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Wireless Automatic Station Identification System with Announcement

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ABSTRACT

In our day to day life, we all are spending our time in travelling as it is integrated part of life. In the proposed system we will try to make such a system which will make it more tension free. This project will be designed and developed for helping the passengers travelling in train and bus especially during night. The people who are not aware of the station on which one should get down will find this very helpful. Here the station name is displayed and announced simultaneously when the station-stop is about to reach which can assist both literate and illiterate.

I. INTRODUCTION

The Radio Frequency technology is used in the above proposed system to communicate between the Station-Stop and the Train-Bus. Each station-stop will transmit a unique binary code continuously to space in a particular range. This signal is captured by the receiver placed in train-bus when it reaches in its range. The system will automatically detect the upcoming station-stop code and will display the name on LCD and also speaker is used for the announcement of the same. Thus this system will be able to reduce our tension in journey to unknown place.

II. BACKGROUND OVERVIEW

A. Existing System

The passengers or the commuters travelling in the buses do not have any idea about the stop for which they are waiting, will come, came or had already passed.

If the passenger is new on that route then he need to ask for the required stop either from the other passengers or from the conductor.

In rush hours many times the passengers miss there stop and they reach few stop ahead of there destination.

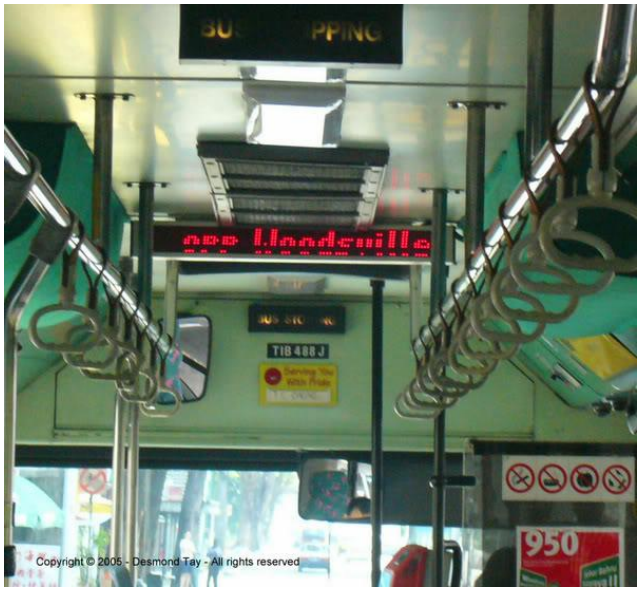
B. Drawbacks of Existing System

Thus the non-existence of the proposed system in buses leads to more tension in travelling and also unmercenary wastage of our precious time and energy if the desired stop is missed.

C. Proposed System

The following will be the complete working procedure of the above proposed system…

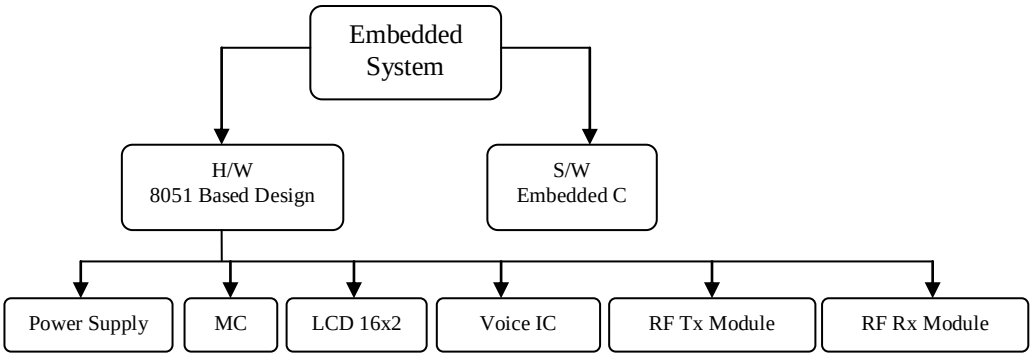
- There will be RF transmitters installed on each stations having unique Stop ID,
- The stop will continuously transmit its ID in air till a particular range,
- The bus will have RF receiver unites installed in it.
- After detecting the Stop ID, the system will decode the ID & will search for its name in lookup table,
- The fetched name will be displayed on the LCD,
- A pre-recorded voice for the same ID will be played automatically for announcement.
- This will help and alert the passenger so that he will get ready and will come the exit door of the bus so as to get out of the bus at required stop.



III. THE PROPOSED SYSTEM

A. System Overview

The above proposed system will be divided into the following sub modules or sections…



B. Block Diagram

The Block Diagram of the system is attached behind.

C. Explanations of Blocks

The following are the brief explanations of the working principle of the various major blocks or sections used in the system…

- **Power Supply**
  This unit will supply the various voltage requirements of each unit. This will be consists of transformer, rectifier, filter and regulator. The rectifier used here will be Bridge Rectifier. It will convert 230VAC into desired 5V/12V DC.

- **Microcontroller**
  This unit is the heart of the complete system. It is actually responsible for all the process being executed. It will monitor & control all the peripheral devices or components connected in the system. In short we can say that the complete intelligence of the project resides in the software code embedded in the Microcontroller.
  The controller here user will be of 8051 family. The code will be written in Embedded C and will be burned or programmed into the code memory using a programmer.
  This unit requires +5VDC for it proper operation.

- **LCD 16x2**
  It is called Liquid Crystal Display. We are going to use 16x2 character LCD. This will be connected to microcontroller. The job of LCD will be to display all the system generated messages coming from the controller. LCD will provide interactive user interface.

- **RF Encoder HT12E**
  This unit is used to encode the 4-bit data before transmitting it in the communication channel. Basically it generates a serial bit stream of the parallel input data bits. It then sends data stream to RF transmitter unit.
  This unit requires +5V to 12V DC for it proper operation.

- **RF Decoder HT12D**
  This unit is used to decode the 4-bit after receiving it from the RF Receiver unit. Basically it generates a parallel data from the serial incoming bit stream.
  This unit requires +5 to 12VDC for it proper operation.

- **The RF Transmitter**
  This unit performs very significant roll i.e. it is responsible for the modulation (ASK, CF-434MHz) of the message or data to be transferred. Once the data is modulated then is transmitted or launched in Air by the help of the antenna. The baud rate is generally 1200bps and the range will be up to 100 ft.
  This unit requires +5V to 12V DC for it proper operation.

- **The RF Receiver**
  This unit performs very significant roll i.e. it is responsible for the demodulation of the message or data after reception from air. This section is internally constructed with Amplifier unit, Filter unit, Peak Detector, Sample and Hold circuit and Level Shifter.
  This unit requires +5VDC for it proper operation.

- **Voice IC**

This unit is the only Analog IC used in the whole project. It has the capability to sample and store the voices signals at 8KHz. It is re-recordable IC. It can store voice of up to 8 minute duration. This will be interfaced with microcontroller using SPI (Standard Peripheral Interface) protocol.
This unit requires +3.3VDC for it proper operation.

- **Microphone**
  Microphone is used to receive the different audio frequencies generated by the headset. This microphone transmits the data received from the headset to the section called 1st stage Amplifier.

- **First Stage Amplifier**
  This unit is used to amplify the very low level signal received from the microphone using transistor in Common Emitter Configuration.
  This unit requires +3.3VDC for it proper operation.

- **Second Stage Amplifier**
  This unit is used to amplify the signal receive from first stage amplifier. This section uses Op-Amp as amplifier. The gain will be adjustable here up to 200.

D. Features

The Following are the prominent features of the above discussed system…

- RF Based Wireless Link at 1200 bps,
- ASK Modulation at 434MHz,
- Up to 100 ft. range,
- Customized re-recordable Voice IC,
- Keeps on repeating the announcement till in the range of the stop.
- Fully automatic, no manual trigger required.

E. Technology & Programming Languages

As microcontrollers are the core of these days digital circuit design in industry, this system uses it for the centralized operation and digital processing. The technology used here is embedded technology which is the future of today's modern electronics.

The followings are the various Programming Languages & Technologies that are going to be used in the proposed system…

For Embedded System…

- Embedded Technology,
- 8051 Family Based Controller,
- Embedded C - Keil Compiler,
- Eagle Software for PCB Designing,

F. Project Development Methodology or Steps

The following will be development steps so as to achieve the working Prototype Model of the above proposed system…

- Defining the Problem,
- Understanding the Need & Usability in industry and society (Market Analysis),
- Developing Block Diagram,
- Designing Circuits of individual blocks,
- Testing circuits in LAB & Finalizing,
- Developing PCB on PC,
- Getting the PCB printed from market,
- Soldering the components,
- Performing various Basic Experiments to test the PCBs,
- Developing Flowchart for the entire process,
- Writing actual Software Program,
- Compilation & Burning,
- Testing and Debugging,
- Finally Running the system and,
- Documentation.

IV. SCOPE & APPLICATIONS

Only the imagination can limit the applications of the above proposed system.

Though the following are some examples…

- In Public Transport System.
- Can be used in trains for the identification of coming station.
- Can be use as a Bus rout indicator.
- etc,

V. CONCLUSION

By the realization of the above proposed system one can learn many aspects of a digital electronics circuit. This will give the complete knowledge of designing microcontroller based system and developing embedded software.

VI. ENHANCEMENTS

A. Limitations

As generally all systems have some limitation, here are some listed for the proposed system…

- Range is limited to 100fts only,
- Modulation is ASK which provides some noise,
- Only 16 stop ID can be generated,
- Voice IC can record up to 8-min voice,

B. Drawbacks

This system has certain drawbacks also as listed…

- Installation of RF transmitter required at all stops,
- Installation of RF receiver required in all buses,

C. Future Modifications

There is always chance to improve the any system as research & development is an endless process. Our system is no exception to this phenomenon. The following improvements can be done…

- Range can be increased up to 100 meters,
- FSK Modulations can be used for error free transmission,
- More stop IDs can be generated,
- Higher capacity voice IC can be used,
- Area based advertisement can be added.

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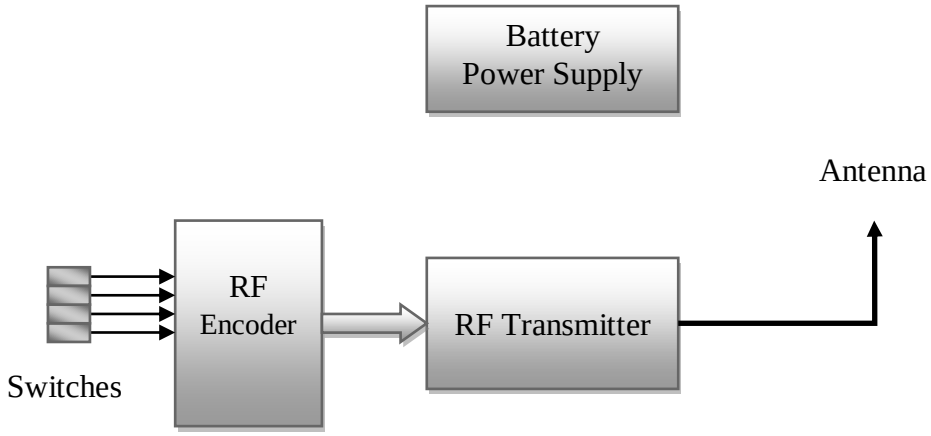
THE SYSTEM BLOCK DIAGRAM

Transmitter on stops



Receiver in buses