SMART ELEVATOR USING FACIAL RECOGNITION

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Abstract— **Identifying a person by an image, has been popularized through mass media. Facial recognition is a currently used technology and has a wide range of applications. This paper presents a methodology for maintaining the security and increasing the building automation, by incorporating facial recognition in elevators. This project solves problems using Internet of things, IoT.**

Keywords: Facial recognition, building automation, elevator.

I. INTRODUCTION

Archimedes made the first known elevator in 236 BC. In 1852, Otis demonstrated the first safety-based elevator and in 1857 he installed the first passenger elevator. The first residential elevator was created by Clearance Conrad in 1929. The elevator controller in its basic form is a finite state machine (FSM). It is a mathematical abstraction used to design digital logic circuit or computer programs.

A facial recognition system is a technology capable of identifying or verifying a person from a digital image or video frame from a video source. There are multiple methods in which facial recognition systems work, but in general, they work by comparing selected facial features from given image with faces within a database. It is also described as a Biometric Artificial Intelligence based application that can uniquely identify a person by analyzing patterns based on the person's facial textures and shape.

II. COMPONENTS AND FEATURES

A. RFID RC522

RFID or Radio Frequency Identification system consists of two main components, a transponder/tag attached to an object to be identified, and a Transceiver also known as interrogator/Reader.

A Reader consists of a Radio Frequency module and an antenna which generates high frequency electromagnetic field. On the other hand, the tag is usually a passive device, meaning it doesn't contain a battery. Instead it contains a microchip that stores and processes information, and an antenna to receive and transmit a signal.
o read the information encoded on a tag, it is placed.

B. Arduino board

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or breadboards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++and python.

C. Python Code

Python is an interpreted, high-level, general-purpose programming language. Python's design philosophy emphasizes code readability with its notable use of significant whitespace. Its language constructs and object-oriented approach aim to help programmers write clear, logical code for small and large-scale projects.

D. Stepper Motor

A stepper motor, also known as step motor or stepping motor, is a brushless DC electric motor that divides a full rotation into a number of equal steps. The motor's position can then be commanded to move and hold at one of these steps without any position sensor for feedback (an open-loop controller).

III. MODEL AND WORKING

The proposed model would be used in an elevator of a residential building. There would be a database of pictures of faces of all residents of the building, along with their respective floor numbers at which they currently reside. Once they enter the lift, their face would be scanned and recognized, and the elevator would automatically go to the desired floor (without the need to press any button). This would increase the security, as well as automation of the building as no outsider would be able to access the elevators.

For guests and visitors however (if digitally approved by a resident) the doorman of the building could give them a card that would have the data of the floor which is needed to be visited, encoded in it. The visitors could then scan the card inside the elevator and go to the desired floor. The same concept is applicable for residents who want to go to anther floor (not the one on which they reside). This has been implemented using our code in the programming language 'python' which is one of the most commonly used programming languages today and it is also open source, which means that the code could be slightly edited to serve various purposes in different buildings. As we do not have an actual elevator (due to obvious and practical purposes) we have represented the movement of elevator using a stepper motor. We have coded in python and the hardware implementation is done using an Arduino board.

A. *Figures*

FIGURE 1. Arduino board (Image)

FIGURE 2. Arduino board (diagram)

The most important parts on the Arduino board high lighted in red:

1: USB connector
2: Power connector
3: Automatic power switch
4: Digital pins
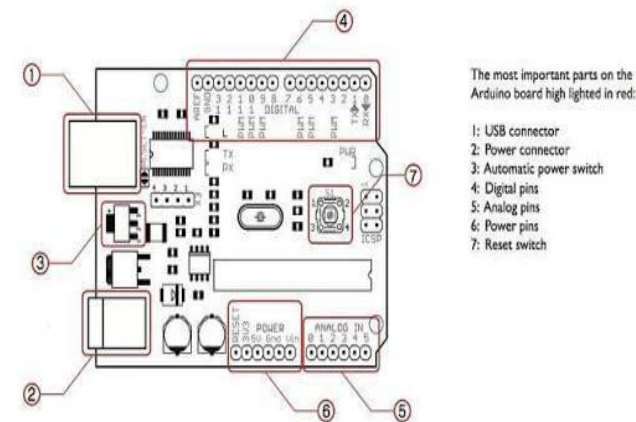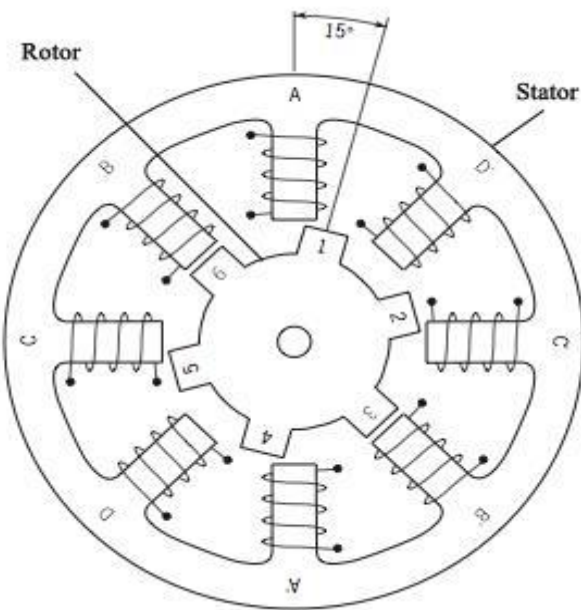5: Analog pins
6: Power pins
7: Reset switch

FIGURE4.Stepper Motor (diagram)

FIGURE 3. Stepper Motor (Image)

CONCLUSION

In this paper, we develop a computer system for allowing the access to a certain floor of a building to certain people through an elevator by a device inside the elevator car while operating it. The python code was implemented in this
which helped to detect the human face at a faster rate. A RFID based card system has also been implemented in order to grant access to visitors as well as residents who wish to go to a different floor.

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