



Synopsis

FACE RECOGNIZING ROBOT

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Introduction to the topic

The information age is quickly revolutionizing the way transactions are completed. There is a need for a faster and accurate user identification and authentication method. Face recognition has become one of the most important user identification methods. Literature survey statistics shows that research work in face recognition system is in its booming era, and in the past forty years, the research in this field has increased exponentially. Face recognition is an AI-based technology in which a computer recognizes a face by analyzing its features. Face recognition has become prevalent in modern devices, and you must've seen its application on multiple places such as smartphones and social media. If you're familiar with this concept and want to implement it in a robot, then you can do so through Raspberry Pi.

Problem Statement

- (1). To build an efficient security system which uses face recognition technology.
- (2). We have given an image, to identify it as a face or extract face images from it.
- (3). And to retrieve the similar image (based on a heuristic) from the database of face images.
- (4). Authenticated users based on their facial images which are compared against those present in the database.

Working Methodology

The Functionality of this system is mainly categorized in following steps.

- 1:- To enrol and detect faces using camera connected to the ARM Cortex of Raspberry Pi board.
- 2:- To display the match status on the LCD as well as the terminal running on the VGA (Video graphics array) monitor.
- 3:- To program for the same using python language. The code imports certain modules that enable functions such as face recognition, GPIO modules.
- 4:- To drive the motor in clockwise and anticlockwise direction upon getting a present status.

5:-The identification and authentication technology operate using the following four stages:

- Capture: A physical or behavioural sample is captured by the system during enrolment and also in identification or verification process
- Extraction: Unique data is extracted from the sample and a template is created.
- Comparison: The template is then compared with an existing sample.
- Match/non match: The system decides if the features extracted from the new samples are a match or a non match and accordingly accept/reject.

Hardware Requirements

Hardware Design

It includes Raspberry Pi Development kit, connecting cables, LCD, DC Motor driver IC, DC motor, Power Supply, USB keyboard, USB mouse and USB webcam.

1. Raspberry Pi 2

Raspberry Pi is a small scale based computer, it performs efficiently when it comes to running games, image files, and documents. They can be manufactured using different configurations as per the user's needs.

It runs at 700MHZ with nearly 256MB RAM, with on board graphic card capabilities. RaspberryPi2 are considered one of the few low power consumption CPU's [7].

The basic layout of the Raspberry pi2 consist of

Input/Output.

RAM

CPU/GPU

USB hub

Ethernet

HDMI Port

2. LCD

The LCD used here is 16×2 alphanumeric LCD. It is a very basic module which overcomes the disadvantage of the seven segment display as well as multi-segment LCD. It consists of command register to perform the user defined instructions and data register to display the data on LCD.

3. DC Motor Driver

The L293D Motor drivers provide voltages ranging from 5V TO 36 V with output current of 1 A per channel. L293D provides bi directional currents and can be operated at temperature up to 70 degree Celsius.

4. DC Motor

The speed of the motor can be changed by varying the voltage levels. Here the motor rotates in clockwise and anticlockwise direction at a speed of 10,000RPM, representing opening and closing of gate.

Result and Discussion

A prototype of surveillance robot, shown in consisting of sensors and motor activators interfaced to the controller is developed and all functionalities are demonstrated. The face detection system using Haar-Classifer algorithm is implemented in OpenCV Python programming and the working of the robot with face recognition is demonstrated.

a) Sensor Output

When robot is moving in forward condition, it keeps checking, in an infinite loop, for an obstacle in its path. Upon activation of left side IR sensor, the system displays of “left side object detected”. When right side IR sensor gets activated, the system displays “right side object detected”. Ultrasonic sensor measures the distance between the object and sensor to identify its location. After calculation, it displays the measured distance in the output window.

(b). Known person recognition

The system continuously monitors the surrounding area and checks for the presence of facial data of human being. If the detected person is known, the system displays his name.

(c) .Unknown person recognition

When the detected person is unknown i.e., facial data of the image does not match with the database, Robot system stops and the relay activates the laser gun to target him or LED turns on. Result of unknown person recognition is displayed on the system.

Reference :

<https://www.upgrad.com/blog/raspberry-pi-i>