KLE Technological University

Creating Value
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School

of

Electronics and Communication Engineering

Senior Design Project

on

Auto Restart Escalator

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Under the Guidance of

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SCHOOL OF ELECTRONICS AND COMMUNICATION ENGINEERING

CERTIFICATE

This is to certify that project entitled **" Auto Restart Escalator "** is a bonafide work carried out by the student team of **"VinayKumar Patil (01FE19BEC207), Madhukeshwar .Pratahkal(01FE19BEC063),Vrashank Bobbi(01FE19BEC033),Annapurna Goudar (01FE19BEC021) "**.The project report has been approved as it satisfies the requirements with respect to the Senior Design project work prescribed by the university curriculum for BE (VII Semester) in School of Electronics and Communication Engineering of KLE Technological University for the academic year 2022-2023.

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1.

2.

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-The project team
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ABSTRACT

This project is about the implementation of Auto Restart Escalator. There are Escalators located at various stations like malls,railway stations,etc. Unlike regular escalators, this technology continuously monitors the balancing circumstances of escalator passengers.
Press the START button the main relay get's on and current flows through it continuously, the coil continues to get the power and hence Escalator remains ON. Similarly when the STOP button is pressed, it breaks the current to the coil and Escalator turns OFF.
Raspberry Pi control the relay. Then once the power is interrupted during the regular process, it registers the power off event and then when power resumes, it registers the power on event. Based on this power on and then back on after sometime, Raspberry is able to start a delay loop for 1 minute, it turns ON the Buzzer and after 10 seconds, then the Relay gets ON. The Relay now supplies the current needed for the coil of Main Power Relay. Thus, the Main Power Relay complete the Lamp circuit and Lamp is turned ON. Same logic also applied for Emergency STOP button.

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Chapter 1

Introduction

When the electricity fails or the emergency stop button is pressed, the escalators (which are located at various stations like malls,railway stations,etc) stops. Ideally, there should be certain corrective actions taken to guarantee that the escalators automatically restart when the power is restored.
This Project is about the implementation of automatic electric Restart of Escalator using Contactors, MCB, Raspberry pi 3b+ without using manually. When START push button is pressed, the coil of Main Power Relay is energized and main and aux contacts get activated, as a result of aux contact making the circuit, the coil continues to get the power and hence the Main Power Relay continues to stay in the activated state and it completes the circuit to the Lamp. Similarly when the STOP button is pressed, it breaks the current to the coil and Main Power Relay gets deactivated and disconnects power to Lamp.

1.1 Motivation

An intelligent escalator emergency stop system is made up of multiple sensing devices that are installed in predetermined locations on the escalator, each of which is installed along a straight line that is parallel to the escalator's path and has a fixed height from the path; an object is only visible to one of the multiple sensing devices at a time.

1.2 Objectives

The objectives for the proposed design are:

•The Intelligent Escalator Emergency Stop System is a highly efficient guard that is very smart and ensures the safety of the users of escalators.
•It doesn't require any guard to stop the button during emergency. It will automatically get start and stop.

1.3 Literature survey

The papers that where referred to complete the model are as follows:

1.3.1 Automated Elevator With Overload Alert

This paper contains the elevator at a selected time. The system presentations the wide variety of human beings interior an elevator with the assist of 7 phase display. Every pair includes 2 sensor pairs placed at a certain distance from one another in the contrary course. The system consists of Infrared Sensor pairs which might be positioned near the elevator door. these sensors senses whilst a person enters an elevator and it opens the door of the elevator and simultaneously increments the counter for the wide variety of humans entering the elevator. The IR transmitter is used to transmit IR rays directly to the receiver which receives the input and feeds this to an 8051 Micro-controller. The Micro-controller system this input obtained. at the moment the device additionally counts the variety of people present and increments a counter on every arrival and decrements when a person exits from the elevator. The system even includes a buzzer for demonstrating an alarm. The buzzer starts off evolved ringing as quickly as extra variety of people enters the elevator than the restriction of the elevator which is already set and the buzzer stops ringing only while the people in the elevator come outside the elevator. this can cause the counter to be decremented and the buzzer stops ringing as quickly as the counter is less or equal to the limit of the elevator set.

1.3.2 Intelligent Escalator Passenger Safety Management

This paper contains the addresses an method to smart protection control of passengers on escalators. The aim is to enhance the accuracy of detecting threatening situations on escalators within the subway to make decisions to save you threats and eliminate the results. the newness of the approach lies in the complex processing of facts from three types of resources (video, audio, sensors) using system getting to know techniques and recurrent neural networks with managed elements. The conditions and indicators of protection guarantee efficiency are clarified. New techniques and algorithms for handling the safety of passengers on escalators are proposed. The structure of a promising protection software program gadget is developed, and implementation of its additives for cloud and fog computing environments is supplied. Modeling consequences confirm the talents and benefits of the proposed technological answers for boosting the safety of escalator passengers, efficiency of manipulate selection making, and machine usability. because of the proposed answers, it has emerge as feasible to increase the speed of identifying situations three.5 times and increase the accuracy of their determination by 26efficiency of decision making has improved by using almost 30

1.3.3 Intelligent Escalator Emergency Stop System

An embodiment of the discovery may additionally encompass a set of sensing devices to hit upon objects on an escalator. The sensors may be hooked up in numerous fixed spots of the escalator in order to song the gadgets as the escalator moves. In a desired embodiment, the sensor are mounted along instantly strains parallel to the direction of the escalator. it's far favored that each of the traces have a set top from steps of the escalator. So, when an object enters the escalator , it is first "visible" via a primary sensor within the line, after which it is seen by way of the opposite sensors within the line in order.
In a desired embodiment, the sensors may be Infrared (IR) sensors. as the IR sensors generally work in 34 to 42 KHz frequency range, they're remitted from other emitters. it is also not going that they motive any interference to other verbal exchange channels. The output of an IR sensor is TTL, Le zero or +5 DC Volts. This virtual output facilitates to simplify the layout

of the associated strategies. An IR sensor comprises of a transmitter and a receiver. in a single embodiment, a transmitter and receivers may be installed in specific opposite spots on either sides of the escalator . In any other embodiment, the transmitter and the receivers can be established in the same location, and a reflect needs to be mounted in the exact contrary spot. Herein and after, this pair of the transmitter and the receivers optionally followed by means of a reflect, is called an IR-Line.
In a preferred embodiment, the slim beam IR sensors may be used, in order that they do now not intervene with one another.

1.3.4 Automatic Escalator System

This paper contains the venture evolved to control an escalator routinely. the main modules in this challenge are Human sensor, Micro-controller unit, driver unit and Escalator motor. whilst any individual steps at the escalator, it senses that a person desires to go up or down. It robotically sends sign to the micro-controller. It mechanically at the motor of the escalator.when the escalator starts off evolved, if every other steps at the escalator, the microcontroller calculates the time the previous one come in and consequently it stops the escalator while the first one reaches the unique vicinity. The Microcontroller programs are written in assembly language. this can be very useful in industries, institutions etc.In future this can be carried out with synthetic intelligence.An escalator is a moving staircase conveyor delivery tool for wearing humans between floors of a building. The tool includes a motor-pushed chain of individual,linked steps that flow up or down on tracks, allowing the step treads to stay horizontal.Escalators are used around the world to move pedestrian traffic in locations where in elevators might be impractical. to transport from one stop of an escalator to the alternative, a man or woman can also surely stand on one step till one reaches the end, or one can also climb or descend the escalator like conventional stairs. Many escalators in busy regions are extensive enough to accommodate columns of people, and those who desire to stand conventionally continue to be on one facet of the escalator.

1.4 Problem statement

Design the Automatic restart of Escalator to restart Escalator using Raspberry pi,Contactor and MCB without pressing the switch manually.

1.5 Bill of Materials

Table 1.1: Bill of Materials

Symbol	Description	Approx Cost
R1, R3, R5	4.7k, ¼ w	10
R2, R4	10k, ¼ w	10
Buzzer	Active 5v Buzzer for Arduino with Piezo	50
Raspberry Pi	Raspberry Pi 3b +	5000
Lamp	230v, 0 w/10w LED bulb	100
MCB	SCHNEIDER ACT 9 10 AMP 2 POLE MCB	450
Power Sense	A9C15914 Schneider Electric, 230 Volt	250
Main Power Relay	HAVELLS IHPHA009110, DIN Rail, 3	650
Relay	Arduino DC 5V Coil Relay Module	100
Npn Transistor	2N2222A or equivalent npn BJT	50
Emergency Stop	SCHNEIDER ACT 9 10 AMP 2 POLE MCB	450
Start, Stop	Taiss Momentary Push Button Switch Start/Stop Red Green Sign NO NC AC 660V 10A Button Switch HB2-Start/Stop	600

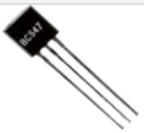
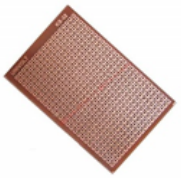
1.6 Organization of the report

Chapter 2: System design: The design of auto restart escalator, its functioning, architecture,functional block diagram is explained in chapter 2.
Chapter 3: Implementation details: Chapter 3 discusses the specifics of deployment for the entire auto restart escalator.
Chapter 4: Optimization: The cost, power, range optimizations are explained in Chapter 4.
Chapter 5: Results and discussions: The results obtained are shown in Chapter 5.
Chapter 6: Conclusions and Future scope: Then future scope and usability of the project is discussed in Chapter 6.

1.7 Morphological Chart

Table 1.2:Morphological chart

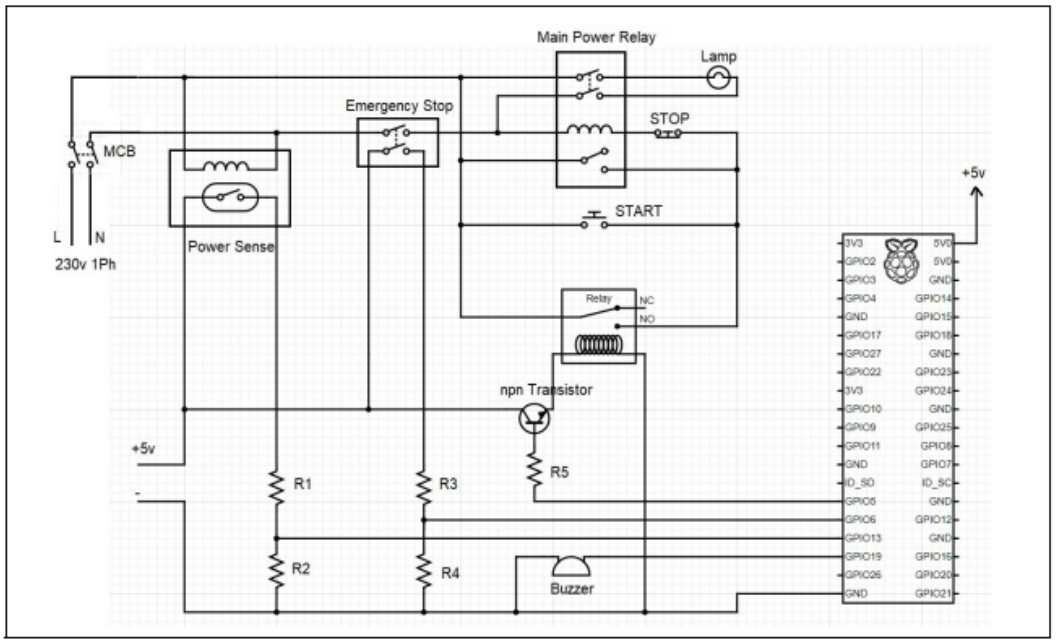
	Contactor
	Power Supply Cable
	Single pole Contactor
	Jumper Cable

	Npn Trnsistor
	PCB
	Relay
	Start and Stop Button
	PVC Duct for wiring

Chapter 2

System design

2.1 Functional block diagram



2.2 Design alternatives

There are different types of alternatives they are as follows

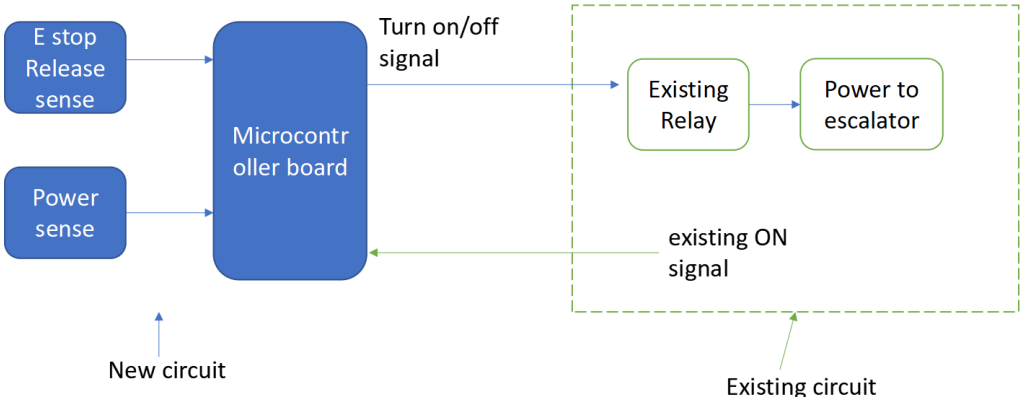
1.Infrared Sensors
2.Mosfets
3.Point to point construction

Chapter 3

Implementation details

MCB is miniature circuit breaker, which can be manually turned on or off. This also breaks automatically if there is over current or short circuit. Main Power Relay can be engaged/activated by applying power to the coil. The coil is rated for 230v.
When START push button is pressed, the coil of Main Power Relay is energized. Main and aux contacts get activated, as a result of aux contact making the circuit, the coil continues to get the power and hence the Main Power Relay continues to stay in the activated state and it completes the circuit to the Lamp. Similarly when the STOP button is pressed, it breaks the current to the coil and Main Power Relay gets deactivated and disconnects the power.
Raspberry Pi control a relay a transistor drive. The npn transistor provides enough current to relay coil. Initially when power is turned on, Raspberry registers this event in one of its variable. Then once the power is interrupted during the regular process, it registers the power off event and then when power resumes, it registers the power on event. Based on this power on and then back on after sometime, Raspberry is able to start a delay loop for 1 minute, it turns ON the Buzzer and after 10 seconds, then the Relay gets ON. The Relay now supplies the current needed for the coil of Main Power Relay. Thus, the Main Power Relay complete the Lamp circuit and Lamp is turned ON. Same logic also applied for Emergency STOP button.

3.1 Final design



3.2 Algorithm

step 1- press the start button
Step 2- the main relay get's on and current flows through it continuously
Step 3- if the main power is off the flow disconnects
Step 4- when the escalator starts automatically the buzzer beeps for 10 seconds and Escalator starts
Step 5- stop

Chapter 4

Optimization

4.1 Discussion on optimization

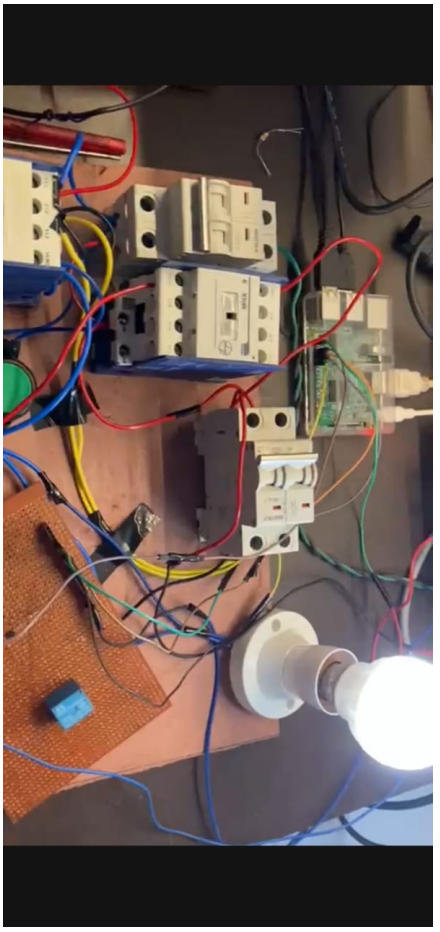
Optimization is a crucial stage in making appropriate decisions and watching and analysing physical and logical processes. The main goal of optimization is to achieve to achieve the best design possible for a set of parameters or constraints that are prioritised in declining order. This entails maximising high-yield factors or qualities such as energy efficiency, long-range coverage, and so on. This pattern of decision-making is known as optimization, which simply tries to improve and unconditionally perfect the system's operation. Our task is to modulerize when there will be power cut or emergency. The escalator should turn on emergency button automatically without pressing the stop button and when there is no power after power is come it should restart automatically.

Chapter 5

Results and discussions

5.1 Result Analysis

The proposed problem statement is achieved. This proposed product of automatic restart escalator successfully started automatically, when the the start button is pressed lamp will glow and when power is cut lamp gets off and when power comes buzzer beeps for 10 seconds and lamp will glow automatically without the start button this was achieved through the code.Therefore we can say problem statement is achieved.



Chapter 6

Conclusions and future scope

6.1 Conclusion

Escalators are high-risk devices that use a spinning engine to continuously move hard, deadly metal stairs. The elderly, the disabled, and individuals of all ages utilise escalators. These days, escalators are safer because they have emergency stop buttons built into the bottom and top. However, since the motion of the escalator is constant.In the event of an accident, pressing the emergency button requires the assistance of another person. To stop the escalator and also if power is cut and after power comes it requires a person to restart escalator.So it is important that escalator should stop automatically during emergency and if power comes it should restart automatically, So that it will be easier.

6.2 Future scope

Vertical transportation is increasingly in demand as a result of growing urbanisation and development. It fulfills a need rather than a luxury. There will be a greater need for housing and commercial space as urbanisation increases. As a result, the escalator sector will keep expanding quickly. We should also expect digitalization and a focus on the passenger experience to be the future improvements in escalator technology.

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