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Wireless Sensor Network based Intelligent Urban Transportation System

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***Abstract:** This research work analyzes the urban transportation system, which is one of the problems attempted to solve by means of digital cities. A system is designed through the use of a wireless sensor network (WSN) where each unit has ZigBee communication module and a global positioning system (GPS). This allows to obtain the position and speed of each transport unit and to transmit that information to the central station, where software is developed to analyze and monitor the obtained information through a server and a database.*
***Keywords:** Wireless Transportation System (WSN), Intelligent Transportation System (ITS).*

I. EXISTING SYSTEM

In the existing system we used RFID Technology to identify bus detail. However, lack of systematic mechanism to monitor and manage the bus-network is lack of predictability of the bus-network. It gets complex to clarify causes after delays, or predict the arrival times.

II. PROPOSED SYSTEM

In this paper, we propose a novel and innovation IoT solution to track the location of buses with the help of GPS device. Our solution uses Zigbee to track the journey of a bus along its service route. While Zigbee detection devices are installed at selected bus stop along the route, including deployment at the bus terminals. With the proposed solution is able to first track.When the bus leaves the bus terminal. At what time the bus arrives at a particular bus stop. Time analysis of the bus along the route.

III. INTRODUCTION

Public transport is one of the important infrastructures of several countries. In developing country like India bus transport consists of around 70% of public transport. This research work analyzes the urban transportation system, which is one of the problems attempted to solve by means of digital cities. A system is designed through the use of a wireless sensor network (WSN) where each unit has a Zigbee communication module and a global positioning system (GPS). This allows to obtain the position and speed of each transport unit and to transmit that information to the central station, where software is developed to analyze and monitor the obtained information through a server and a database. This allows to obtain the position and speed of each transport unit and to transmit that information to the central station, where software is developed to analyze and monitor the obtained information through a server and a database.

IV. BLOCK DIAGRAM

A. Block Diagram Of Bus Stop Section

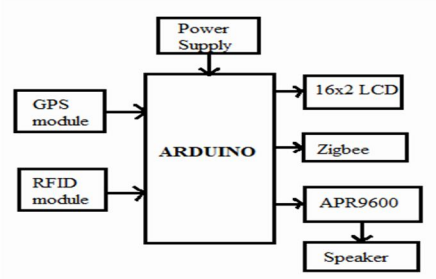


Fig.2.1 Block diagram of Bus Stop section

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B. Block Diagram Of Control Section

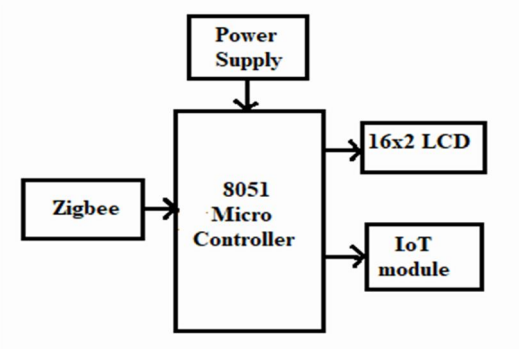


Fig.2.2 Block diagram of Control section

V. HARDWARE COMPONENTS

A. Arduino

Arduino/genuino uno is a microcontroller board based on the atmega328p (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a ac-to-dc adapter or battery to get started.

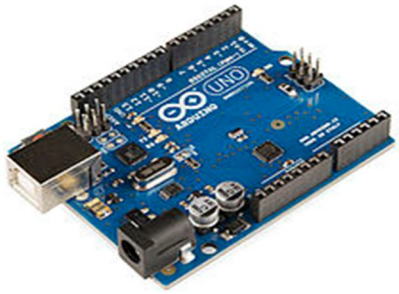


Fig.3.1ArduinoUNO

B. Microcontroller

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable flash memory. Micro controllers are inside many kinds of electronic equipment (see embedded system). They are the vast majority of all processor chips sold. Over 50% are "simple" controllers, and another 20% are more specialized digital signal processors (DSPs) (ref?). A typical home in a developed country is likely to have only one or two general-purpose microprocessors but somewhere between ones and two dozen microcontrollers.



Fig.3.2 Microcontroller

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C. Radio Frequency Identification (RFID)

RFID, short for Radio Frequency Identification, is a technology that enables identification of a tag (that is normally attached with an entity) by using electromagnetic waves. RFID Reader Module, are also called as interrogators. They convert radio waves returned from the RFID tag into a form that can be passed on to Controllers, which can make use of it.



Fig.3.3 RFID Reader

D. Liquid Crystal Display(LCD)

The principle behind the LCD's is that when an electrical current is applied to the liquid crystal molecule, the molecule tends to untwist. This causes the angle of light which is passing through the molecule of the polarized glass and also cause a change in the angle of the top polarizing filter. As a result, a little light is allowed to pass the polarized glass through a particular area of the LCD. Thus that particular area will become dark compared to others. The LCD works on the principle of blocking of light.



Fig.3.5 16x2 LCD

E. Global Positioningn System (GPS)

The Global Positioning System (GPS) is a satellite based navigation system that can be used to locate positions anywhere on earth. Designed and operated by the U.S. Department of Defense, it consists of satellites, control and monitor stations, and receivers. GPS receivers take information transmitted from the satellites and uses triangulation to calculate a user's exact location.



Fig. 3.6 GPS module

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F. ZIGBEE

ZigBee is a specification for a suite of high level communication protocols used to create personal area networks built from small, low-power digital radios. ZigBee is based on an IEEE 802.15 standard. Though low-powered, devices often transmit data over longer distances by passing data through intermediate devices to reach more distant ones, creating a mesh network; i.e., a network with no centralized control or high-power transmitter/receiver able to reach all of the networked devices.



Fig.3.7 Zigbee Module

G. Speaker(APR9600)

The APR9600 device offers true single-chip voice recording, non-volatile storage, and playback capability for 40 to 60 seconds. The IC is 28 pin device used to record & playback of maximum of 8 messages.

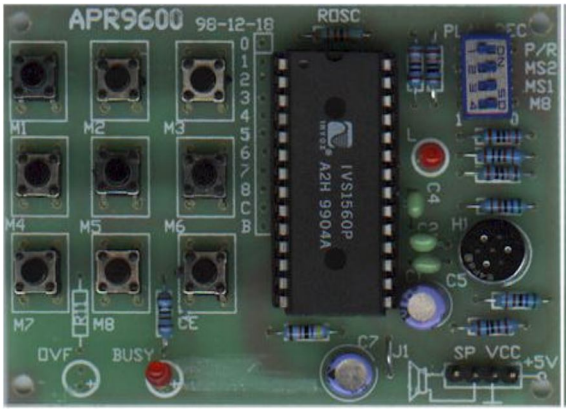


Fig.3.8 Speaker

H. ESP8266 IOT Module

These modules include 1MB (8Mbit) of flash memory, twice the size of the older blue colored ESP-01 module. The ESP8266 Serial/UART to WiFi module is a great way to connect your Arduino or other microcontroller projects to a WiFi network.

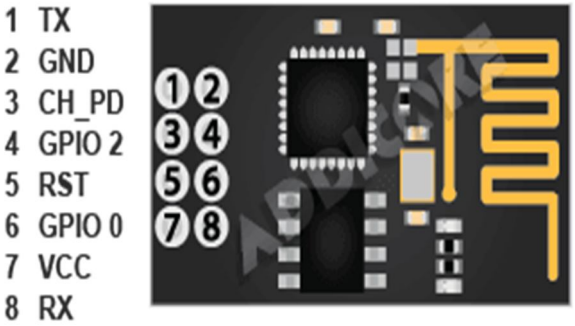


Fig.3.9 ESP8266 IoT module

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VI. RESULTS

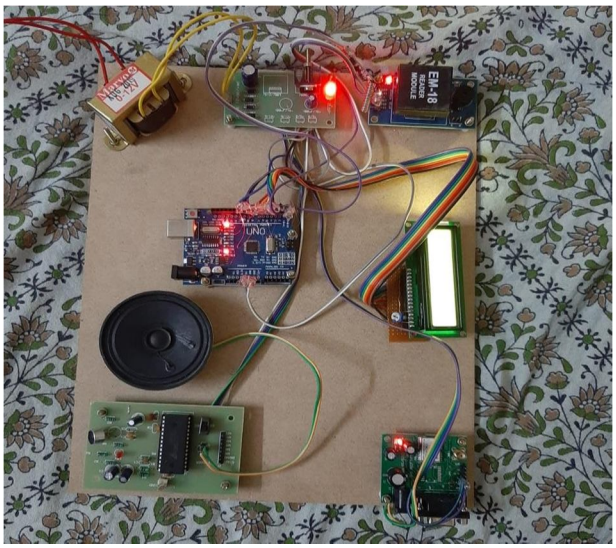


Fig.4.1 Bus stop section

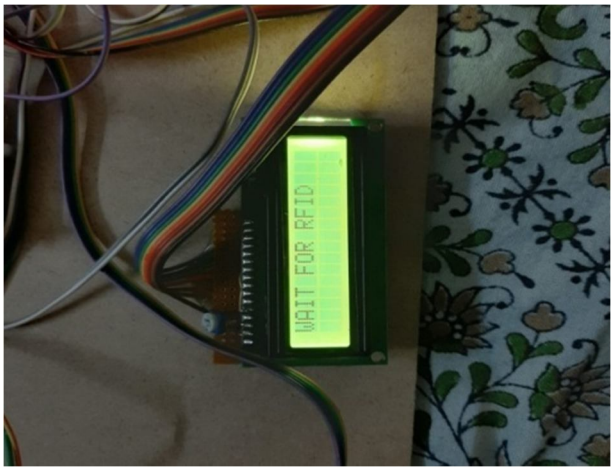


Fig.4.2 Displaying the data of RFID

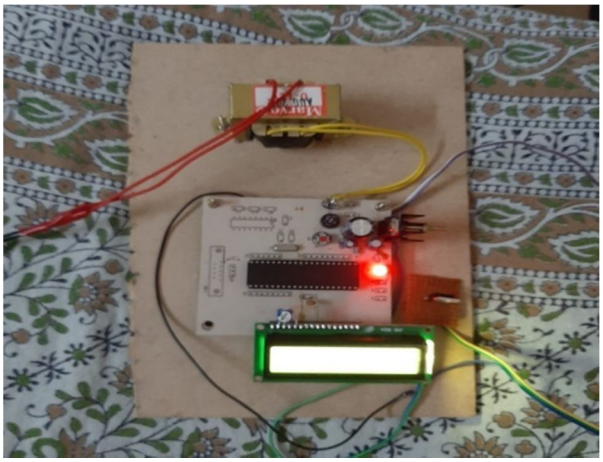


Fig.4.3 Control section

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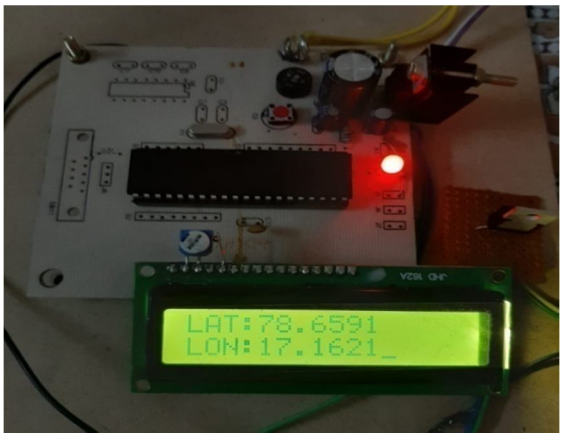


Fig.4.4 Displaying the bus coordinates

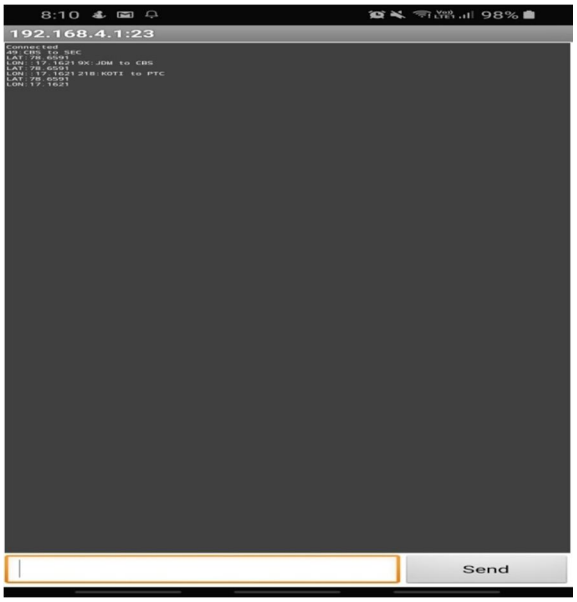


Fig.4.5 Displaying the bus location using IoT module

VII. FUTURESCOPE AND CONCLUSION

A. Futurescope

In the research work, design and development if a low cost transportation management system based on integration of RFID and GPS data is described. The system makes use of various modules which are wirelessly linked with GPS modems, This service provides the user with the information about location of desired buses so that the user can adjust his schedule accordingly. This technology outdates the need of waiting at the bus-stop thus saving a lot of time. Displays are used at a bus-stop to let passengers know the expected time to arrive and bus locations coming towards that stop. The system made such that it can also handle the emergency situations such as un-utilization of buses and waiting time at the bus station will be reduced. So, both bus station administrators and passengers will benefit from the system as real time information is provided.

B. Conclusion

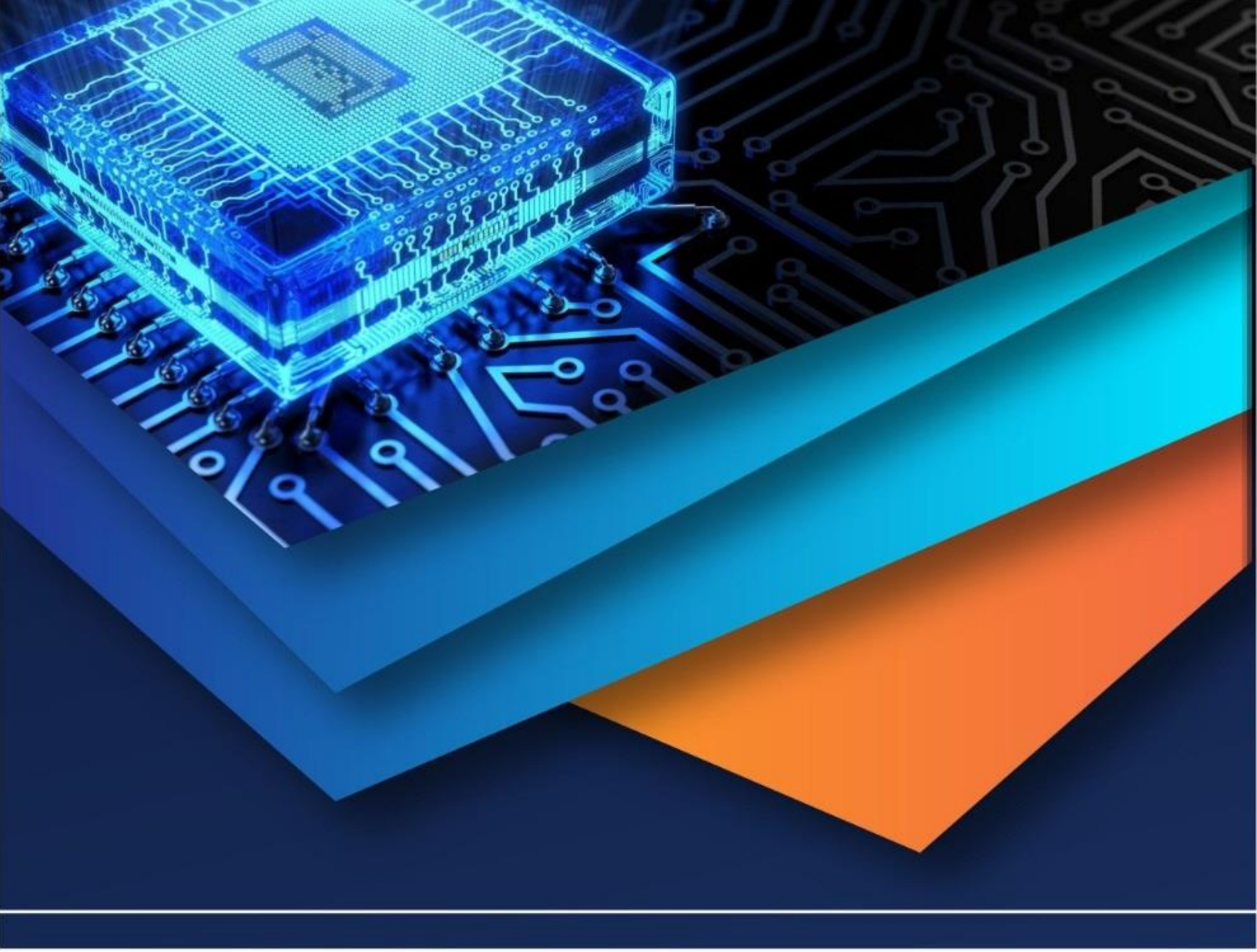
The proposed system is based in a methodology V2I, where each transport unit transmits its location to the central station through the wireless sensor network improving the transport system efficiency. A Zigbee network performs efficiently because it has an acceptable coverage range, is scalable due to the number of devices that can be part of it and mesh topology allows to obtain a flexible network in which the coordinator device is responsible for accepting new devices to the network in an easy way, assigning to the new devices a unique address within the network.

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