

## **GSM Based Real Time Bus Arrival Information System**

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**ABSTRACT:** This paper presents the prototype implementation of a real-time bus arrival information system. The system focuses upon real-time bus operations information which includes the current location and estimated arrival time at the next stop, and distributes this information to the public in an effort to reduce passenger waiting time. Vehicle-mounted units and bus station units comprise the system. The vehicle unit reports the current position of the vehicle to the bus station unit and this information is displayed to passengers at the stop using station units. The prototype is implemented using ATmega8 microcontroller and GSM module, and tested in a campus environment with two wheelers emulating buses.

**Keywords:** A Bus Arrival information system, ATmega8 microcontroller, GSM, USART, Passenger Information Systems

### **I. INTRODUCTION**

The transportation in India fails to follow the scheduled timetable and puts the common man in trouble. A person sitting inside a bus stop is unable to get the information where the bus has reached. These passengers often faces difficulty in taking the decision of whether it would be quicker to wait for the next bus or to walk or to hire a cab/rickshaw to reach his/her destination. Every day we see people going late to work, students late to their classes, just because they decide to wait for the bus instead of just using an alternate transportation. If passengers had an easy way to see which bus is near to their location and approximate time it would take to reach the stop, in real-time, they could make a more accurate, informed decision of whether or not to wait at a stop. The scope of this paper is to build a system where a person inside the bus station can get the information of the bus's current position and the approximate time it will take to reach the next station.

The GSM based Real Time Bus Arrival Information System is a discrete system that displays the location of the bus and the time it takes to reach the station. This system is design in such a way that, when the bus driver presses a pushbutton as he reaches a station, the information regarding the current location of the bus and the time will be transmitted by a transmitter mounted on the bus. This information is received by a receiver and displayed on the LCD screen, which are installed in all the bus stations in the city. This system there by alleviates the passenger's indecision to wait for the bus or to take an alternate means of transportation. The GSM based Real Time Bus Arrival Information System would not only be a helping hand to the people of India, but also would be a great improvement to the Transportation services in India.

### **II. LITERATURE SURVEY**

Most real time arrival systems, currently in use, are completely web based applications. For example, 'Next Bus' a popular bus tracking service in United States provides the passenger with a website where he/she can login to find out the location of the buses and textual time estimates projecting the next bus arrival at a particular stop. These displays are often misleading since there is no clear indication of where the bus is actually located and whether there are potential delays. Moreover, the technologies used require GPRS or web connected device with the passenger, which only few of the passengers have. The project will help the passenger to find out all the information without any expense required.

Lin and Zeng [4] proposed a set of bus arrival time prediction algorithms for a transit traveler information system implemented in Blacksburg, Virginia. Four algorithms were introduced with different assumptions on input data and were shown to outperform several algorithms from the literature. Their algorithms, however, did not consider the effect of traffic congestion and dwell time at bus stations. Kidwell [3] presented an algorithm for predicting bus arrival times based on real -time vehicle location. The algorithm worked by dividing each route into zones and recording the time that each bus passed through each zone. Predictions were based on the most recent observation of a bus passing through each zone. This algorithm couldn't work in large cities where both travel time and dwell time could be subject to large variations.

### **III. ARCHITECTURE AND IMPLEMENTATION**

The main part of GSM based Real Time Bus Arrival Information System are bus module and station module.

**3.1 Bus Module**

This module is installed inside the bus. It mainly consists of a user interface for the driver, a control unit, and a GSM module. The user interface consists of a simple switching mechanism like a push button which is used to give a logic high signal to the control unit. The driver is required to use this switching mechanism on arrival at each bus station thereby signaling the control circuit that the station has been reached. It also has indicator LEDs which are used to show the status of the module. It also has an emergency reset button for resetting the whole module in case of emergency. The control unit consists of ATmega8 microcontroller circuitry which processes the user input thereby finding the current position of the bus and generating a unique control word which is to be send to the coming bus stops. The control word will be generated based on the bus number and the current position of the bus. It then transmits this control word serially to the GSM module using USART [7]. SIM 300 GSM module acts as the link between the bus and bus stations. It sends the control word generated by the control unit as text messages to station module present in the coming bus stops. The power supply for the bus module is taken from the 12V DC supply from the vehicle battery. This is then connected to LM7805 [8] to get a stable 5V DC supply to the bus module. The whole circuitry provides enough current to power the device load.

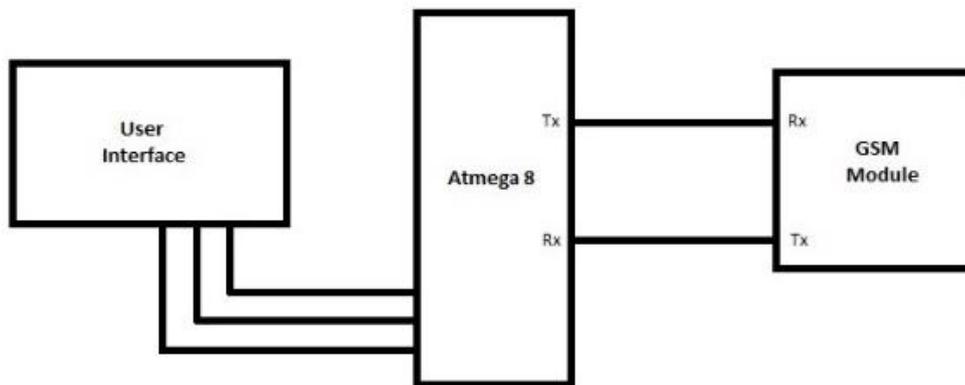


Fig. 1 Block diagram of the bus module

**3.2 Station Module**

This module is installed inside each bus station and consists of a GSM module, control unit and a LCD display. The GSM module receives the control word send by the bus module and signals the control unit. On reception of command from the control unit it transmits the control word to control unit through USART. Just as in the bus module an ATmega8 microcontroller is used as the control unit. On receiving the signal from the GSM module it sends the command for fetching the message which is stored in the SIM card present in the GSM module. Based on the control word the control unit finds the bus number and its position which will be displayed on the LCD.

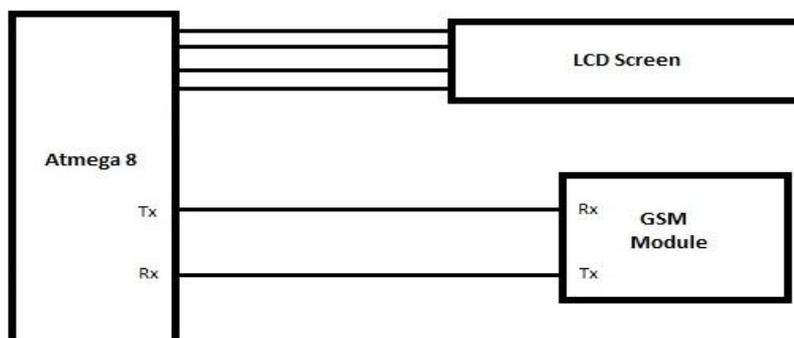


Fig. 2 Block diagram of station module

**IV. RESULT AND DISCUSSION**

Thus a bus running in a particular route will have a transmitter module installed inside it. This transmitter module is what sends the data of the location of this particular bus. Since GSM module is used in both transmitter and receiver module every module will have a unique number. To explain the working of the whole system let us take the map of Coimbatore city. In this map we will mark four points (bus stops) A, B, C and D. A is the starting point of the bus. From the starting point, the bus conductor/ driver presses the push button provided in the transmitter module inside the bus. This will increment a variable in the module corresponding to a particular location. This variable is now sent as a text message to the bus stops B, C and D. When the receiver module in the points B, C and D receives this variable the corresponding information about the bus i.e. it is now at point A will be displayed on each of the LCDs. When the bus reaches point B, the bus driver/ conductor again presses the push button and this will increment the variable corresponding to point B. This variable is now transmitted to the point C and D. Again upon receiving this variable at point C and D. It will be displayed on the LCD that the bus has now reached point B. This will continue till the bus reaches the point D.

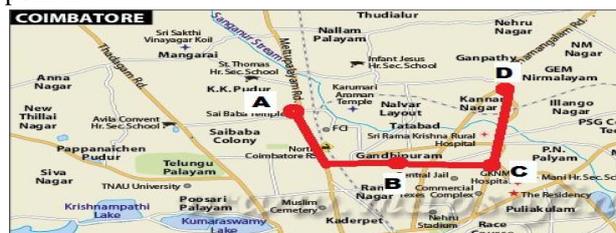


Fig. 3 Bus route of Coimbatore city where the GSM based RTBAIS will be deployed



Fig. 4 LCD display showing the current position of the bus and expected time

## V. CONCLUSION

The literature review, survey and the implementation of GSM based Real Time Bus Arrival Information System yielded the results that the deployment of real-time bus arrival information systems need a complete analysis of financial, technical, institutional, and organizational issues[5]. A feasibility study should be conducted in the area to be deployed before considering a real-time information system. It was also acknowledged that making the system a success would require significant training and cultural change. In this paper, the partial implementation details of GSM based Real Time Bus Arrival Information System are stated. The GSM based Real Time Bus Arrival Information System tracks the current location of all the buses and displays their arrival at different stops in their respective routes. This research serves the needs of passengers, vehicle drivers and administrators of the transport system. With the advent of GPS and the ubiquitous cellular network, real time vehicle tracking can be made better [5].

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