International Journal of Research In Science & Engineering e-ISSN: 2394-8299
Volume: 3 Issue:2 March-April 2017 p-ISSN: 2394-8280

SMART ELEVATOR SYSTEM

Ms. Disha Chandankhede[1], Ms. Shraddha Lokhande[2], Ms. Jayashri Belkhode[3], Ms. Sonu Dhabarde[4], Ms. Rajshree Patil[5]

Electronics and Telecommunications Engg, DMIETR Wardha, India
dishachandankhede133@gmail.com
shraddha.star123@gmail.com
jayshribelkhode@gmail.com
sonudhabarde16@gmail.com
patilrajshree13@gmail.com

Abstract -
Elevators in a building has long been recognized as an important issue to improve transportation efficiency, since elevator service ranks second after heating, ventilation and air conditioning as the main complaints of building tenants. The problem, however, is difficult because of complicated elevator dynamics, uncertain traffic in various patterns, and the combinatorial nature of discrete optimization. With the advent of technologies, one important trend is to use advance information collected from devices such as destination entry, radio frequency identification and sensor networks to reduce uncertainties and improve efficiency. Most of conventional elevators have simple up and down buttons for hall calls, and destinations are not known until passengers placed car calls from inside an elevator. This system has keypads to enter passenger destination floors, and destinations are known in advance. The operation of the elevators will vary for different modes like normal and emergency modes. In the normal mode the lift in the nearest floor will move to the Destination. The floors are identified through IR sensing. In the emergency situation where smoke is sensed in any of the floors all the lifts will move to that particular floor. Movement of the lift in this mode will be faster compared to the normal mode.

I. INTRODUCTION

There has been a significant amount of work in the area of elevator to minimize the discounted or average passenger waiting time for up-peak traffic has been studied in destination entry system, passengers can enter their destination through keyboards before they get into the lift .Elevator get smart by using RFID. Several NP variants with inheritance have been developed to address this problem the latest advancements in sensor technology and information technology further open up the possibility to collect future open up the possibility to collect future traffic information within a certain time window . It provides the structure of the optimal control policy to minimize the discounted or average passenger waiting time for up-peak traffic. In conventional elevator systems, only up and down, buttons are available for hall calls, and passengers cannot specify their destinations until they enter the elevators. The systems need to make decisions in the presence of uncertainties on passenger arrival times and destinations. The destination entry system, passengers can enter their destinations through keyboards before they get into the lift. Lift or *elevator*, is a transport device that is very common to us nowadays. We use it every day to move goods or peoples 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 to cope with traffic uncertainties, advanced technologies have been introduced to collect and predict traffic information. In a Destination Entry system, passengers can enter their destinations through keyboards before they get into the cars. For these systems, passenger

arrival times, origins, and destinations are known before the systems make decisions

II. OBJECTIVE

In a building, effective operations of transportation systems including elevators, escalators, and stairs are vital. In addition, while buildings are evacuated by stairs according to current standards, stairs are inefficient because they become congested, people slow down during the long distance from top floors to the ground, and the elderly and persons with disabilities might not use stairs at all. Elevators have been shown to be potentially invaluable in certain emergencies such as the detection of chemical or biological agents, or fires in neighboring buildings. Nevertheless, as emergencies are rare events, systems specifically designed for egress cannot be justified based on such merits alone, but must provide an increased value during normal operations as well.

Most of conventional elevators have simple up and down buttons for "hall calls," and destinations are not known until passengers placed "car calls" from inside an elevator. It takes more time for the passengers to move to the destination as the requested lift might be in top floor and other lift may be in the nearer floors.

One important aim of this project is to improve elevator systems and to provide transportation efficiency for mid-rise and high-rise buildings, increase the flexibility of elevators. .It remains as an open and challenging issue to develop new scheduling methods that can effectively utilize advance traffic information. Taking advantage of advance information, a new door action control method is developed to increase the better performance in it. This paper focuses on improving conventional elevator system and shows the potentials for practical applications.

III. LITERATURE REVIEW

1. Optimization of Group Elevator Scheduling with Advanced Information

Group elevator scheduling has received considerable attention due to its importance to transportation efficiency for mid-rise and high-rise buildings. A two-level formulation is developed with passenger-to-car assignment at the high-level and single car dispatching that is innovatively formulated as passenger-to-trip assignment at the low-level. Detailed car dynamics are embedded in simulation models for performance evaluation. Taking advantage of advance information, a new door action control method is suggested to increase the flexibility of elevators. In view of the hierarchical problem structure, a two-level optimization framework is established. Key problem characteristics are exploited to develop an effective trip-based heuristic for single car dispatching, and a hybrid nested partitions and genetic algorithm method for passenger-to-car assignment which can be extended to solve a generic class of sequential decision problems. Numerical results demonstrate solution quality, computational efficiency, benefit of advance information and the new door action control method ,and values of new features in our hybrid method.

This paper is motivated by the needs to develop new elevator scheduling methods that can make effective use of advance traffic information. A novel two-level formulation is developed, with detailed car dynamics embedded in simulation models for performance evaluation. Taking advantage of advance information, a new door action control method is suggested. Key

problem characteristics are exploited to develop an effective two-level optimization framework, where the high-level solution method can be extended to solve a generic class of sequential decision problems .Numerical results demonstrate values of advance information and the new door action control method, and effectiveness of our solution method. Further improvement is needed to reduce CPU time for online implementation.

2. Normal and Emergency Mode using Group Elevator Scheduling with Advance information

Scheduling a group of elevators in a building has long been recognized as an important issue to improve transportation efficiency, since elevator service ranks second after heating, ventilation and air conditioning as the main complaints of building tenants. The problem, however, is difficult because of complicated elevator dynamics, uncertain traffic in various patterns, and the combinatorial nature of discrete optimization. With the advent of technologies, one important trend is to use advance information collected from devices such as destination entry, radio frequency identification and sensor networks to reduce uncertainties and improve efficiency.

This paper implements the optimized scheduling of a group of elevators with destination entry and future traffic information for normal operations and coordinated emergency evacuation. To overcome the difficulties caused by traffic uncertainties, one important trend is introduced to explore advance information. Most of conventional elevators have simple up and down buttons for hall calls, and destinations are not known until passengers placed car calls from inside an elevator. This system has keypads to enter passenger destination floors, and destinations are known in advance. The operation of the elevators will vary for different modes like normal and emergency modes. In the normal mode the lift in the nearest floor will move to the destination.

In this paper, a series of experiments have been done to check the good performance of the system in several aspects of interest

3. Group elevator scheduling with advanced traffic information for normal operations and coordinated emergency evacuation

Group elevator scheduling has long been recognized as an important issue for transportation efficiency. The problem, however, is difficult because of the large state space, various traffic profiles, and uncertainties. With the progress in information technology and sensor networks, one potential way is to use advanced traffic information to reduce uncertainties and optimize the performance. How to effectively utilize such information remains an open and challenging issue.

This paper presents the optimized scheduling of a group of elevators with advanced traffic information for normal operations and coordinated emergency evacuation. A look-ahead time window is first introduced to model advanced information. Key characteristics of group elevator scheduling are abstracted to establish an innovative formulation. The objective function is transformed into an additive form to facilitate the decomposition of the problem into individual car sub problems. Sub problems are independently solved by using a local search method in conjunction with dynamic programming with a novel definition of stages, states, decisions, and costs to optimize single car dispatching. With surrogate optimization, local search is “good enough” to set multiplier updating directions. Individual cars are then coordinated through the updating of multipliers by using surrogate optimization for near-optimal solutions. Numerical testing results demonstrate that near-optimal solutions are obtained for problems of moderate sizes under selected traffic patterns. The results also show

the value of advanced information through testing different window sizes and rescheduling intervals.

IV. PROPOSED SYSTEM

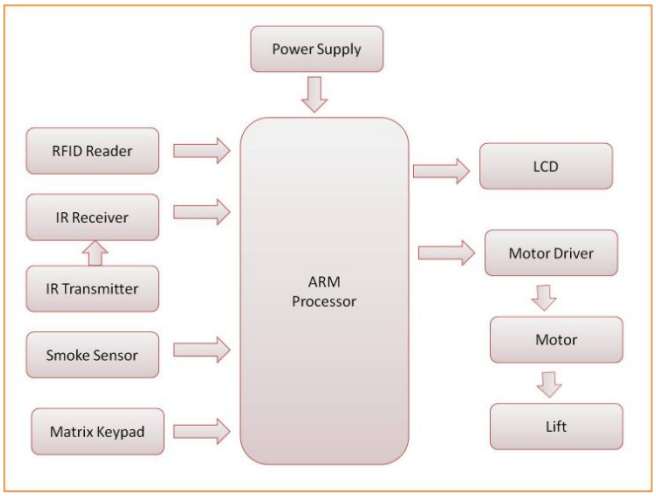


Fig. 1: Block diagram of the system

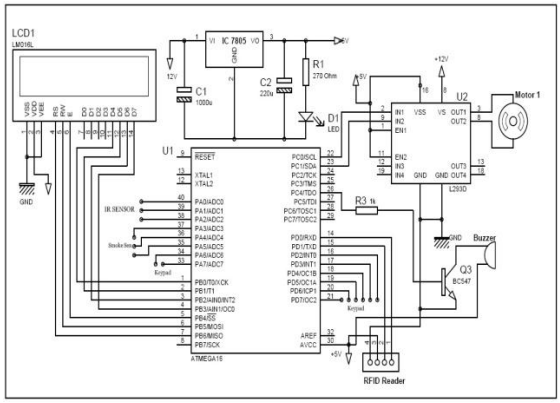
The Block diagram shows the different component used in the Smart Elevator System. It consists of DC motors, Driver Circuit, IR Sensors, Smoke Sensors, LCD Display, Timer and Matrix Keypad, RFID reader. A microcontroller is a small computer on a single integrated circuit consisting on a single integrated circuit consisting of a relatively simple CPU combine with support functions such as a crystal oscillator, timers, and watchdog timer, serial and analog I/O etc. Neither program memory in the form of NOR flash or OTP ROM is also often included on chip, as well as a typically small amount of RAM.

A passive Infra-Red sensor (PIR sensor) is an electronic device that measures infrared (IR) light radiating from objects in its field of view, PIR sensors are often use in the construction of PIR-based motion detectors (see below). Apparent motion is detected when an infrared source with one temperature, such as a human, passes in front of an infrared source with another temperature, such as a wall. Computer parallel and serial forms.

Input is given through keypad and LCD is to display the floors. IR Transmitters are placed in the floors and IR receivers in the Lift. In the normal mode when input is received from the user the Processor will process based on timer scheduling and move to nearest lift to the destination. In the emergency mode when smoke is sensed in any of the floors at a time all the lifts will be moved to the particular destination with the increased speed than normal mode. The lift is operated using DC motor driven by the DC Motor Driving Circuit. A DC motor is an electric motor that runs n direct current (DC) electricity. The DC electric motor generates torque directly from DC power supplied to the motor by using internal commutation, stationary permanent magnets, and rotating electrical magnets.

This system has keypads to enter passenger destination floors, and destinations are known in advance. The operation of the elevators will vary for different modes like normal and emergency modes. In the normal mode the lift in the nearest floor will move to the destination. The floors are identified through IR sensing. In the emergency situation where smoke is sensed in any of the floors all the lifts will move to that particular floor. Movement of the lift in this mode will be faster compared to the normal mode.

V. CIRCUIT DIAGRAM



VI. SOFTWARE

1. Atmel Studio 6.0

Atmel Studio is the new integrated development environment from Atmel. It provides you a modern and powerful environment for doing AVR and ARM development. Get started by exploring the included example projects. Run your solution on a starter or evaluation kit. Program and debug your project with the included simulator, or use one of the powerful on-chip debugging and programming tools from Atmel.Atmel Studio carries and integrates the GCC tool chain for both AVR and ARM, Atmel Software framework, AVR assembler and simulator. All newest Atmel tools are supported including AVR ONE!, JTAGICE mkII, JTAGICE3, STK500, STK600, QT600, AVRISP mkII, AVR Dragon and SAM-ICE.

2. PCB Artist

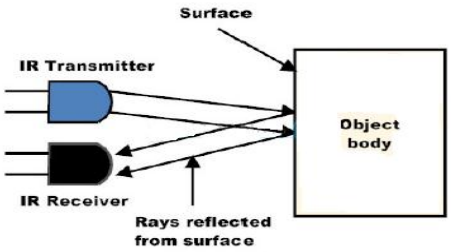
PCB Artist is just one of many PCB layout software tools available to use, but an understanding of one layout tool can easily transfer to any PCB design tool.

PCB Artist is a free software tool and can be downloaded for free at www.4pcb.com. The only restriction is that PCB Artist will not output a Gerber (.grb) file for general use to be fabricated anywhere, but a .fab file that must be fabricated through Advanced Circuits.

The process for PCB design is to first create a list of parts you will use in the circuit, then search for these parts in the libraries available. If the parts are not in any of the available libraries, you must create the components. This includes making a schematic symbol, a PCB symbol and then creating a component that will connect the two together in order for the program to relate the schematic to the PCB design. Next create the schematic, which is a symbolic representation of the circuit, configuring the functionality of the circuit. The final step is to then tell the software to import all the components' PCB symbols that are in the schematic and arrange them physically how you want them to be fabricated on the board. After ordering the completed PCB you must then order the parts to populate the board. The parts can be professionally soldered, or you can solder the parts yourself.

VII. HARDWARE

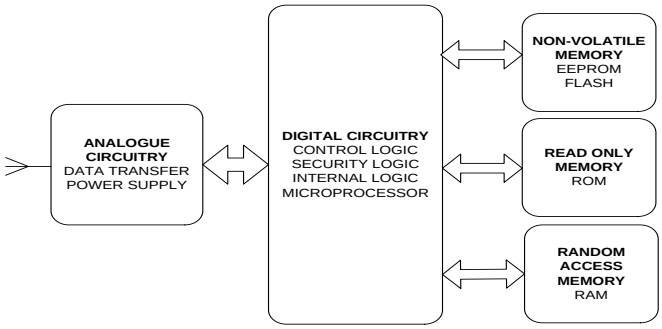
1. IR SENSOR



An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. These types of radiations are invisible to our eyes that can be detected by an infrared sensor.

The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode. The resistances and these output voltages, change in proportion to the magnitude of the IR light received.

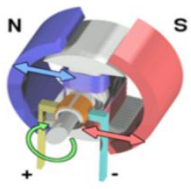
2. RFID MODULE



Basic Structure of an RFID transponder

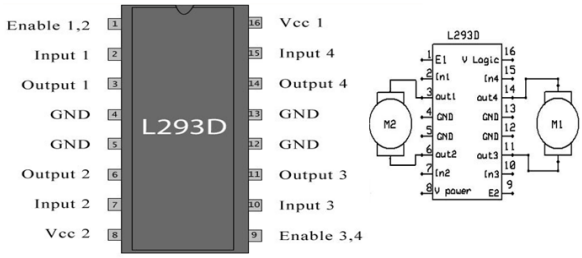
Radio Frequency Identification (RFID) used electromagnetic energy as a medium for communication. The two basic components, a reader and a transponder, are connected to a host computer that controls the reader. The transponder consists of a single unit containing a radio receiver and transmitter. When the transponder receives a signal from the unit reader, it responds by transmitting its unique identification code and any other data that is requested in the form of a serial data stream. . The object of any RFID system is to carry data in suitable transponders, generally known as tags, and to retrieve data at a suitable time and place to satisfy particular application needs. Data within a tag may provide identification for an item in manufacture, goods in transit, object location information, the identity of a vehicle, or animal identification. In addition to tags, the system requires a means of reading or interrogating the tags, and some means of communicating the data to a host computer.

3. DC MOTOR



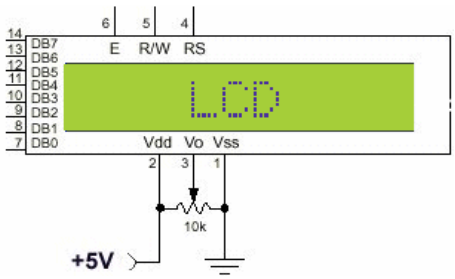
A DC motor relies on the fact that like magnet poles repel and unlike magnetic poles attract each other. A coil of wire with a current running through it generates an electromagnetic field aligned with the center of the coil. By switching the current on or off in a coil its magnet field can be switched on or off or by switching the direction of the current in the coil the direction of the generated magnetic field can be switched 180°.

4. MOTOR DRIVER L293D IC



L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher current signal. This higher current signal is used to drive the motors.

5. LCD



A liquid crystal display (LCD) is a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. Each pixel consists of a column of liquid crystal molecules suspended between two transparent electrodes, and two polarizing filters, the axes of polarity of which are perpendicular to each other. Without the liquid crystals between them, light passing through one would be blocked by the other. The liquid crystal twists the polarization of light entering one filter to allow it to pass through the other. Many microcontroller devices use 'smart LCD' displays to output visual information.

6. SMOKE SENSER

A smoke detector is a device that senses smoke, typically as an indicator of fire. Commercial security devices issue a signal to a fire alarm control panel as part of a fire alarm system, while household smoke detectors, also known as smoke alarms, generally issue a local audible or visual alarm from the detector itself. Smoke detectors are housed in plastic enclosures, typically shaped like a disk about 150 millimeters (6 in) in diameter and 25 millimeters (1 in) thick, but shape and size varies. Smoke can be detected either optically (photoelectric) or by physical process (ionization), detectors may use either, or both, methods. Sensitive alarms can be used to detect, and thus deter, smoking in areas where it is banned.

APPLICATIONS

- Multinational Companies
- Colleges
- Hospitals
- Shopping complex
- Apartments
- Defense areas

ADVANTAGES

- Power Consumption is less.
- Travelling and waiting time reduced.
- Regulated allotment of the passengers thus reduced traffic
- Efficient elevator transportation

CONCLUSION

This paper presents a design principle of elevator conservation systems which is able to minimize the energy consumption of existing traction elevator system. By using microcontroller as a controlling device, this work aims to control the elevator and enhance the performance. As microcontroller is being used here as a controller, it is very much chip and easy to control and can be made without any dependency to external hardware.

REFERENCES

[1]Jin Sun, Student Member, IEEE, Qianchuan Zhao, Senior, Member IEEE, and Peter B.Luh, Fellow, - Optimization of group elevator scheduling with Advance information, IEEE, Apr.2010.

[2]D.L. Pepyne and C.G. Cassandras, -Optimal dispatching control for elevator systems during up-peak traffic, *IEEE Trans. Contr. Syst. Technol., Vol5, No.6, pp.629-643 Nov, 1997.*

[3] J. Gale, - Destination control and tower top access in Belgium, *Elevator World, Vol.10, pp.45-49,2002*

[4] K. Rajkumari,C. Nalini "Normal and Emergency modes using Group Elevator Scheduling with Advance Information" International Journal of Innovative Research in Computer and Communication Engineering., Vol. 2, issue 12, December 2014.

[5] Z. Gagov, Y. C. Cho, and W. H. Kwon, "Improved Concept for Derivation of Velocity Profiles for Elevator Systems," Proceedings of IEEE International Conference on Robotics & Automation, Seoul, Korea, May 21-26, 2419-2423, 2001.

[6]N. S. Shimbun, "Elevators get smart," RFID in Japan Dec. 2004.

[7]M. L. Siikonen, "Procedure for Controlling an Elevator Group Where Virtual Passenger Traffic is Generated,"U.S.patent6,345,697,Feb.12, 2002

[8]G.C.Barney,ElevatorTrafficHandbook:TheoryandPractice. New York: Spon, 2003.

[9]M. Huang and Q. B. Zhu, "A novel predictive method for traffic flow of elevator system," Dyn. Contin. Discret. Impul. Syst. Ser. A: Math. Anal., vol. 13, pp. 332–339, 2006.