used in the medical field such as analyzing medical images to

find out the cause of disease and some other researches. It also used in application software for editing such as Microsoft Paint, Adobe Photoshop, Picasa and Prisma. One of the multinational technology companies uses digital image processing applications for the main security features of their devices. In terms of safety measures, the proposed advanced system offers an improved security system for partially computer-based vehicles.

IV. Project Methodology

a.) The advanced system uses face recognition to identify the authorized users of the vehicle.

When the user turns on the vehicle, the advanced system will automatically be turned on as well. The advanced system authority will then provide three options for the user which are to start the vehicle, registration or addition of new users/drivers, and delete user or clear all data. The user will first be asked to register the name and scan the user's face, after successful registration and recognition the user can now start the vehicle. Hence, if unauthorized personnel try to use the vehicle, the advance system will scan the person's face and check the database whether the image matches with the registered user of the vehicle. If the scanned image does not match, the alarm/buzzer will set off and alert the person nearby that someone is trying to steal the vehicle.

b.) Hardware specification

- **Raspberry pi 3** – is a single-board computer that contains a System on chip usually called SOC (has a multicore processor, graphical user interface, read-only memory, and input/output peripherals inside it). It is a small device capable of doing most of the things that a desktop computer can do.

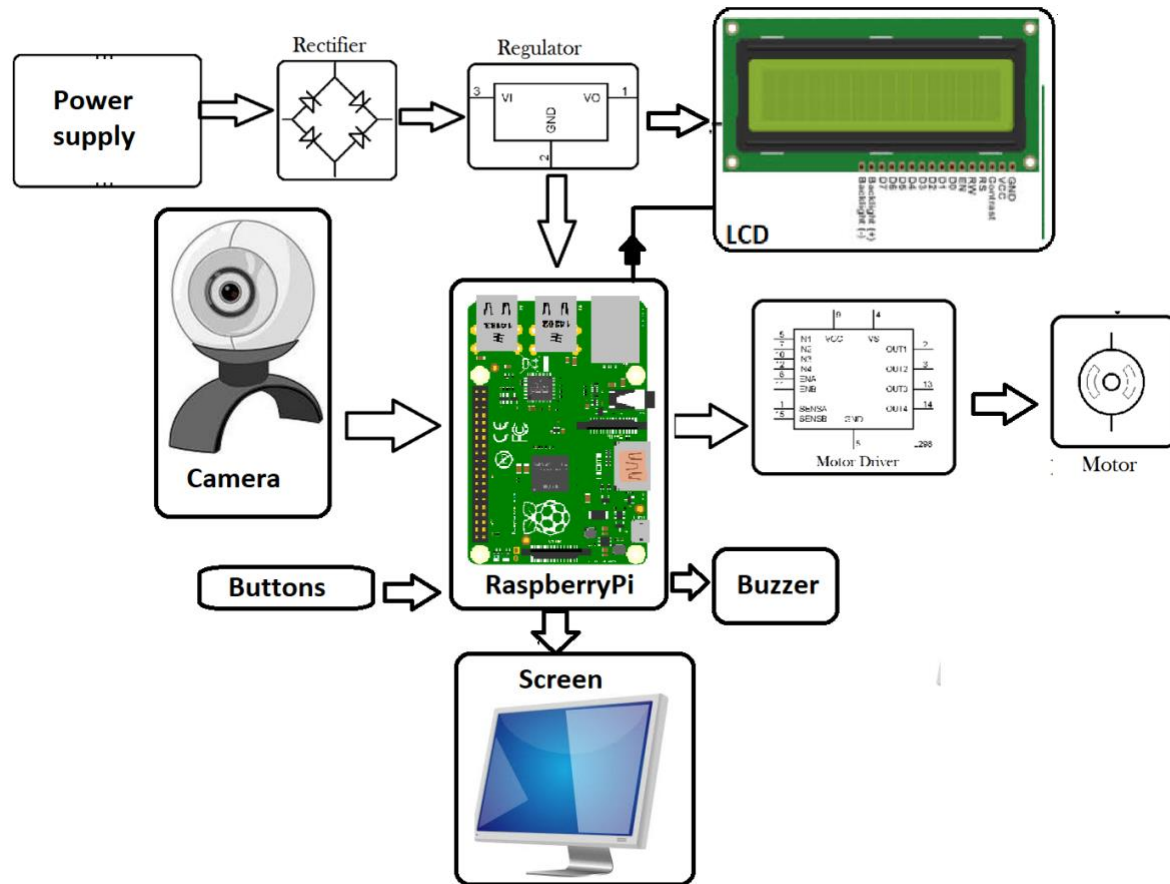
- **DC Motor** - is a class of rotary electrical machines that converts direct current electrical energy into mechanical energy.
- **Integrated Circuit (IC)** – it is a set of electronic circuits on one small flat piece of semiconductor material that is normally silicon.
- **Integrated Circuit socket** – it is used as a placeholder for IC chips.
- **Buzzer** – is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers include alarm devices, timers, and confirmation of user input.
- **Liquid Crystal Display** – is a type of flat panel display which uses liquid crystals in its primary form of operation.
- **Resistors** – is a passive two-terminal electrical component that implements electrical resistance as a circuit component.
- **Capacitors** – it is a component that used to store an electrical charge, consisting of one or more pairs of conductors separated by an insulator.
- **Transistor** – it is a semiconductor device with three connections, capable of amplification in addition to rectification.
- **Diodes** – it acts as a switch which allows the flow of current in one direction only.
- **Printed Circuit Board (PCB)** – mechanically supports and electrically connects electronic components using conductive tracks, pads and other features etched from one or more layers of copper laminated between sheet layers of a non-conductive substrate.

- **Light-emitting diodes** – is a semiconductor device that emits infrared or visible light when charged with an electric current.
- **Transformer/Adapter** – is a passive electrical device that transfers electrical energy between two or more circuits.
- **USB to Serial converter** – cables that convert the data sent by a serial-enabled device for use by a USB port.
- **Switch** – To turn on/off the system
- **Camera** – an input device used to capture either still pictures or motion video of the user.

c.) Software specification

- **Python software** – software used to input codes to the system.
- **Windows OS**

d.) Block diagram



e.) Project Procedure

- 1.) Connect the components as shown in the block diagram.
- 2.) Download and install the Python software on the computer.
- 3.) Open the python software and copy the codes from the file.
- 4.) After running the program, register the image of the user as authorized personnel.
- 5.) After successfully registering the image of the user, turn on the switch and let the system scan the user's face.
- 6.) After successfully authenticating the user, the motor will automatically start.

Note: If the students are stuck in the process please refer to this video:

https://www.youtube.com/watch?v=T4HEL6_m6ls

V. References

<https://www.pyimagesearch.com/2018/06/25/raspberry-pi-face-recognition/>

<http://mitchtech.net/raspberry-pi-opencv/>

<https://nevonprojects.com/raspberry-pi-vehicle-anti-theft-face-recognition-system/>

<https://www.apple.com/iphone-11-pro/specs/>

https://www.youtube.com/watch?v=T4HEL6_m6ls

VI. Appendix

All data sheets should be stated here.

Please note that if you are using a code, it should be provided in the original format with this report.

VII. Cost Analysis

Components	Website	Cost
Raspberry pi 3	https://www.adafruit.com/product/3775	\$35
DC motor	https://www.adafruit.com/product/711	\$1.95

PCB Board		
16x2 LCD display	https://www.adafruit.com/product/399	\$13.95
Breadboard wire bundle	https://www.adafruit.com/product/153	\$4.95
Piezo Buzzer	https://www.adafruit.com/product/160	\$1.50
Switch	https://www.adafruit.com/product/3219	\$2.95
Camera	https://www.adafruit.com/product/3099	\$29.95
Push Buttons	https://www.adafruit.com/product/4183	\$2.50
Transformer/Adapter		
USB to Serial Converter	https://www.adafruit.com/product/3309	\$5.95
Crystal Oscillator	https://www.adafruit.com/product/2214	\$0.75
IC Sockets	https://www.adafruit.com/product/2206	\$1.25

Resistor		
Capacitor		
Transistor		