

ARM CORTEX M3 BASED ELEVATOR

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Abstract: This paper presents the design and implementation of an elevator model utilizing ARM CORTEX M3 microcontroller and pulley mechanism. The system aims to provide efficient and cost effective system for multi floor elevators. The ARM CORTEX M3 is known for its high performance and low power consumption.

The pulley mechanism is employed to achieve smooth and vertical operation of the elevator car. A program was written in arm assembly and dumped to the arm microcontroller. And a stepper motor is used for operating the elevator.

Keywords: Arm cortex based elevator, arm assembly, stepper motor.

I. INTRODUCTION

Elevator systems are critical components in modern building, providing vertical transportation. This project focuses on design and implementation of an elevator using ARM CORTEX M3 microcontroller, integrated with pulley mechanism. The ARM CORTEX M3 is known for its high performance and low power consumption serves as control unit ensuring precise and reliable operation.

The pulley mechanism facilitates smooth and controlled movement of elevator car between floors. This system consists of a cabin and a counter weight. The counter weight ensures in balancing the forces . A stepper motor is used for operating the elevator as it is a step signal and a direction signal . It is a step signal as it moves in discrete signals rather in continuous signals . It is a direction signal as it moves in clockwise or anticlockwise direction.

The stepper motor driver is connected to the arm microcontroller . A program was written in arm assembly and dumped to the microcontroller. Push buttons are used to operate the elevator in different floors. A 7 segment led display is used to indicate the current floor of the elevator. The led's are used to indicate in which floor the elevator is operating.

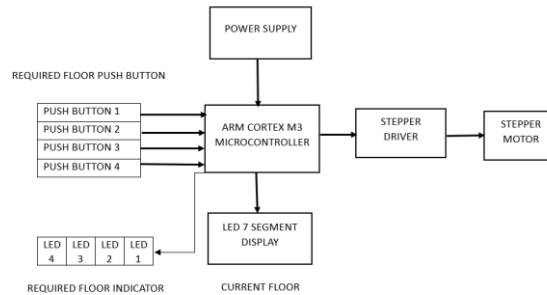
II. LITERATURE PAPER

[1] [1]. Hassan Falah Fakhrudeen et al. has proposed “Arduino Based Voice Recognition elevator for special purposes”. This paper presents design and implementation of five floors electrical elevator system that utilizes voice recognition technology, specifically using an Arduino microcontroller, for special applications. The purpose of this project is to provide a convenient and accessible means of transportation for individual with disabilities , specifically those who may have difficulty using traditional elevators due to physical limitations or mobility issue.

[2]. Xiaohu han et al. has proposed “ Design and research of elevator control system based on PLC”. In this paper, the hardware and software design of the elevator control system based on PLC are tested, and the operation of the implementation process is carried out .With the gradual popularization of high-rise buildings in China, the elevator control system has also achieved rapid development, and the relevant design is constantly improving and optimizing. For the elevator system, the advantage of PLC control system is that it can use the elevator control system of PLC, and its later maintenance cost is lower.

[3]. Y Zhou et al. has proposed “An elevator monitoring based on IoT.” This paper introduces the application of elevators internet of things technology in real time monitoring, fault diagnosis, alarm and maintenance.

III. METHODOLOGY



VI. BLOCK DIAGRAM

Figure 1 represents the block diagram of ARM CORTEX M3 based elevator using pulley mechanism. The power supply is given to arm microcontroller . The push buttons , led , 7 segment led display are inbuilt in the arm kit. The stepper motor driver is connected to the arm microcontroller and stepper motor.

B. WORKING

A program is dumped to ARM microcontroller which consists of the elevator operations . The cabin and counter weight are connected to the stepper motor via wheel. The stepper motor driver is connected to the microcontroller . The push buttons are used to operate the elevator to required floors . The led indicates the status of the required floor. The 7 segment led display indicates the current position of the elevator.

C. FLOWCHART

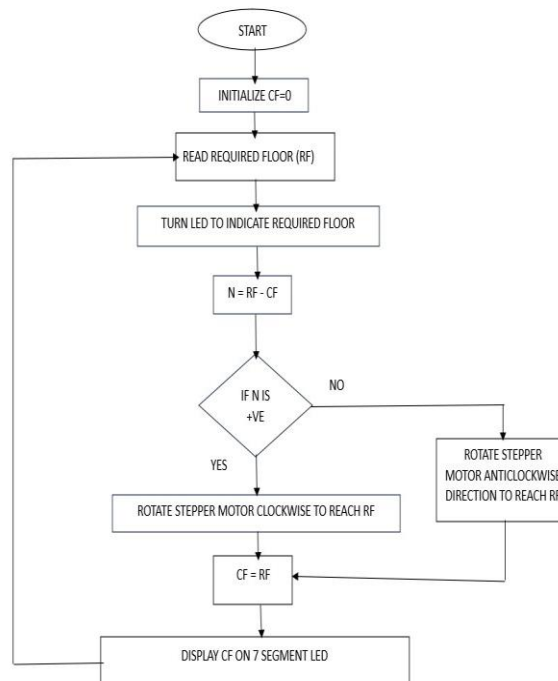


Figure 2 represents the flowchart of the system. First initialize current floor as zero, then we have to read the required floor, then the led turns on to indicate the required floor, then we have to calculate no of turns of stepper motor , so we will be using $N=RF-CF$. if N is positive then stepper motor turns clockwise to reach required floor. If N is negative then stepper motor turns anticlockwise to reach the required floor, now assign $CF=RF$, and the current floor will be displayed on 7 segment led display. This process continues as a loop.

IV. RESULTS

The prototype of the proposed system is shown in Figure 3.

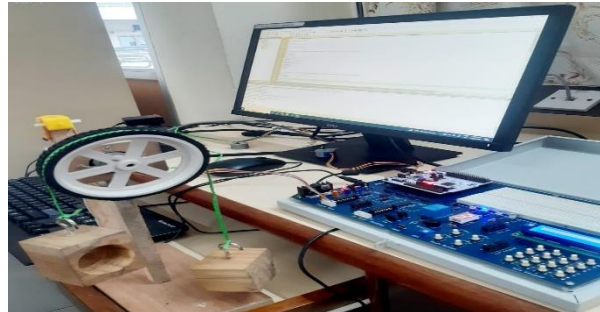


Fig1: System of the project with the complete connections.

V. APPLICATIONS

- Residential Security.
- Commercial Buildings.
- Educational Institutions.
- Financial Institutions.
- Residential Rental Properties.
- Schools, Colleges and other residential places.

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