TRAIN CROWD MANAGEMENT VIA ZIGBEE

[1]Bisojit Pal, [2]Sagar Mahadik, [3]Benniel Selvaraj
Department of Electronics Engineering,
K.C. College of Engineering & Management Studies & Research,
Kopri, Thane-(E)-400603, India.
bisojitpal16@gmail.com
sagarreincarnation@gmail.com
benzoppa.2891@gmail.com

Abstract— **This paper gives the general idea about "Train Crowd Management Via Zigbee" and its Applications. Train Crowd Management Via Zigbee contains circuit components like Micro-Switch, Zigbee Module, Microcontroller (AT89S51), LCD Display, IR Anti-Collision Sensor, Platform Direction Indicator, Relay Driver, etc. which makes it a multi-purpose circuit. In this report, we have listed about the literature survey which gives a brief gist about the various IEEE papers and journals which give us information about Train Crowd Management Via Zigbee that were previously made by researchers. The next section describes the block diagram of Train Crowd Management Via Zigbee. Various components used and the working about the same has been listed further. We have listed about the advantages, limitations and various applications in the next part.**

Keywords- **Zigbee, Microcontroller (AT89S51), LCD Display, Micro Switch, LED Indicator, Buzzer, IR Anti-Collision Sensor, Platform Direction Indicator, Occupancy Indicator LCD, etc.**

I. INTRODUCTION

Local trains are a very integral part of our day-to-day life. We largely depend on them for regular travelling and journey. But the journey becomes a very horrible experience for us when the trains are over-crowded and unfortunately crowded train is a very common thing. This experience can even become worse when we need to travel along with our family or hand full of baggage or luggage in both the hands. Technology has advanced rapidly in today's world. Hence we can make use of the technology to make information available to public in advance, so that they can take judgment or decision in advance for better journey. In the system, which we are proposing, all trains will carry a sensor system to sense level of occupancy in each train compartment and it will be shown on a large indicator on the platform before the train arrives on station via ZIGBEE based wireless communication. So People can take a wise decision in advance to travel the particular train or leave it. If decided to travel, then in which compartment, that can be decided well in advance. This will help to distribute crowd evenly throughout the train. Even-though our local trains are of the British-era. Still the performance is quite comparable to world standard. But one part of the system is totally mechanical type and creates a lot of problems in operation, i.e. train chain pulling system. This system never works as intended to work because it has no logic associated with it and

it is totally mechanical type in nature. In our system, we propose to digitize this mechanical system, so as to improve its performance and efficiency. Instead of keeping a chain for emergency, we will keep a panel of four switches in each compartment with acknowledgement indicator and different condition labels like:-(1) Unknown Object 2) Fire Bracket 3) Medical Emergency 4) Theft Attempt This will help traveler and train management both to make quick and informed decision through wireless communication between train and station head office.
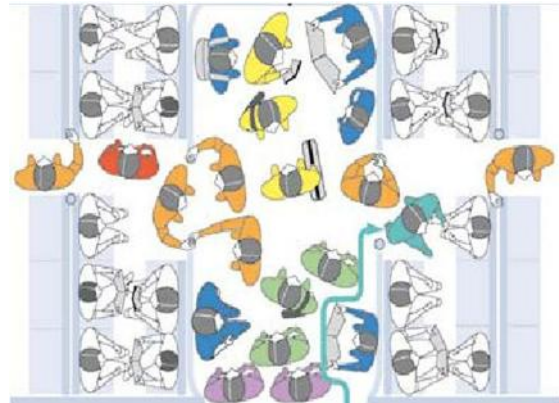

Fig.1. Crowd Management in Train Compartment

II. SYSTEM OUTLINE

- *Hardware System Design-*

2.1. Floor Switch- This is a small switch inside the controller connected to the full on power and full off brake. It gives positive contact and eliminates the resistor from the circuit. It is a very efficient way of handling power even in the newer electronic controllers.

2.2. Micro switch Diagram- A Micro switch is a generic term used to refer to an electric switch that is designed to be actuated by the physical motion of mechanical devices and is generally packaged in a small form factor to allow placement in small spaces.
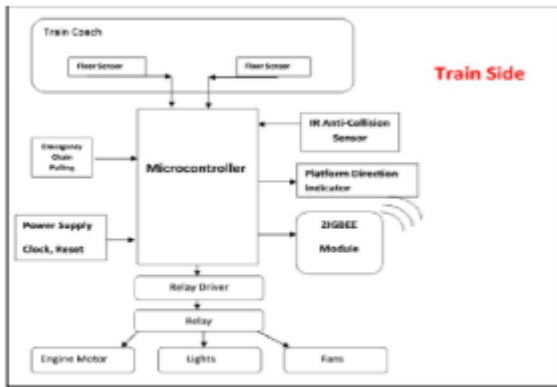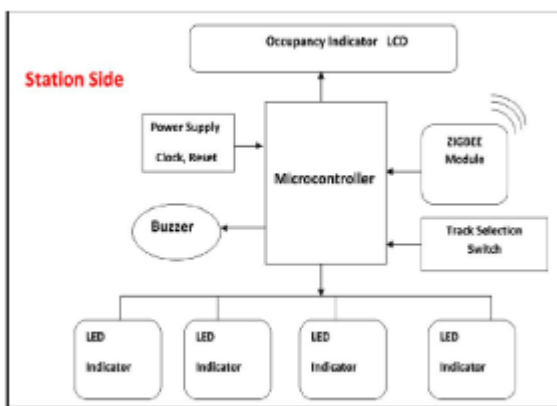
Fig.2. Block Diagram of Transmitter

Fig.3. Block Diagram of Receiver

2.3. Zigbee Module- This article paper provides a complete description of the concepts and features that make Zigbee technology what it is. All aspects of Zigbee are described including the IEEE 802.15.4 layers, the Zigbee stack, the Motivation behind the system, typical applications and design methodologies. Many silicon manufacturers are currently taking advantage of the features and popularity of Zigbee. The Zigbee protocol was designed to carry data through the hostile RFenvironments that routinely exist in commercial and industrial applications. The Zigbee specification provides a security toolbox approaching to ensure reliable and secure networks.

[1] Microcontroller (AT89S51) - The AT89S51 is a low-power, high-performance CMOS 8-bit microcontroller with 4K bytes of In System Programmable Flash memory. The device is manufactured using Atmel's high-density non-volatile memory technology and is compatible with the industry- standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional non-volatile memory programmer. By combining a versatile 8-bit CPU with In-System Programmable Flash on a monolithic chip, the Atmel AT89S51 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

[2] LCD Display- Various display devices such as seven segment display, LCD display can be interfaced with microcontroller to read the output directly. Liquid crystal Display (LCD) displays temperature of the measured element, which is calculated by the microcontroller. CMOS technology makes the device ideal for application in hand held, portable and other battery instruction with low power consumption.

[3] Working- The working of the system is divided into two parts-

Train Side-

At the train side, the microcontroller AT89S51 is used. Information such as vacant spaces in a compartment, medical emergency, theft, unoccupied or vacant seats, unnecessary use of fans and lights in the compartment, platform direction indication, etc. will be transmitted to the station side. Hence train side is the transmission side.

Station Side-

At the station side, all the information that is gathered at the train side will be displayed to the travellers in advance. Information such as vacant spaces in train compartments, platform direction indication, etc. will be displayed on LCD screen. Also, the buzzer will act in case of theft, medical emergency, fire bracket, etc. Hence Station side is the receiver side.

B. Software System Design-

In this system we are using software architecture such as BASCOM-8051 and Application Program.

BASCOM-8051- BASCOM-8051© is the Windows Basic Compiler for the 8051 family. It is designed
to run on W95/W98/NT/W2000 and XP.

Application Program- The application program is developed with Microsoft C# programming language using Microsoft Visual Studio framework and it provides a user interface for the security system. The advantages of Microsoft C# programming language are its robustness, easy to program, has an excellent database connectivity, runs on the two most common operating system platforms (Windows and Unix) and it has a larger user community that provides online support.
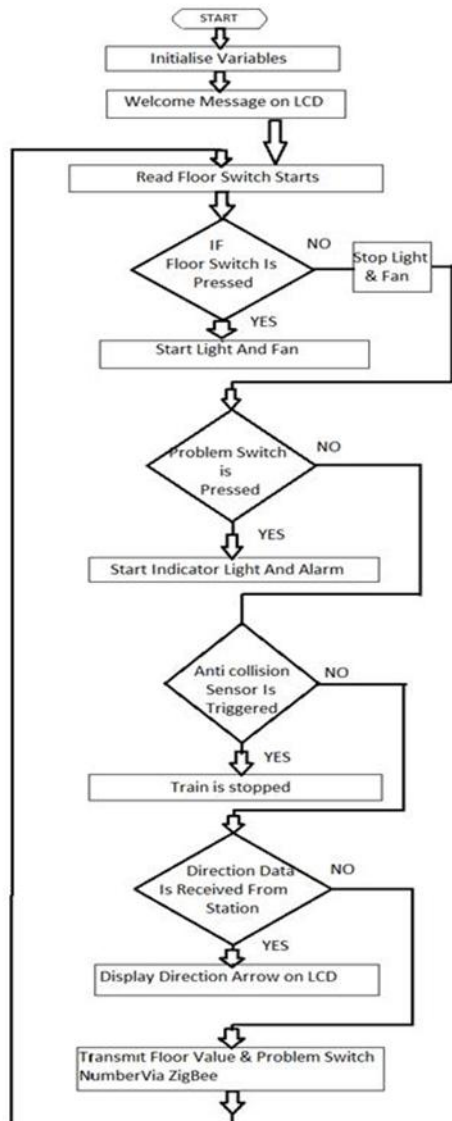
III. HARDWARE IMPLEMANTATION

Fig.5. TRANSMITTER MODULE

Fig.6. RECEIVER MODULE

Fig.4. Flow Chart of Software System Design

IV. ADVANTAGES

Advance information about the direction of the platform. Journey will be safe. Information about occupancy in train compartment. Help Commuter and Train management both to make quick and informed decision. Take judgment or decision in advance for better journey. Medical Emergency, Detection of Unknown Object, Fire Bracket, Theft Attempt, etc. Highly Durable and Power Efficient Device.

V. APPLICATIONS

As proposed it can be used in local trains, Mail express trains, Metro trains and Subway trains. With a bit of modification, it can be implemented on other public transport like buses etc. With a bit of modification, alcohol detection device can be implemented in the loco pilot cabin for the safety of passengers.

VI. LIMITATIONS

Cost of the system. Scale of the project will be very large. Not helpful in over-crowded trains. Complexity in the system.

Vulnerable to theft. Has lot of loopholes so the security is the main issue.

VII.CONCLUSION

The system named "Train Crowd Management Via Zigbee" is made eco-friendly and does not have hazardous effect on environment. The model of this project reduces the existing faults in the presently implementable projects. This model is cost reduced (Cheaper components) and it is also power minimized. This model is ready for practical use and it can be implementable in Developed as well as Developing Countries. This model has long, durable and efficient battery life and can be used as a power saving device. This model if implemented in day to day life will be beneficial to avoid overcrowding in trains, accidental safety, etc.

VIII. ACKNOWLEDGEMENT

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