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# Raspberry Pi Controlled Three Stage Elevator Design And Application

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***ABSRACT:****In this study, a design and application of a three-ply elevator was carried out using Raspberry Pi 3. For this, elevator position information is obtained with 12V-24V 150 RPM 42mm Reducing DC Motor, L293B Motor Driver Integrated, switches and mechanical design. When the elevator is called, the floor information is transferred to the Raspberry pi 3 with the switches we use and the elevator movement is controlled according to the result information provided by the condition commands so that the floor information is visible in the displays.*
*Thanks to the wi-fi feature of the Raspberry Pi 3 card, the lift can be remotely monitored with the aid of the server by providing access to the internete. In case of a problem, the signal is sent to the server center, and the technical service is faster than standard elevators.*

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## I. INTRODUCTION

The first mass-produced embedded system was the Autonetics D-17 Computer made in 1961 for the Minuteman Fuze. When the Minuteman-II was produced in 1966, the prices of the units were reduced from $ 1,000 to $ 3, which was the beginning of commercial activities [1]. An embedded system refers to the whole of electronic hardware and software that is contained within any system and which gives the system "intelligence" [2]. Raspberry Pi is a full-fledged mini-computer with a Linux operating system, usually made up of a single board of credit card size with USB and Ethernet inputs, developed by Raspberry Pi Foundation in 2009. It is used with a USB keyboard / mouse and a monitor connected to the TV for display [3]. The Raspberry Pi 3 module is built on the Broadcom BCM2837 microprocessor, which includes a 1.2 Ghz, 4-core 64-bit ARM Cortex-A53 processor unit. Üzerinde 4 adet USB 2.0 port, 10/100 Mbit/s desteklіethernetportuve HDMI çıkışıbulunmaktadır. It has 4 USB 2.0 ports, 10/100 Mbit / s Ethernet port and HDMI output. As can be programmed with the Python programming language, BBC Basic, C and Perl programming languages can also be used [4,5]. Elevatorwill be designedand an applicationthatallowstoinformthetechniciansorthemaintenancecompany of elevators on thefailuresthatthey can present in theiroperation, thusavoidingthatpeopleareTrapped in theelevatorsorhaveperiods of outside of service veryextensive[6]. The triple elevator system developed in laboratory dimensions consists of a DC motor, each sensor on each floor, main elements such as control switches and warning lights in the elevator and on the floors [7]. Elevator control systems are one of the most important systems in terms of safety. Elevator control is very important in engineering education. PLC, Programmable Logic Controller are shortened forms and are special purpose computers designed for industrial automation and control systems. Three floorselevatorprototypecontrolwascarriedout in thisstudyusedbySiemens's SIMATIC S7-200 CPU 224 model PLC. Thehardware of elevatorincludes a DC motor, limit switchesused at everyfloorand inside andoutside of elevatorcontrolbuttonsandwarninglights/indicators, and software includes 12 Networks[8].

## II. MATERİALSANDMETHODS

### 2.1. Raspberry Pi 3

Raspberry Pi is a "real computer" in the size of a credit card. Raspberry Pi is a cheap, small and capable computer that can be used by children all over the world, can be used for simple programming or even for

experiments. You can also connect to your TV or monitor, connect to a keyboard and mouse. With Raspberry Pi, a talented and small computer, you can do jobs on regular computers (office programs, surf the internet, watch videos, etc.) and play them in various games at the same time.

**Figure 1. Structure of Raspberry pi 3**

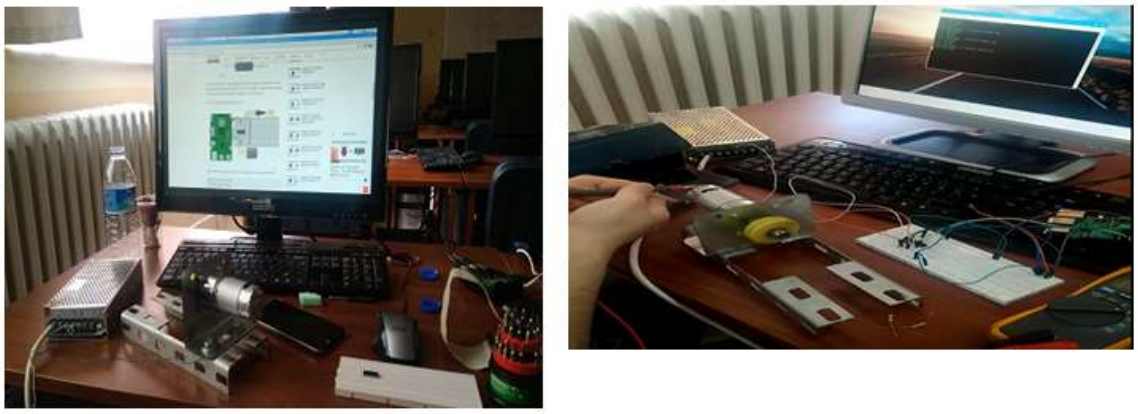

**Figure 2. Installation of the designed motor**

### 2.2. Technical drawing of materials used

The placement of the materials used in Figure 3 is shown. The motor, raspberry pi 3, relays, switch, button, 7 segment display (cathode), driver integration that we will use in the engine cycle are shown.

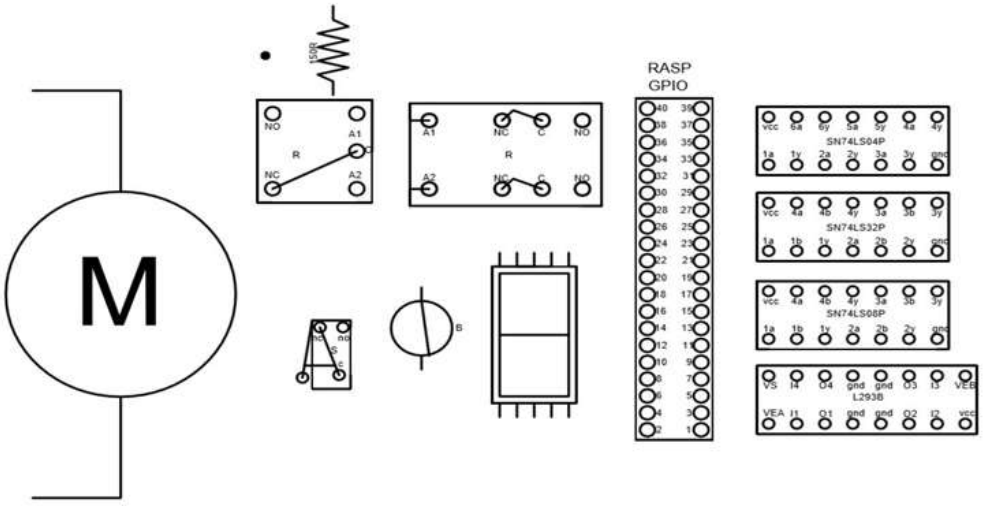


**Figure 3.Placement of used circuit elements**

**2.3. Indicator Circuit**

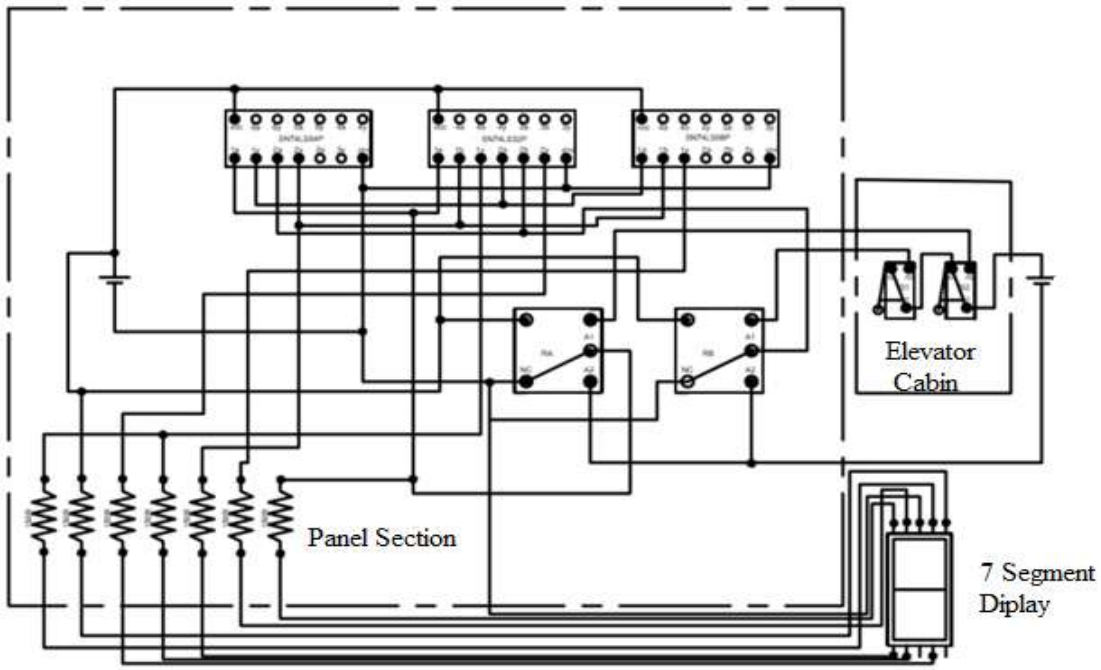


**Figure 4.connection of the indicator to the relay and switches.**

**2.3. Elevator Control Circuit**

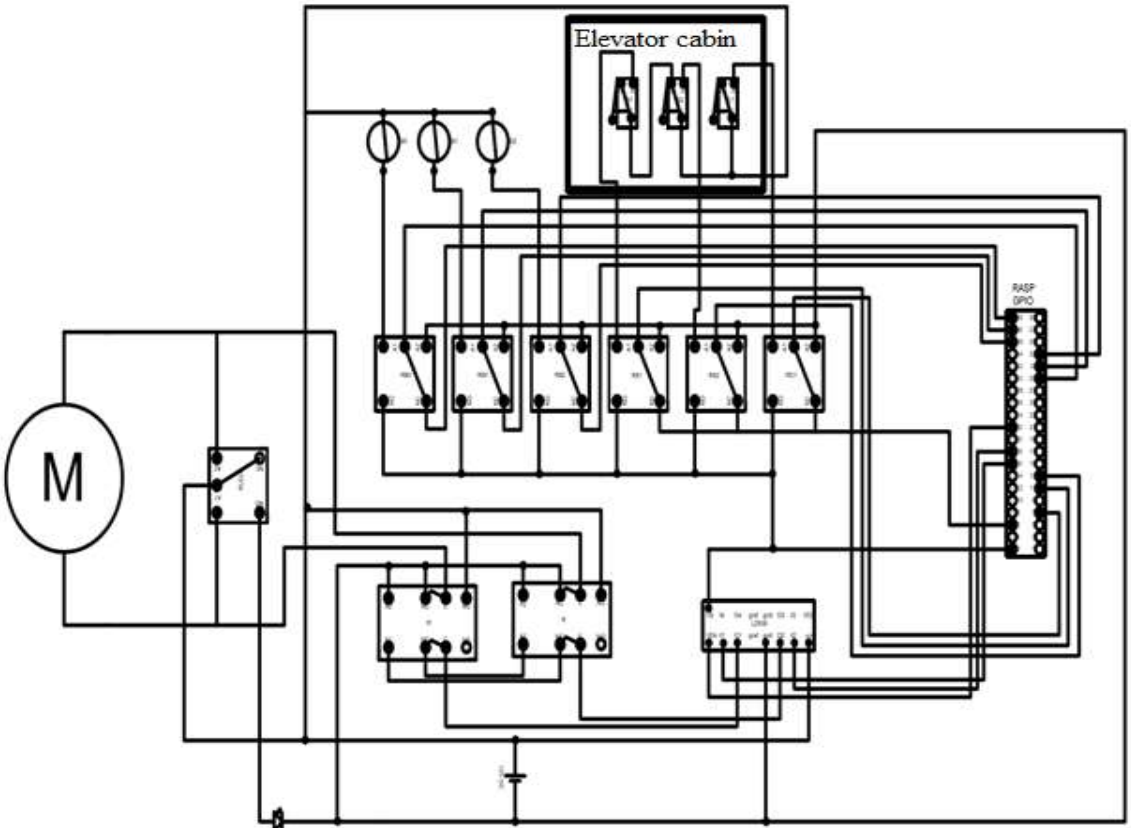


**Figure 5. Raspberry pi 3; 2, 6, 7, 11, 13, 16, 18, 22, 29, 31, 33, 36, 38, 40 are used.**

**2.5. L293B Motor Driver Integration**

It is an H-bridge motor driver integration. From 4.5V to 36V it can deliver 1A continuous or 1.2A instantaneous current from each channel. The motor is the most preferred integrated in drive circuit. It is also easy to use on its

own. It functions the same as the L293D, and the pin arrangement is the same. The pin arrangement is as follows:

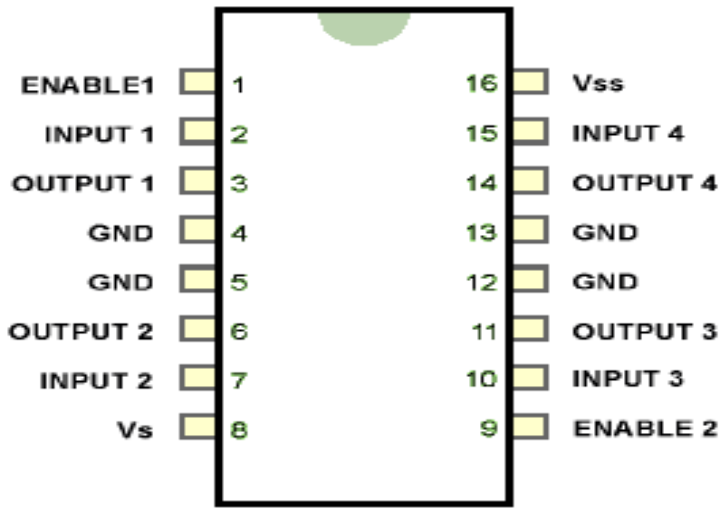


**Figure 6. L293d Pins**

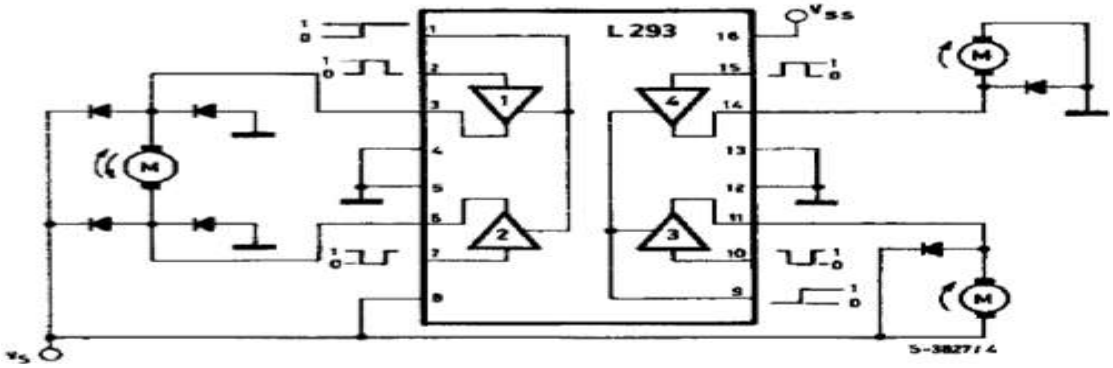


**Figure 7. Internal structure of L293B**

**2.6. Reducing DC Motor**

12V-24V This engine with 150 RPM speed is used in various systems and robots thanks to low speed and high torque. Figure 9.4. 12V-24V 150 RPM 42mm Reducer DC MotorDC motors usually have a high turnover capability. In applications where high torque is preferred instead of high speed, a gear set connected to the shaft of the motor will reduce the output speed to 1 in 30, for example, but it is theoretically possible to increase the torque (torque) to 30 times.

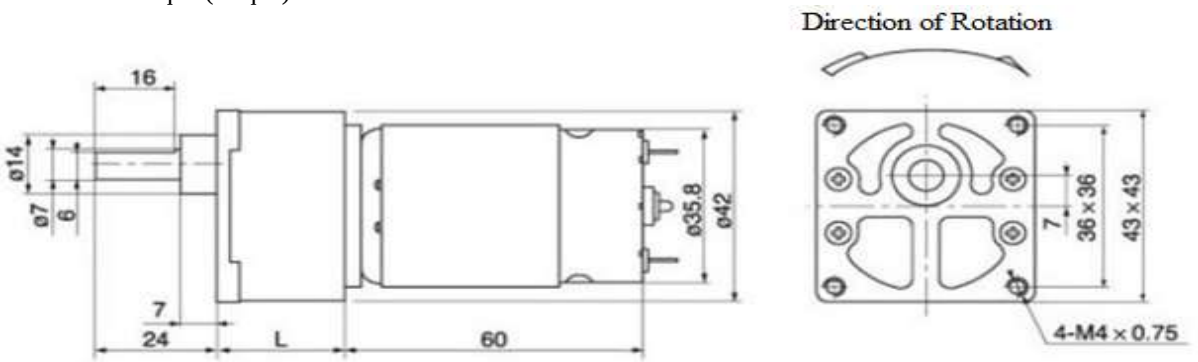


**Figure 8. 12V-24V 150 RPM 42mm Reducer DC Motor**

**3. DC Motor Controlwith Raspberry Pi 3**

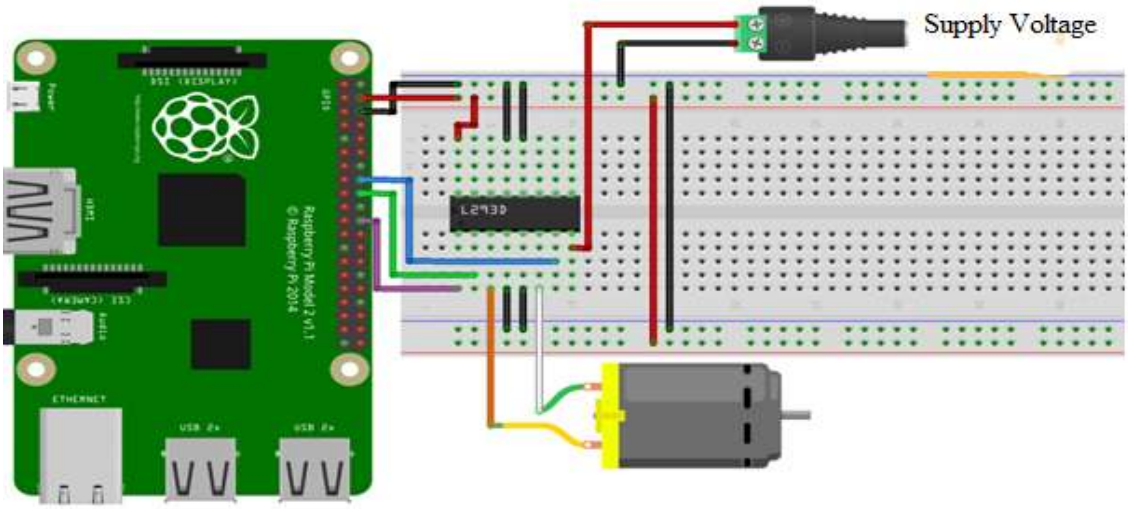


**Figure 9. Motor drive connection**

This integrator has input 1 and input 2 inputs, the direction in which the motor will rotate; The enable pin controls which outputs are active. Since only one engine is used in this study, the number 1 pin, "Enable 1,2", is sufficient.

## III. CONCLUSION AND SUGGESTION

In this study, a design and application of a three-ply elevator was carried out using Raspberry Pi 3. The prototype we have seen has been tested successfully at a stop-stop or all stops. The elevator we have designed and implemented is providing access to the internet via wi-fi of the Raspberry Pi 3 card, which is superior to other elevators. This function provides access to status data of the elevator. Early intervention was possible in possible error conditions.

The energy transitions can be monitored via an R-F receiver by feeding an R-F emitter parallel to any control terminal for ease of fault detection. As a result, the time lost for the technical solutions is removed.

**Figure 10. Completed elevator**

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