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IOT Based Industrial Safety System

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ABSTRACT: There has been rising demand for security system that must be dependable and quick respond for the industries. RFID (Radio Frequency Identification) is one of the consistent and fastest means of identifying the material object. In the long-ago the barcode's are more preferable as compared to RFID because of their cost but now a day's RFID are easily available and are more convenient to use. RFID reader is attached to the safety helmet tag. It sends the data to the RFID reader. The Raspberry Pi connected with the reader sends the data to the cloud for storage via wi-fi module. This Paper is based upon security access and control system using RFID and Raspberry Pi. This paper provides a clear picture of hardware and software used in the system. Security access system is very convenient to use at Research and development sectors.

KEYWORDS: RFID tag, RFID reader, Raspberry Pi, Stepper motor, RS232

I. INTRODUCTION

Automatic identification and control system has become necessary to overcome the security threats faced by many industries. By installing this system at the entrance, it will only allow the authorized persons to enter into the industries. The system can also be installed at various points inside the research and development section to maintain attendance regularly and to restrict their access to sensitive areas in the organization. In such a way, any persons who is suspicious can be caught which will surely improve the security level in the organization. Radio frequency identification (RFID) is a wireless technology that can be used in safety helmet tag to mark the person who are all present. The paper has implied the use of this technology to automate various industrial sectors. The use of RFID technology is to automate sight attendance cum door opening management system. The system hardware consists of RFID attached with helmet, RFID readers, computer terminals, RS232 interface, wi-fi module and stepper motor. The security helmet tag contains the encrypted form of data likeMobileNumber, Name, Address, and either he is present or absent. The RFID reader reads the data inside the tag and transmits it to the computer terminal and servers though the cloud network. The data is decrypted at the terminal and its authenticity is verified. If it is correct, the door is unlocked by a stepper motor. If not, it gives a loud buzzer sound. The safety system allows the right person to enter into the Research and development section.

II. LITERATURE SURVEY

[1] Many researchers have utilized RFID technology in developing safety control system. Filipe has developed an RFID based monitoring control system. It consists of an RFID terminal, camera, server and an alert device. After detecting by a transponder, the terminal captures a photo and transmits the data and photo to the server through TCP/IP connection. The server searches the database for this particular query and sends the results back to the terminal to allow or deny the access control. The system also monitors illicit acts e.g., a person tries to enter when the door is open without completion of authentication process and turns on the alert device using web services. The performance of the system is tested by installing RFID kits with antennas covering a range of 10cm.

[2] Xiang-Lei Meng has described an RFID based embedded security authentication system with novel face recognition structure. The system comprises of two phases namely registration and recognition. In registration phase, ten pictures of user face with different emotions are collected and eigen information is obtained with an extraction algorithm. This

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information along with a UID is written on RFID tag. In recognition phase, a camera tracks the face and an extraction algorithm returns eigen information of the face in the picture. This information is then matched with the information already stored on the tag for authentication. The entire processing is done on embedded ARM11 processor, S3C6410 instead of computer terminal/server which has resulted in faster response time, about 57ms with authentication accuracy up to 86.5%. The performance of the system is compared with the existing database systems and is found to have far better response time with the same authentication accuracy.

III. BLOCK DIAGRAM

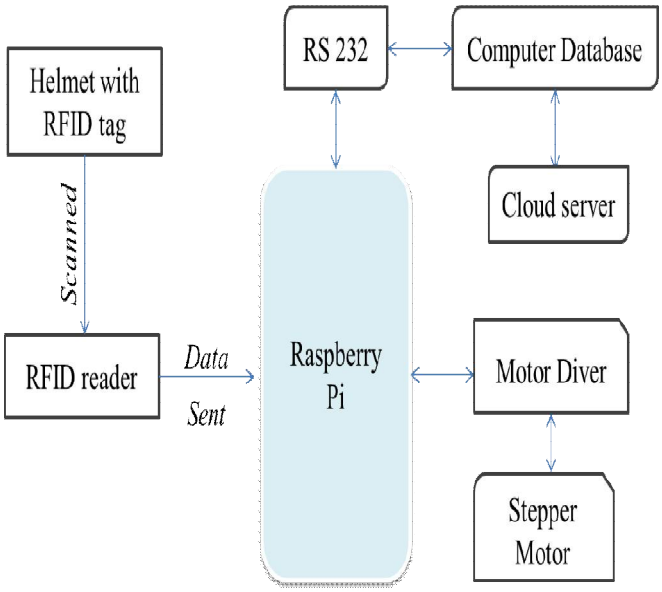

Fig.1. Architecure

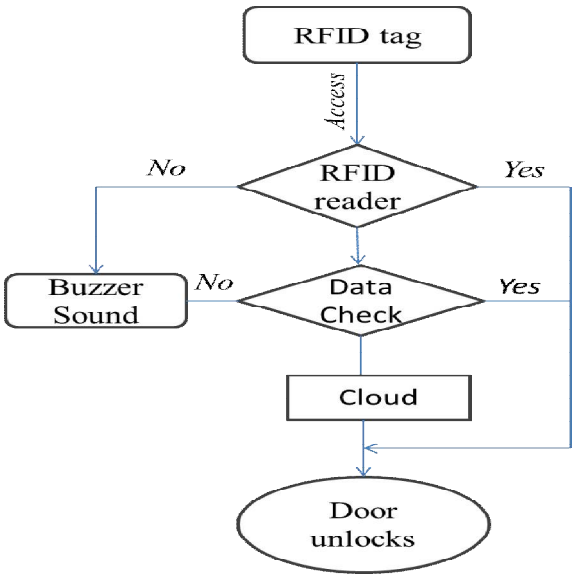

Fig.2. Block diagram

The RFID (*Radio Frequency Identification*) tag is attached to the safety helmet. The reader is placed at the outside of the important rooms. The frequency limit is set to maximum. When the person enters the certain region, it will scan their tags and mark as present and automatically the door opens. The concept behind in this is the reader sends the tag details to the Raspberry Pi. It sends the data to the computer as well as cloud. For the reading of past months, cloud storage is the best way to retrieve the data.

If the unknown person or the not approved person tried to enter the room, the reader scans the data and checks and immediately the buzzer sound starts alarming and the door cannot be opened. This technique allows us only the security persons can enter into the room. It avoids the unnecessary persons can enter and steals the important data and also for security for other persons.

IV. DESCRIPTIONS

1. RFID Tag

It uses Electromagnetic fields automatically identify and track tags attached to the objects. It contains electronically stored information. There are two types of tags 1) Active 2) Passive. The active tags have a local power source. The Passive tags collect energy from nearby RFID reader

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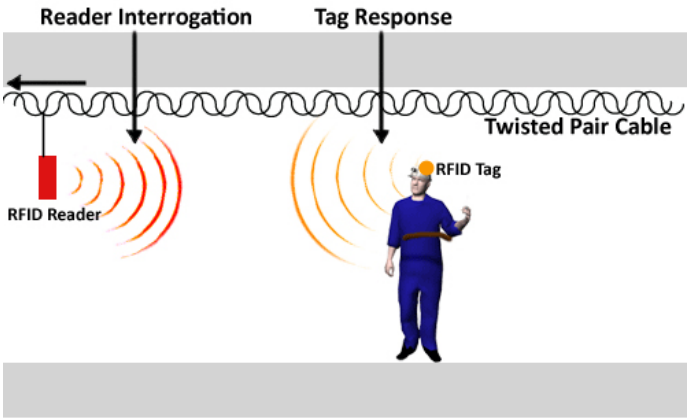

Fig.3. RFID tag sensing the reader

2. RFID reader

IP10 proximity card reader with operating frequency of 125KHz and reading distance up to 4 inches is used. The reader can be easily installed on metal doors, provides the tag information serially in RS232 format and is suitable for indoor as well as outdoor operations. The reader has two parts – a transceiver and an antenna. The transceiver generates a weak radio signal that may have a range from few feet to a few yards. The signal is necessary to wake or activate the tag and is transmitted through the antenna.

3. Raspberry Pi

Hardware setup is easy and the software installation is simple.The camera can also be set up to sense motion and start recording video or take a picture when triggered by bellRaspbian is a Debian-based computer operating system for Raspberry Pi.It is now provided by the Raspberry Pi Foundation, as the primary operating system for the family of Raspberry Pi single-board computers.Fully user space. From user's perspective drivers are not different from an those in kernel space.Each plug-in (e.g. *Streaming Server*) runs in the context of a single process and is "per-device". Multi-thread safe , it can run in foreground, or in background.

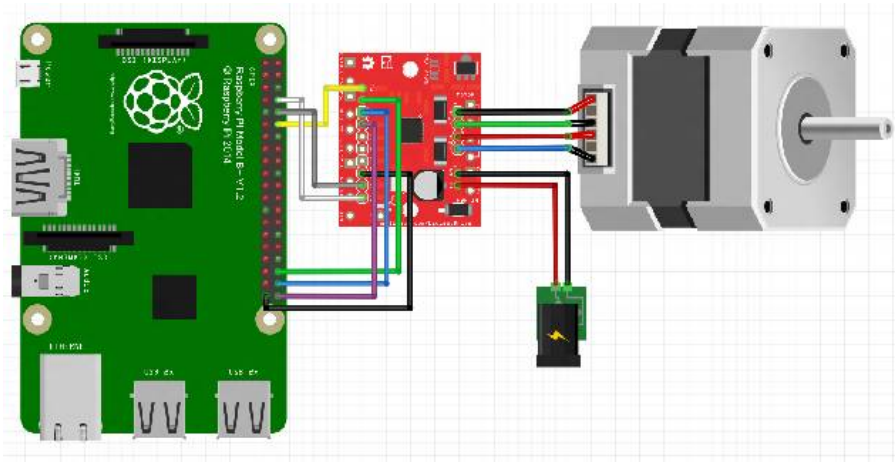

Fig.4. Raspberry Pi attached with Stepper motor

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4. Computer Database system

A computer database is a huge compilation of electronic files stored at a single location that is designed and modeled to support processes that require storage and retrieval of rerlevant information without a lot of work to the user. Computer databases are generally run and managed by specially designed application known as database. In this paper, we designed to connect wi-fi module with cloud sever.

5. Stepper Motor

It is an DC motor that moves in discrete steps. They have multiple coils that are organized in groups called Phases. By energizing each phase, the motor will rotate one step at a time. With a computer controlled stepping, we can achieve very precise position and speed control. For this purpose, we are using stepper motor for closing and opening the door.

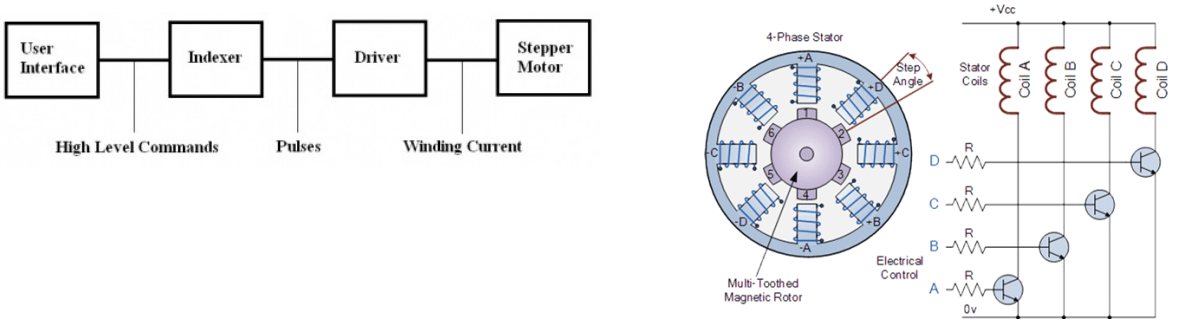

Fig.5. Architecture and block diagram of Stepper motor

V. CONCLUSION

This paper shows that the security and safety of a Research and Development system. For reason, we have implemented the RFID tag security system. For further advancement, it can be analyzed that the body language with facial recognition can be used for high security purposes. It must be highly automated so that it cannot fail. The reliability of Raspberry Pi is compatible, so that we can use the system faster. This technique shows the way that the person can enter into the room without any disruption.

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