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Faculty of Engineering & Information Technology

Graduation Project 2 Done by:

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Project Name:

Safety Evelator

Acknowledgment

It is with great pleasure that we dedicate this work to those who supported us in completing it.

Every challenging endeavor requires not only personal effort but also the guidance of mentors and the unwavering support of loved ones. First and foremost, we dedicate our humble efforts to our families and friends—strong and compassionate souls who taught us to trust in Allah, believe in hard work, and achieve great things with even the smallest resources.

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Disclaimer

This paper was accomplished by Mira Shahed and Haya Shilleh from the Computer Engineering Department at An-Najah National University. The thoughts expressed in this report are the authors own and do not reflect the view of An-Najah National University, department of Computer Engineering.

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First chapter

1. Introduction

1.1 Statement of the problem

In work environments that rely on transporting goods via elevators, workers are exposed to many risks such as injuries resulting from direct handling of heavy loads or sudden elevator malfunctions. In addition, goods may encounter problems related to the quality of storage during transportation, such as damage resulting from high temperatures or fire.

In the event of a power outage, transportation operations may be disrupted, leading to disruption of work and delays in the delivery of goods. Moreover, the lack of intelligent systems for remote control or monitoring the condition of goods during transportation may increase the possibility of accidents or damage.

Therefore, there is a need for an innovative system that maintains the safety of workers, ensures the safe and efficient transportation of goods, and provides smart solutions such as remote elevator control using a mobile phone, camera monitoring, alarm systems, temperature control, and continued operation in the event of a power outage.

Additionally, the elevator features a security system that utilizes a password to enhance confidentiality, allows for specifying the quantity of different items to be transported, and designates the destination floor for each item. It also enables adjusting the interval between item dispatches. The system provides automatic item propulsion, increasing transport speed and reducing the need for users to enter the elevator, thereby protecting them from potential accidents during transportation.

1.2 Objectives

The project aims to improve the safety of goods transportation via elevators using remote control via mobile phone, with goods monitored by camera and temperature sensor, and ensuring suitable temperature using air conditioning system. It also includes fire alarm and operation of the elevator using backup battery in case of power failure, with information displayed on LCD screen, keypad for enhanced security and slots for self-propulsion respectively.

1.3 Project Scope

This project focuses on enhancing the safety and efficiency of goods transportation in elevator-dependent work environments. It targets industries such as warehouses, factories and office buildings, and provides a smart solution that includes:

1.3 Report Organization:

This report contains 4 chapters each with several topics.

The first chapter contains introduction with its subchapters.

The second one is constraints, the third one is the literature review and the methodology. And the last one contains conclusion, references and recommendations.

Second chapter

1. Constraints, Components and Earlier coursework

1.1 Constraints and Limitations:

1.1.1 Time Limit:

The project needed 3 consecutive months to be built and tested, starting with designing and building the shape and apply it, creating and connecting features, and finally putting all the components together, these all combined together formed a real challenge to be accepted.

1.1.2 Cost:

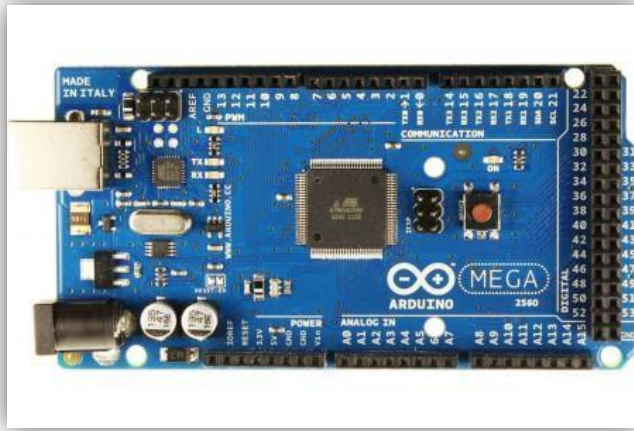
As we were compelled to cancel some intended features due to the highly expensive cost.

1.1.3 Electrical components sensitivity:

Dealing with small electrical components such as drivers and small chips was hard as they are too sensitive to voltage, current or even weather changes. Also, some of the chips were damaged while developing the machine.

1.2 Components:

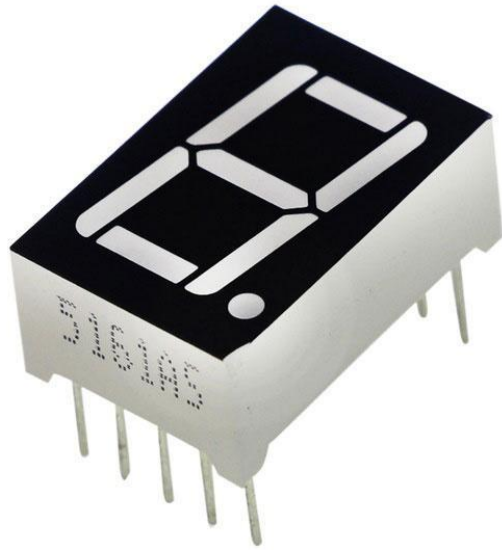
1.2.1 Hardware components:



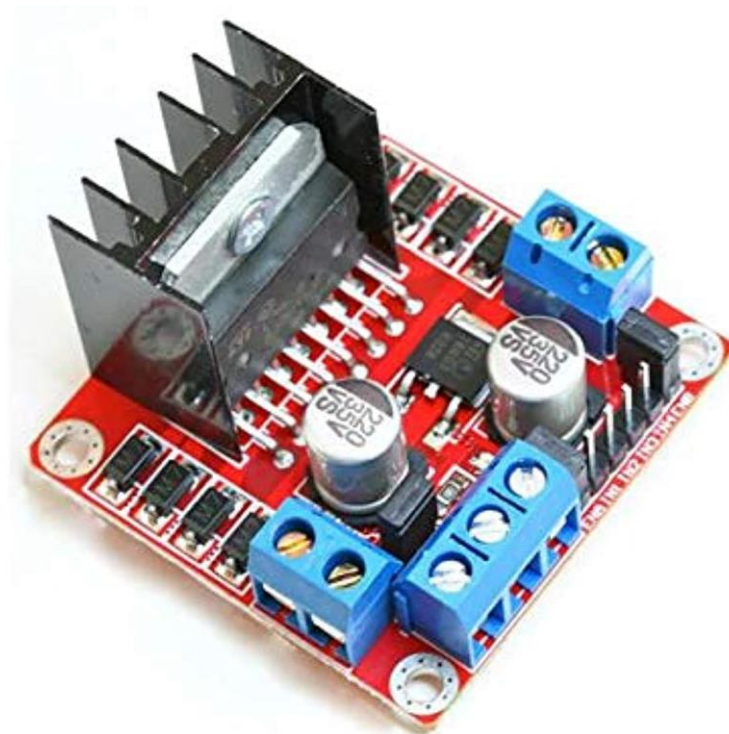
Arduino Mega Microcontroller



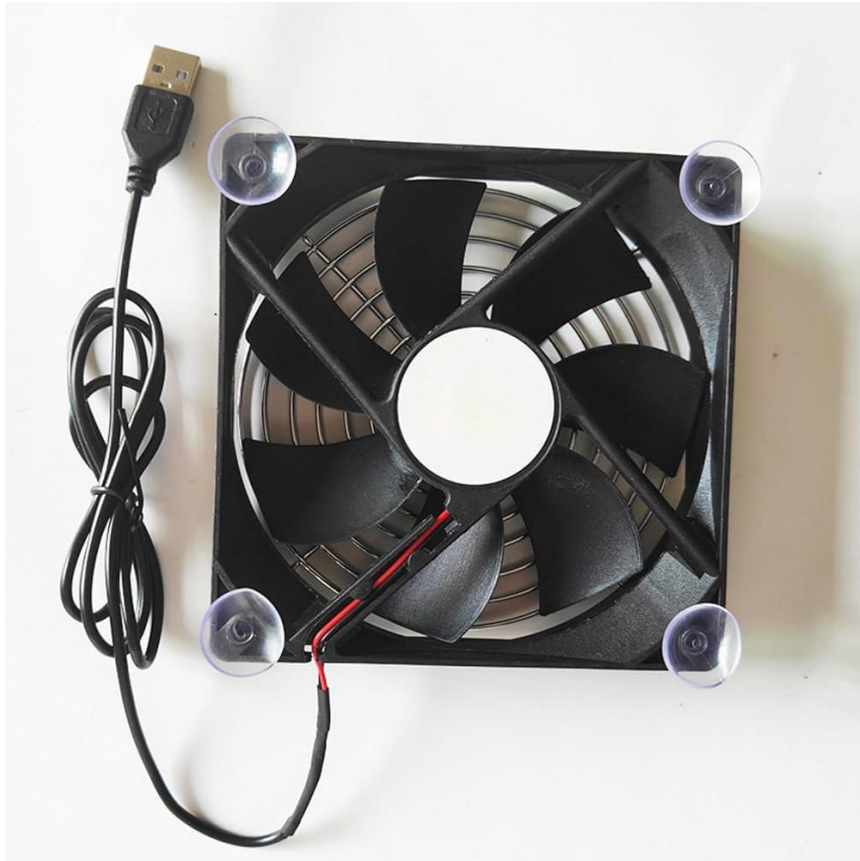
2 X dc motors



7-segment



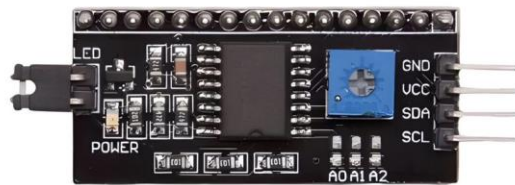
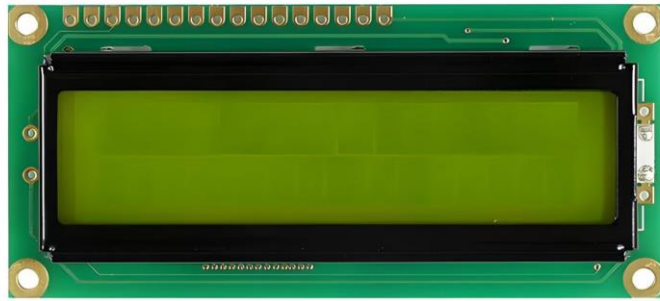
h-bridge



fan



push buttons



i2c lcd



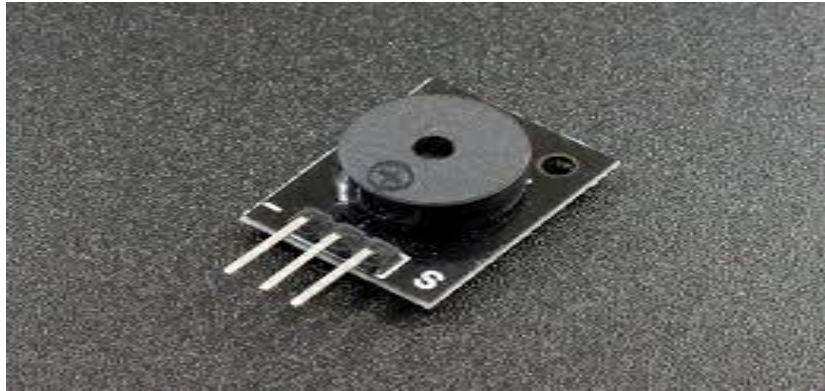
dht-11



flame sensor



Battery



buzzer



ep32 cam



mq-sensor

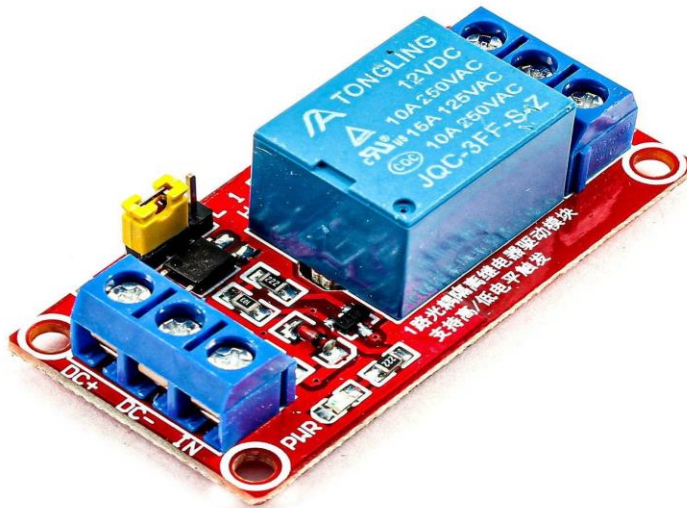
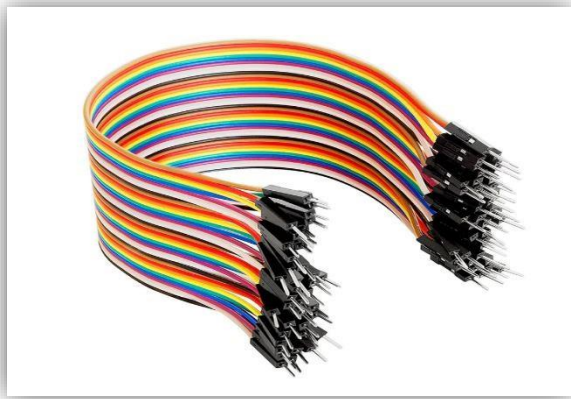
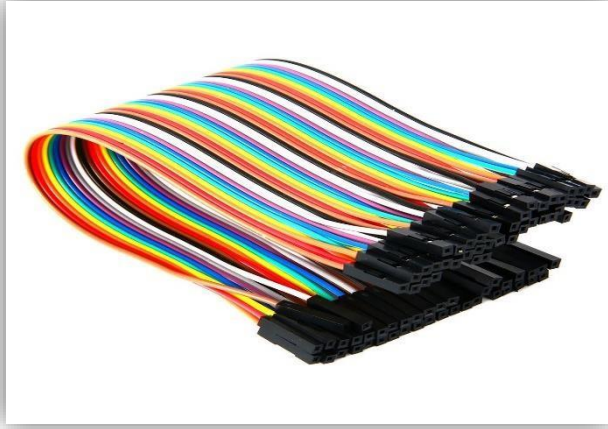


Photo by ElectroPeak

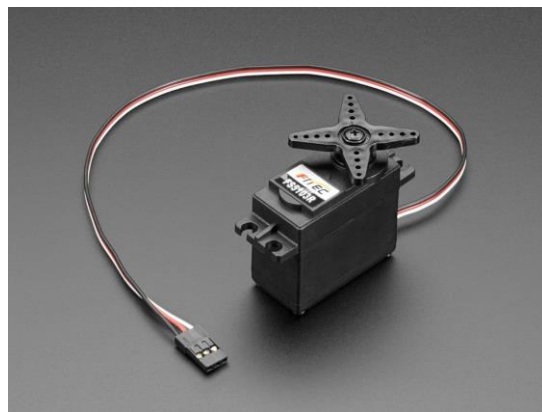
relay



wires



Keypad



Continuous rotation servo motor



3 slots

1.1.1 Earlier Coursework:

Web, PIC courses and PIC lab provide by Computer Engineering Department have helped us in developing the proje default-search

Chrome://settings/searchEngines

Add

Live live <https://rowcr.livesearch.world/s?uid=95627f9c-7258-41e5-92b8-0834173735a2&q=%s>

Live

95627f9c-7258-41e5-92b8-0834173735a2

ive <https://rowcr.livesearch.world/s?uid=95627f9c-7258-41e5-92b8-0834173735a2&q=%s>

Live

ct. In addition to that, we needed to enroll in other courses such as
Arduino course to get this job done.

Third chapter

2. Literature review

In recent decades, elevator control technologies have witnessed remarkable development through the integration of smart systems that allow remote control. Recent research focuses on improving the efficiency of transportation operations within large buildings, especially with regard to the safe and efficient transportation of goods. There are many systems that have been developed to monitor goods during their transportation inside elevators, as these systems contribute to avoiding damage that may occur to goods as a result of environmental fluctuations or sudden accidents.

One of the most prominent technologies used in this field is mobile phone-based technologies that allow remote control of elevators. These systems are a powerful tool for improving efficiency and reducing the need for physical presence, and several studies have shown that these technologies can reduce human error in the transportation process and save time.

Surveillance cameras are an essential part of ensuring the safety of transported goods. According to several studies, artificial intelligence is used to analyze video captured by cameras to ensure that goods are transported without any damage. These technologies contribute to early detection of any problems that may occur during transportation.

Temperature sensors are also an effective tool for monitoring the condition of goods during their transportation. Some studies have shown that using these sensors in elevators helps avoid risks related to temperature-sensitive goods, such as food or medicines. The sensor provides immediate alerts if the specified temperatures are exceeded, which improves the safety of the goods.

On the other hand, research has shown that adding alarm systems to elevators in the event of a fire or power outage is essential to ensure everyone's safety. Many modern systems rely on advanced technologies such as smart emergency systems, which allow the elevator to operate using a backup battery to reach the nearest floor in the event of a power outage. These systems help reduce potential risks and allow the necessary measures to be taken quickly.

The smart air conditioning system is also an important solution to maintain a suitable

environment for goods during transportation. Studies indicate that elevators equipped with smart air conditioning systems are able to automatically adjust the temperature based on the type of goods being transported, which increases the efficiency of the system and enhances the protection of goods.

The inclusion of a keypad is crucial for ensuring confidentiality, as it allows users to input a four-character password. Each character corresponds to a specific slot: 'a', 'b', and 'c' represent slots 1, 2, and 3, respectively. For example, entering 'a1,b2,c0' indicates that slot 'a' will transport one item, slot 'b' will transport two items, and slot 'c' will transport none. The character 'd' is used to set the interval between the dispatch of items.

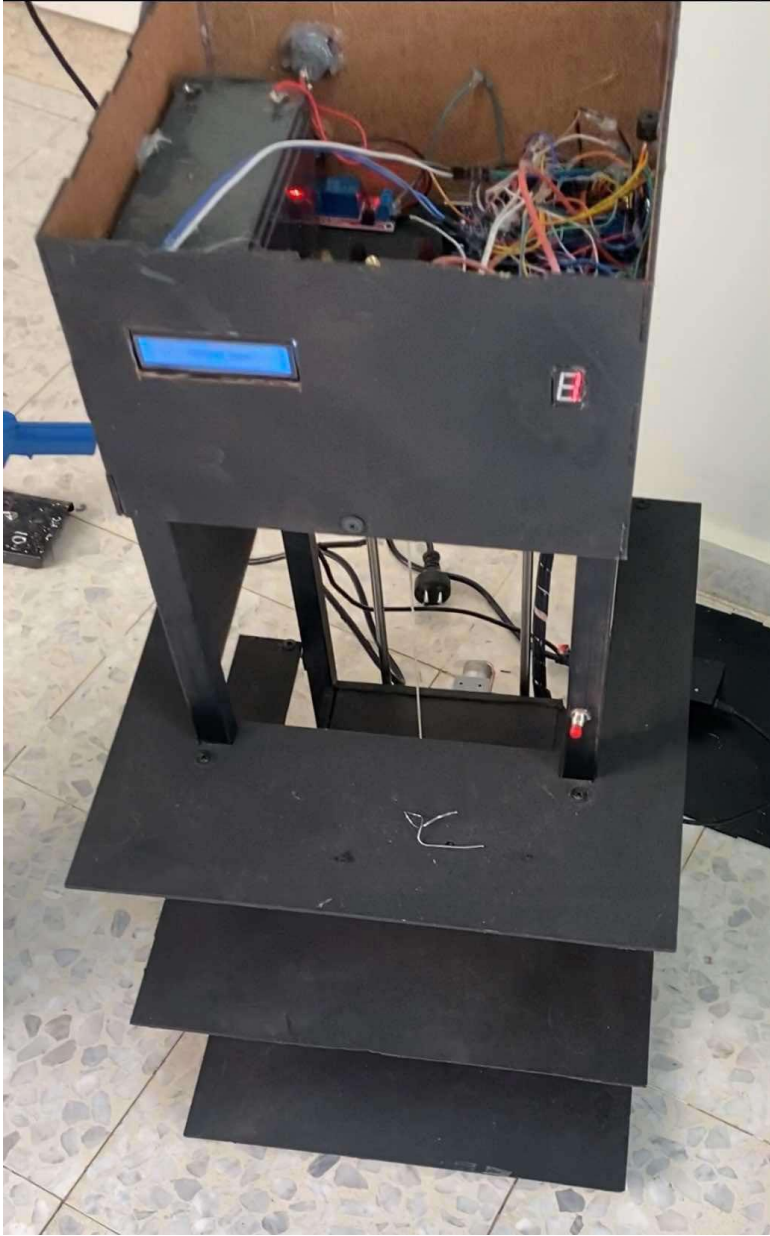
Finally, research indicates that the use of RFID technologies and remote control systems such as the JSM chip via a mobile phone to locate and request the elevator remotely contributes to facilitating the management of operations and making them safer and more efficient.

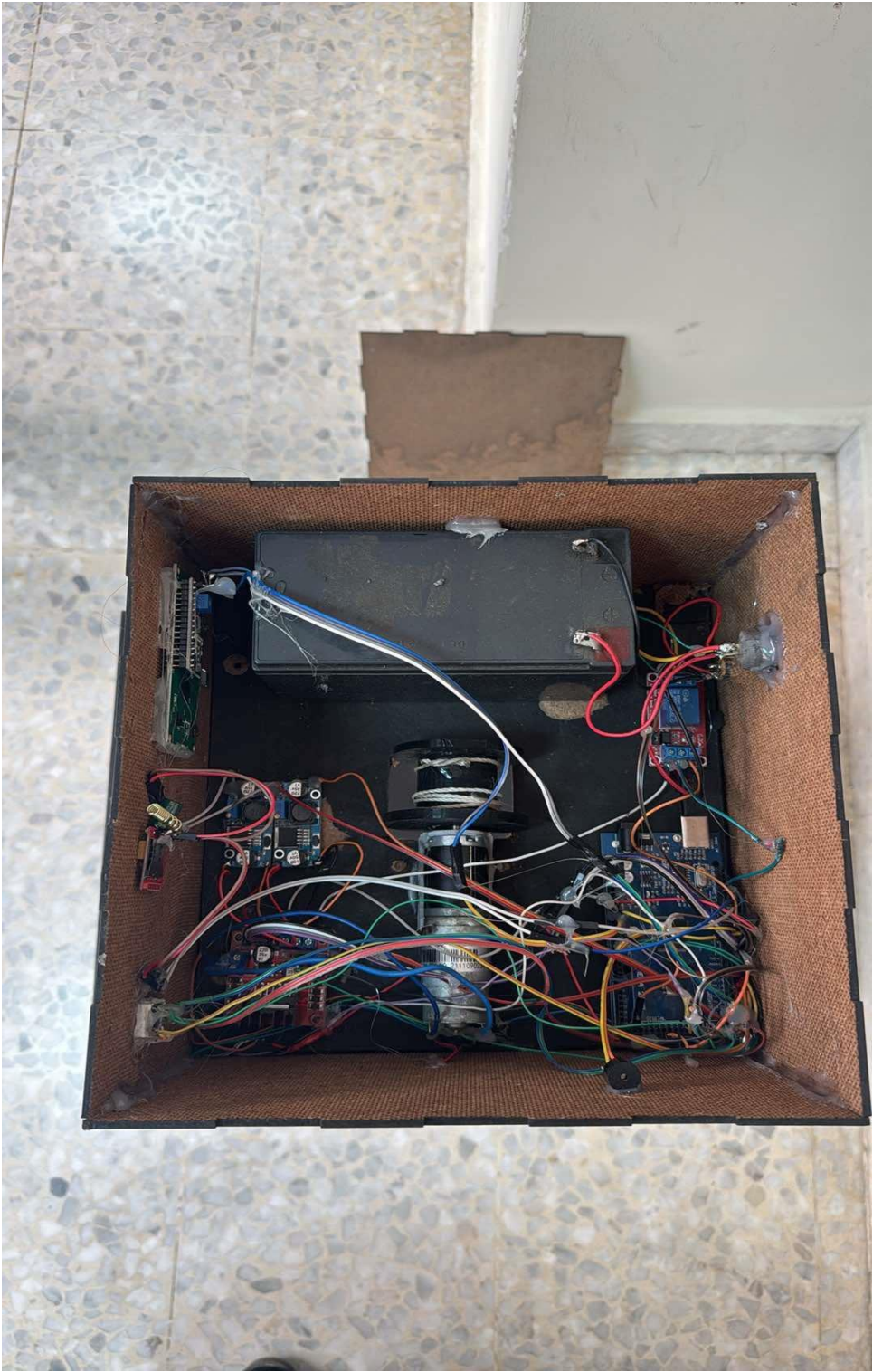
Third chapter

3. Methodology

3.1 System Features and Design:

The system combines advanced hardware and software solutions in a user-friendly design to ensure safe and efficient goods transportation via elevators. Key features include mobile remote control, real-time camera monitoring, temperature sensors, air conditioning, fire alarms, and a backup battery for power outages. The design caters to both users and administrators, offering intuitive controls, detailed monitoring, and safety alerts. This comprehensive system ensures reliability by integrating innovative software with robust hardware components.





Fourth chapter

4. Conclusion and discussion

The proposed innovative elevator system effectively addresses the risks and challenges associated with transporting goods in work environments. By integrating advanced features such as mobile remote control, real-time monitoring via cameras, temperature sensors, fire alarms, and a backup battery, the system ensures the safety and efficiency of goods transportation. Additionally, the inclusion of air conditioning and smart monitoring enhances the quality of storage during transit, reducing the risk of damage.

This system significantly improves worker safety by minimizing manual handling of heavy loads and mitigating risks related to elevator malfunctions or power outages. Furthermore, the user-friendly design and seamless integration of hardware and software solutions provide an efficient and reliable experience for both users and administrators.

Ultimately, this project not only ensures the safe transportation of goods but also introduces smart technological solutions into work environments, contributing to enhanced productivity and a safer, more efficient workplace.

Recommendations

5. Recommendations

- **Leverage technology to address real-life challenges:** Highlight the need for adopting modern technological solutions to improve workplace safety and efficiency in goods transportation.
- **Enhance worker safety:** Focus on minimizing manual handling of heavy loads and reducing risks related to elevator malfunctions.
- **Incorporate advanced technologies:** Utilize features like mobile-based remote control, real-time monitoring, and intelligent alarm systems for improved safety and functionality.
- **Combine traditional and modern solutions:** Integrate conventional safety measures with innovative technology, such as air conditioning for temperature control and backup batteries for power outages, for a reliable and comprehensive system.
- **Encourage continuous improvement:** Promote ongoing research and development to add smart features and adapt to future needs in goods transportation and workplace safety.

6. Future Work

- **Integration with IoT:** Enhance the system by connecting it to an Internet of Things (IoT) platform, allowing for real-time data analysis, predictive maintenance, and improved decision-making.
- **AI and Machine Learning:** Incorporate AI and machine learning algorithms to predict potential malfunctions, optimize elevator usage, and improve safety measures.
- **Advanced Monitoring Features:** Expand monitoring capabilities by adding sensors for humidity, vibration, or weight to ensure better protection of goods during transportation.
- **Cloud-Based Control and Reporting:** Develop a cloud-based system for remote access, control, and detailed reporting to provide administrators with comprehensive oversight.
- **Scalability and Flexibility:** Design the system to accommodate different types of goods and transportation environments, ensuring it can be scaled for larger operations or customized for specific needs.
- **Energy Efficiency:** Introduce energy-saving mechanisms, such as optimizing air conditioning and backup battery usage, to reduce operational costs and environmental impact.

7. References

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