Emergency Evacuation System for Lift

Diksha Wasnik
U.G. Student
Department of Electrical Engineering
Smt. Rajshree Mulak College Of Engineering

Kiran Butle
U.G. Student
Department of Electrical Engineering
Smt. Rajshree Mulak College Of Engineering

Karishma Soundarkar
U.G. Student
Department of Electrical Engineering
Smt. Rajshree Mulak College Of Engineering

Kshitija Khode
U.G. Student
Department of Electrical Engineering
Smt. Rajshree Mulak College Of Engineering

Deepa Upare
U.G. Student
Department of Electrical Engineering
Smt. Rajshree Mulak College Of Engineering

Abstract

Safety of passengers in elevator is a critical issue in case of power failure. The purpose of built system are designed to supply power to emergency evacuation system and exist passenger when main power supply has fails. Currently power storage methods are used by charging battery during operation. While on other hand, safety measures employ separate setup thanonce required normal operation. The concept of merging two separate ideologies into one, i.e storing power during the routine operation and utilizing the stored power in case of power failure. This can be achieved by storing energy in a battery bank from the normal supply given to elevator for its working. When a power cut is detected ,which is done using a microcontroller by constantly checking the signal reaching to drive the elevator car, the stored power is utilized to make theelevator reach the nearest corresponding floor and open the doors. Hence the need to equip the elevator with separate safety devices can be fulfilled by reuse of energy, thus eliminating the extra efforts and capital required for safety devices.

Keywords: Battery bank, floor sensing, Nearest Floor Sensing, Power failure, Power Supply, vvvf drive

I. INTRODUCTION

Elevator is an transport device that is very common to use now a days. We use it every day to move goods or people vertically in a high building such as shopping center, working office, Hotel and many more. It is a very useful device that moves people to the desired floor in the shortest time. There are various elevator available in modern era for the purpose of reaching destined floor in corporate hubs or skyscrapers,though there is still a chance of this elevator to get stuck due to power failure. Thus for safety of the people during sudden power failure, emergency evacuation system is designed.in electrical elevator, When power is cut off people is trapped inside the elevator hence it is difficult to bring them outside. The present ideas is used in passenger elevator application to avoid entraptment of the occupents during power failure.The project implements evacuation system for lift,system consist of microcontroller,motor battery bank,vvvf driveinverter.The system is designed to automatic change power supply back to main supply after AC mains are restore.

II. SYSTEM WORKING

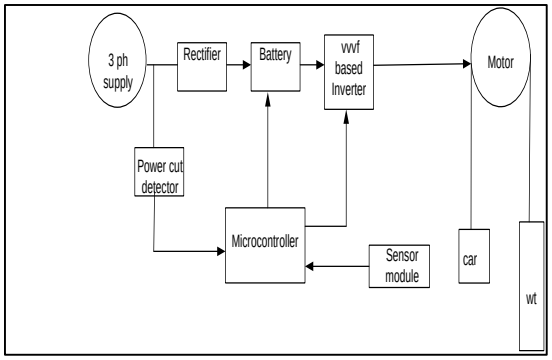


Fig. 1: Block Diagram of System

The purpose of designing of evacuation system for rescuing passenger in the elevator has been shown in block diagram which shows the actual basic structure of control panel has to be made to perform the operation of the backup system during the main power failure.

The block diagram has the following sections:

1) VVVF drive, drives the Inverter to drive the squirrel cage induction motor.
2) The Battery Bank section which gives the supply to the Inverter during the Power Failure conditions. it gets the signal of supplying the power from controller which detects power cut.
3) Microcontroller section is the heart of the system which operates it during the power failure conditions. It is achieved with the help of the programming which will guide the controller to perform the task.
4) Encoder is the inbuilt operation present in the microcontroller which will be used to get the floor counts and will help to get to the nearest floor in power cut.
5) Battery charging and discharging section which will be done with help of the normal supply i.e. the power will be stored in the battery bank using the normal power supply

III. FLOW CHART OF WORKING SYSTEM

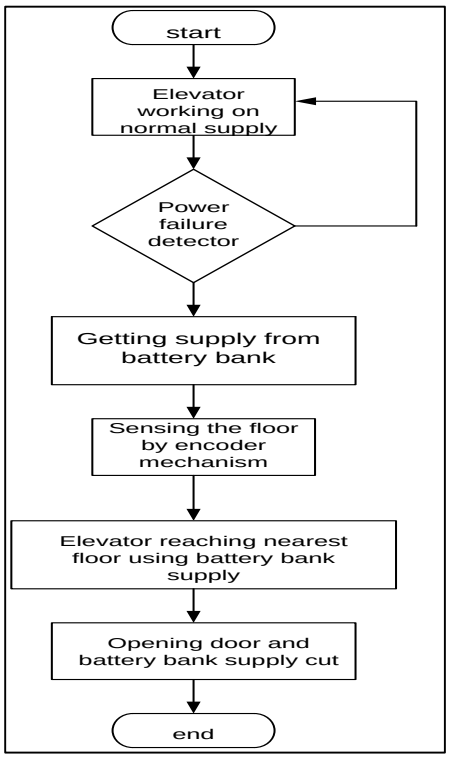
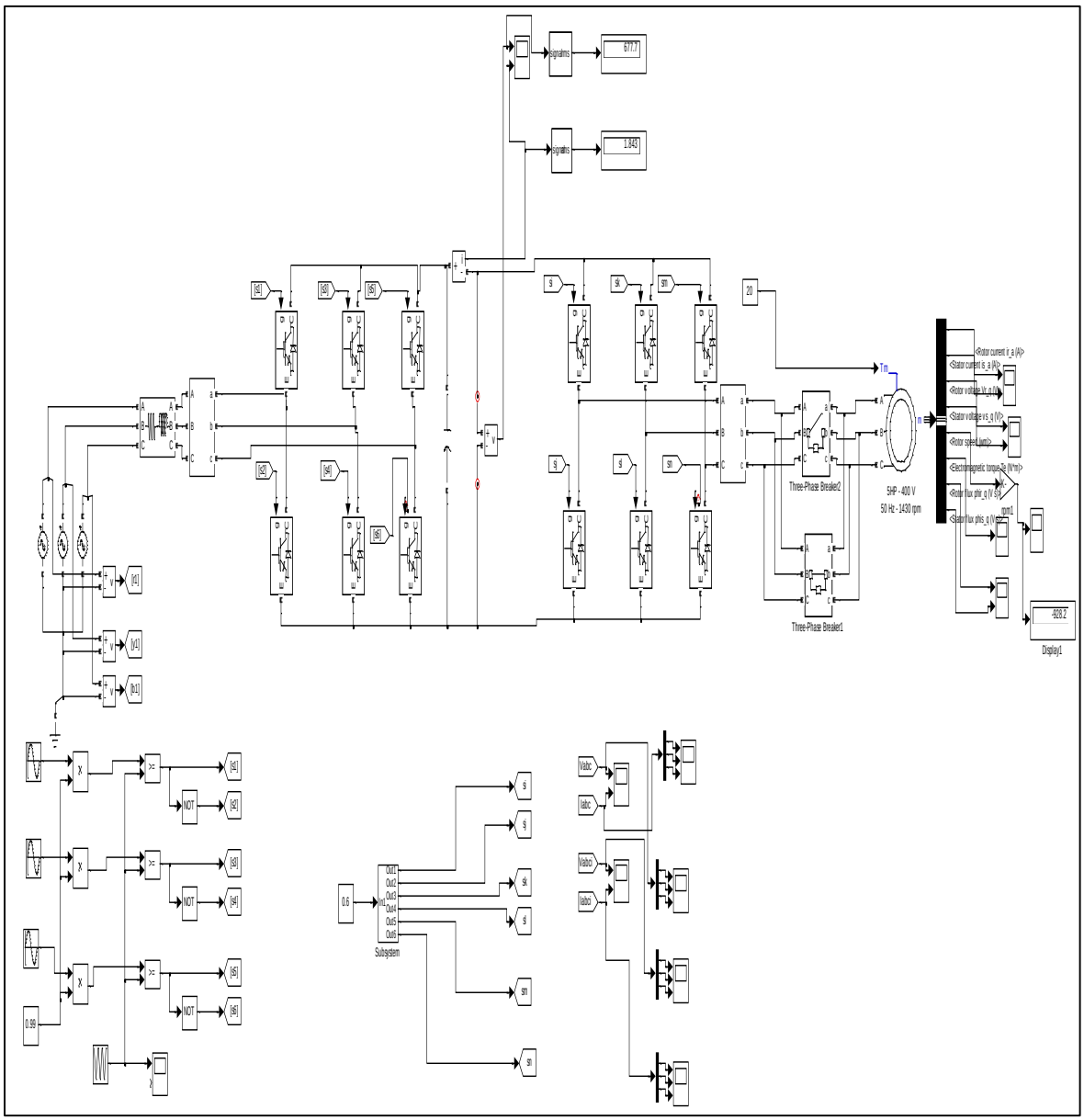


Fig. 2: Flow Chart of System Working

The normal working of elevator will be done with normal supply given to the motor and control panel. The microcontroller continuously check for power failure and upon detection. The microcontroller will guide the connection to be taken from the battery bank which will provide power supply for the motor driving system. Now after the power failure detection has been sensed by the micro controller and supply given by the battery bank, the ac power can be converted in to dc by using rectifier the power can be stored in battery bank which give supply to vvvf inverter which convert dc power in to ac, vvvf drives the motor, the floor sensing is done by using the level sensor. It has an inbuilt operation capability available in the microcontroller which has been used. The sensor is attached to the motor which will be used for floor counting purpose and those counts will saved by the microcontroller. During power failure, these counts will help the microcontroller to decide on which floor the elevator cabin is stuck and subsequently determine the nearest floor the time period to reach the stipulated floor will be calculated in order to ensure the elevator has reached it upon which, the doors of the elevator will be opened. The battery bank power supply will removed and then the passengers can come out of the elevator cabin safety.

IV. SIMULATION WORK OF VVVVF DRIVE SYSTEM FOR SPEED CONTROL OF MOTOR



The result obtained for vvvf drive circuit are obtained by use of six IGBT connected parallel with each other as well as with squirrel cage motor.The resultant circuit and waveform are given below.

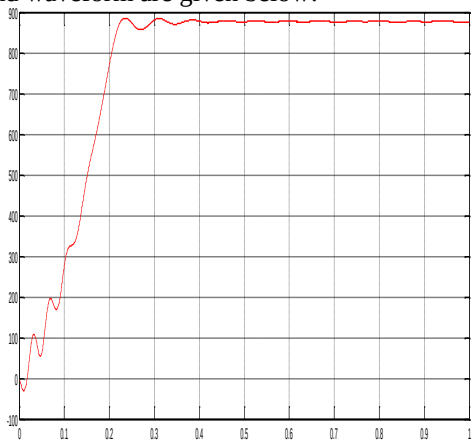


Fig. 3: forward rotation of motor

The second result of simulation is done by changing any two phase sequence of three phase supply for reverse operation of motor.

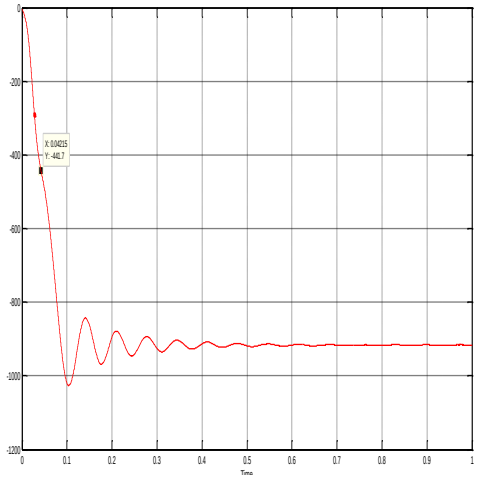


Fig. 4: Reverse rotation of motor

The model to be prepared will be a scaled model of the elevator control system which will made using metal. There will be two motors present one for driving the elevator cabin and other for driving the elevator door. The model consists of four floors of spacing shown in the model and the cabin size and the other dimensions also shown in the model.The measurements are in mm and the control panel consist of the hardware needed to drive the scaled model. In control will be connected to the motor with help of the connectors present in the control panel using a wire going to PMDC motor which is on the top most of the model.

V. CONCLUSION

The implementation of the idea will operate the traction motor for few moments during the outage of power, till the passengers gets evacuated.

After evacuation the inverter will stop feeding the motor and the next operation will commence after the arrival of main power.

The ultimate result will be achieved once the model and the control panel work is finished completely as the work on the schematic and programming is being carried out and the physical scaled model of the system will made and implemented using the control panel keeping the scaling in mind. Thus the ultimate goal to achieve the automated rescue device for the elevator system will be accomplished.

REFERENCES

[1] Trushen Pandya, Yash Sharma, Nandish Jasanil, "ARD based elevator controlsystem",International ResearchJournal of Engineering, Volume 1,Published on Feb 2015

[2] Seog Joo Kang, Gueon Sang Han, "Method For Controlling Rescue Operation of Elevator During Power Failure" ,US petents,us6,264,00531,published on July 24,2001

[3] Cheah sieo Hoon "microcontroller based lift control sytem",published on May 2006