SMART ELEVATOR SYSTEM BASED ON HUMAN DETECTION SENSORS

VARSHINI B - 21MIA1058, JAGADISH R - 21MIA1123, KOUSHIK VISHNU D - 21MIA1054
Guided by - Dr. RAJARAJESHWARI S
SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

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INTRODUCTION

In high-rise buildings where vertical transportation is essential to day-to-day operations, lifts are an essential part of today's urban infrastructure. The need for faster, more effective, and energy-efficient lift systems has grown as cities continue to expand vertically. Passengers in conventional lifts use a straightforward mechanism to request a stop on a particular floor by pressing a button. This is an efficient method, but it also causes inefficiencies like needless stops when the button is pressed and no one is there to board or exit the lift at that floor. These pointless stops waste energy, prolong passenger wait times, and cause needless work on lift parts.The need for smarter lift systems has become apparent as operational efficiency and energy conservation receive more attention.

This project mainly focuses on these two problems and provides solutions for these problems. The normal elevators stop at each and every floor that are requested even without any human presence which leads to inefficiency, energy waste and increased waiting times. The people who travel to higher floors often experience the cumulative delays caused by multiple unnecessary stops at the floors where no one is waiting or no one wants to get off. This is highly inconvenient for those who are in a rush.

OBJECTIVES

- The objective is to increase the overall operational efficiency of lifts in large buildings by minimizing needless stops and optimizing energy consumption.
- his project's main goal is to design and create a smart lift system that uses human detection sensors to decide whether or not to stop a lift on a given floor.
- Most of the systems aim at controlling the flow of traffic, but rather they do not prevent the unwanted halts designed to conserve power. The elevators coupled with human detection to enhance efficiency at the same time ensuring the comfort of the user is a gap in research

SCOPE OF THE PROJECT

The scope of this project focuses on integrating human detection sensors in elevators, preventing stops without human presence on requested floors. The project will involve developing and testing the integration of various sensors into a prototype elevator system as well as implementing an algorithm that enables the elevator to bypass certain floors whenever a button is pressed and there is no one on that floor.

- Reduces unnecessary stops, saving more time and energy
- Low need of costs due to energy efficiency.
- It enhances user experience by reduced waiting time and improved service reliability.

METHODOLOGY

The design methodology framework of the smart elevator system comprises different segments contributing not only to its scalability and adaptability but also to incorporation in the already existing infrastructure. This comprises the human detection component that employs sensors such as infrared or ultrasonic to detect a person to any of the elevator call buttons and the Elevator Management component that makes the decision on whether to stop or skip a floor based on sensor information. The wired connections linking them allow fast deep integration and decision making among these units.

- human sensing and detection module

This module detects whether a human is present when a button is pressed and sends data to the control unit. The alarm for the lift to stop is ignored if no human is found within the designated area.

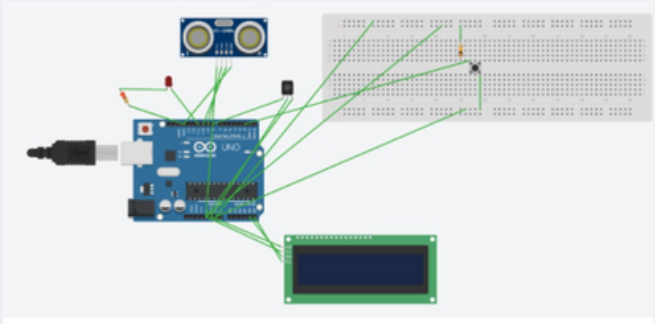
- control and decision making module

The information gathered by the human sensing and detection module is carried over by control and decision-making module. With a microcontroller that evaluates sensor data and determines whether the lift should stop at the requested floor.

- execution and feedback module

The control module's decisions must be carried out by the execution and feedback module. The execution module communicates with the lift's hardware system to either initiate or bypass the stop after the control module determines whether or not the lift should stop at a floor.

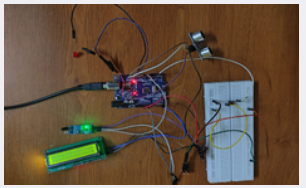
MODEL ARCHITECTURE



This proposed architecture uses a human detection sensor such as ultrasonic sensor and infrared sensor and it is placed next to the lift button panel on each floor. The sensor is used by the system to determine whether a person is within a given radius when the button is pressed. The lift will move to that floor if it detects a person. Even though the button is pressed, the lift will bypass the floor if no one is detected.

RESULTS AND DISCUSSION

The code that is used to perform the necessary tasks is mentioned in that software . The first step is to Initialize the LCD with the I2C address and then need to mention the connection pin of each hardware component in the code and simulate code to detect humans . if detected it will return true which is a human is detected else false . Once the base is set we need to create a loop that keeps track of button state all the time. No actions will be done if the button is not pressed however if the button press is identified the program starts working with the detection of humans through sensors and decides whether to stop or not on that particular floor.



CONCLUSION

In conclusion, the Smart Elevator System's usage of the Rule-Based Decision Algorithm and human detection sensors does enhance efficiency by averting unnecessary stops due external button presses when no passengers are present. Although the problem of external unintentional or unwanted button presses is currently solved by the system, a lift could also employ a similar approach in the cabin rather than outside the elevator. If the destination in question does not have any passengers intending to disembark, accidental or erroneous button presses from within the lift can also be ignored without consequences. More sensors or detection systems could also be fitted in the cabin to help with a more sophisticated design by enabling the lift to know which passengers wish to alight at a given floor and hence help reduce wasteful stops.

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