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Lift Control Using RFID and GSM system

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Abstract: The Objective of this work is to design and implement intelligent Lift using RFID and GSM. The Lift is controlled by wireless communication using RFID and GSM module. The Lift control system designed by this model solves problem of floor control and the communication jamming between interrogator and tag and it is widely used in intelligent buildings centring on the users. In a typical RFID system, individual objects are equipped with a small, inexpensive tag. The tag contains a transponder with a digital memory chip that is given a unique electronic product code. The interrogator, an antenna packaged with a transceiver and decoder, emits the signal activating the RFID tag so it can read and write data to it. When an RFID tag passes through the electromagnetic zone, it detects the reader's activation signal. The reader decodes the data encoded in the tag's integrated circuit and the data is passed to the host computer.

Index Terms*:* Microcontroller,RFID Tag, GSM Module, RFID Reader, Sensor.

1. INTRODUCTION

Radio Frequency IDentification (RFID) is an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags or transponders. An RFID tag is an object that can be attached to or incorporated into a product, animal, or person for the purpose of identification using radio waves. Chip based RFID tags contain silicon chips and antennas.

The purpose of an RFID system is to enable data to be transmitted by a mobile device, called a tag, which is read by an RFID reader and processed according to the needs of the particular application. The data transmitted by the tag may provide identification or location information, or specifics about the product tagged, such as price, color, date of purchase, etc.

In a typical RFID system, individual objects are equipped with a small, inexpensive tag. The tag contains a transponder with a digital memory chip that is given a unique electronic product code. The interrogator, an antenna packaged with a transceiver and decoder, emits the signal activating the RFID tag so it can read and write data to it. When an RFID tag passes through the electromagnetic zone, it detects the reader's activation signal. The reader decodes the data encoded in the tag's integrated circuit and the data is passed to the host computer.

2. LITERATURE SURVEY

In the paper [1], elevator was invented by Archimedes in 312. In the 17th century, the very smalltype elevators were placed in the building of England and France. In 1793, Lvan Kuliben created an elevator with the screw lifting mechanism for the winter place of Saint Petersburg. In 1816, an elevator was established in the main building of sub-Moscow village called Arkhamgelskoye.

In the paper [2], the middle 1800's, there were many type of curd elevators that carried fright. Most of them ram hydraulic elevators used a plunger, or steel column, inside a vertical cylinder.In 1847, J.W.Meaker patented the method which permitted elevator doors to open and close safely. In 1882, when hydraulic power was a well-established technology, a company later named the London Hydraulic Power Company was formed.

In the paper [3], 1852, Elisha Otis introduced the safety elevator, which prevented the fall of cab, if the cable broke. In 1857 March 23rd, the first Otis passenger elevator was introduced in New York City. The first elevator was built by Werner Von Siemens in 1880.

3. MODIFICATION

This paper used PIC-controller instead of microcontroller. RFID technology & GSM module was also included for designing intelligent Lift.

4. SYSTEM DESCRIPTION

4.1 GENERAL BLOCK DIAGRAM

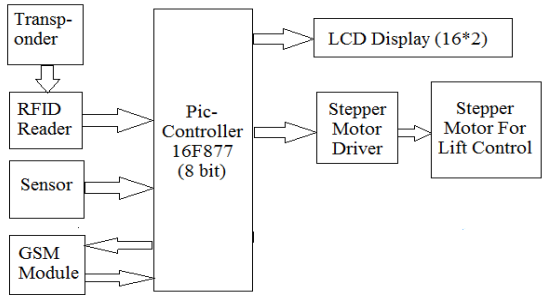

Fig 1. GENERAL BLOCK DIAGRAM

4.1.1 Microcontroller

The PIC16F877 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Microchip high-density nonvolatile memory technology and is compatible with the industry standard 16F877 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU With in-system programmable flash on a monolithic chip. The PIC16F877 is a powerful micro controller, which provides a highly flexible and cost-effective solution to many embedded control applications. The PIC16F877 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a full duplex serial port, on-chip oscillator, high performance RISC CPU, power on resetand clock circuitry. In addition, the PIC16F877 is with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset. More information please refer Data sheet 0f PIC16F877.

4.1.2 RFID TAG

The transponder is an RFID device incorporating a silicon memory chip with wound on I/O coil and a tuning capacitor. Transponder is attached to the object to be identified and a physical or manual work need to be inserted when appropriate RF signals to a reader, it is sometimes referred to as a Tag. A transponder is electronically programmed with unique information. The electromagnetic field produced by an antenna can be constantly present when multiple tags are expected continuously. RFID tags comes in a variety of shapes and sizes, according to specific applications.

4.1.3 RFID READER

The reader is nothing but a microcontroller based unit with a wound output coil, RF module and firmware to transmit energy to tag and read information back from it by detecting the backscatter modulation. The reader emits radio waves in ranges of anywhere from one inch to 100 feet or more, depending upon its power output and the radio frequency used. When an RFID tag passes through the electromagnetic zone, it detects the reader's activation signal. The reader decodes the data encoded in the tag's integrated circuit and the data is passed to the micro controller for processing.

4.1.4 LCD Display

Dot matrix LCD modules is used for display the parameters and fault condition.16 characters 2 lines display is used. It has controller which interface data's and LCD panel. Liquid crystal displays (LCD's) have materials, which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered form similar to a crystal. An LCD consists of two glass panels, with the liquid crystal material sandwiched in between them. The inner surface of the glass plates are coated with transparent electrodes which define the character, symbols or patterns to be displayed polymeric layers are present in between the electrodes and the liquid crystal molecules to maintain a defined orientation angle.

One each polarizer's are pasted outside the two glass panels. These polarizer's would rotate the light rays passing through them to a definite angle, in a particular direction When the LCD is in the off state, light rays are rotated by the two polarizes and the liquid crystal, such that the light rays come out of the LCD without any orientation, and hence the LCD appears transparent. When sufficient voltage is applied to the electrodes, the liquid crystal molecules would be aligned on a specific direction. The light rays passing through the LCD would be rotated by the polarizes which would result in activating/highlighting the desired characters.

4.1.5 *IR Sensor*

The IR Sensor-Single is a general purpose proximity sensor. Here we use it for collision detection. The module consist of an IR emitter and IR receiver pair. The high precision IR receiver always detects an IR signal. The module consists of 358 comparator IC. The output of sensor is high whenever it IR frequency and low otherwise. The power consumption of this module is low. It gives a digital output.

4.1.6 Stepper Motor Driver

A Stepper motor is widely used to translate electrical pulses into mechanical movement. The stepper motor is used for the position control. Every stepper motor has a permanent magnet rotor (shaft) surrounded by a stator. The most common stepper motors have four stator windings paired with a center tapped common. This type of stepper motor is commonly referred as a four- phase stepper motor. The center tap allows a change of current direction in each of two coils when a winding is grounded, resulting in a polarity change of the stator. The stepper motor has a total 6 leads: 4 leads representing the stator winding and 2 common for the center tapped leads. As the sequence of power is applied to each stator winding, the rotor will rotate. Normally four step sequence is generated where each has a different degree of precision.

4.1.7 GSM Module

GSM-Global system for mobile communications, is a standard set developed by the European telecommunications standards institute (ETSI), as a replacement for first generation (1g) cellular networks. This GSM modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. Applications like SMS control,

data transfer, remote control and logging can be developed easily.

The modem can either be connected to pc serial port directly or to any microcontroller. It can be used to send and receive SMS or make/receive voice calls. It can also be used in GPRS mode to connect to internet and do many applications for data logging and control. In GPRS mode you can also connect to any remote FTP server and upload files for data logging.

5. ALGORITHM & FLOW-CHART:

1. Start
2. Initialize the Microcontroller.
3. Read the RFID reader number.
4. If the detected reader number is valid then go to step number 5,otherwise send the message.
5. Rotate the stepper motor according to the reader number.
6. Read the lift position.
7. If the floor number is matched with the floor number of reader then go to step number 8, otherwise go to step number 5.
8. Stop the motor.
9. Stop.

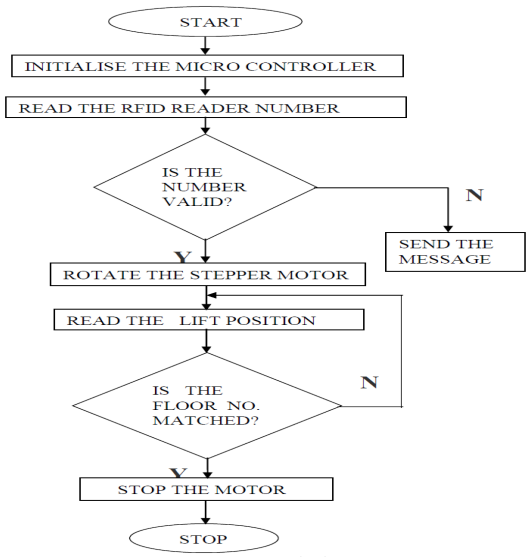

Fig 2. Flow chart of lift control

6. ADVANTAGES:

1. Tags can be read through snow, fog, ice, paint and in environmentally challenging conditions where barcodes would be useless
2. RFID system works in their non-contact and non-line of sight nature highly reliable.
3. RFID technology yields larger memory capacities, wider reading ranges and faster processing

7. EXPERIMENTAL RESULTS

1. The fig. 3 shows the total hardware setup of this project in which microcontroller, sensor and RFID reader mounted on them.

Fig 3. Main setup

2. The fig.4 shows the output of lift which are moving to the first floor indicate on display.

Fig 4. Output of moving first floor

3. The fig.5 shows the output of lift which are moving to the second floorindicate on display.

Fig 5. Output of moving second floor

4. The fig.6 shows the output of lift which are moving to the top floorindicate on display.

Fig 6. Output of moving top floor

5. The fig.7 shows the output of lift does not matched floor which indicate on display with not matched.

Fig 7. Output of not matched floor

6. The fig.8 shows the output of lift which are sending message indicate on display.

Fig 8. Output of message sending

8. FUTURE SCOPE

1. In future an apartment house elevator may be able to communicate audibly that is “voice activated” with boarding passengers and recognize with their voiceprints whether they are tenants of building or strangers.
2. In future by using nanotechnology we can develop space-lift.

9. CONCLUSION

In this work we have implemented the lift control using RFID and GSM technology. This project has provided that the use of RFID technology in the lift can increase flexibility, accessibility and safety to the lift use, providing an easy way to transmit valuable information that could adapt the elevator functionality to the user needs. Being able to validate information relating to an item enables increased security. This individual identification contributes to more effective access control, the ability to provide fast and efficient services at the point of need. Ability to authenticate information can prevent activities like counterfeiting and fraud. Information obtained by RFID scanning can be used to improve planning.

10. REFERENCES

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