Mini Project Report

On

"Traffic Monitoring System"

Submitted for partial fulfillment of the degree of

B.E. (Computer Technology)

By

Amit Prakash

Gaurangi Wanjari

Kawaljot Singh Bagga

Under the Guidance of

Prof. A.R.PATIL

Department of Computer Technology

Yeshwantrao Chavan College of Engineering, Nagpur

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CERTIFICATE

This is to certify that the Mini Project titled

'Traffic Monitoring System'

is submitted

By

Amit Prakash

Gaurangi Wanjari

Kawaljot Singh Bagga

of 6th semester in the partial fulfillment of the Bachelor Degree of Engineering in

Computer Technology *during the academic year* ***2009-2010.***

(Prof. A. R. Patil)

Guide

(Dr. Manali Kshrirsagar)

Head, Computer Technology Dept.

ACKNOWLEDGEMENT

A project work is a test of many qualities in a person, the ability to form goals, stick to a tight schedule, crisis management and overall ability to be a team player. As young students of engineering, who have not yet faced the grind of the industry, we have learnt many things, both the easy and the hard way from a host of people.

We are thankful to **Prof. A. R. Patil** who gave us an opportunity to explore the new dimensions in embedded systems and helped us develop our project.

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Amit Prakash
Gaurangi Wanjari
Kawaljot Singh Bagga

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Chapter 1. Problem Definition and Abstract

Problem Definition

Develop a prototype model for a system that monitors and collects information about the vehicles which cross the speed limit as per traffic rules. System should record the vehicle number and its speed that exceeds the speed limit at the places of interest.

Abstract

This project is aimed at developing a prototype model for Traffic Monitoring System which can monitor the vehicles which crosses the speed limit at squares, highways and at the sensitive locations where speed limit is imposed by the Traffic Department.

It is often found that managing road traffic is quite difficult job. In spite of big efforts of the traffic department, it is difficult, especially in night, to catch the drivers who cross the speed limits at the squares.

This Traffic monitoring System helps traffic department to catch the drivers who cross the speed limits at the places where speed limit is imposed.

It includes an embedded system which will transmit the vehicle number and its speed which can be received by the receivers at the places of interest. Received data, vehicle number and its speed, may be transmitted for further processing. System stores the vehicle number and calculates speed continuously. It will be able to transmit vehicle number and speed information when comes in the range of receiver at any point of time irrespective of differences in road traffic during day and night time.

Chapter 2. Introduction and Literature Survey

Introduction

The automotive technology is gaining importance in modern road traffic control system, since the number of vehicles and passengers are rapidly growing. There is a critical need for safety in the traffic automation. Traffic engineering makes the dynamic or static analysis and the synthesis of automotive vehicle technology possible.

The traffic monitoring system prototype model described here comprises of a transmitter module and a receiver module. The transmitter module has a set of IR sensors for providing signals, a processor unit for processing these signals to determine vehicle speed and a RF transmitter-receiver pair controllable by the processor unit. The processor unit stores data specific to the vehicle and uses this information and the specific parameters measured for the vehicle for further processing by sending it to receiver module of the system.

The receiver module also has a RF transmitter-receiver pair for establishing wireless communication with the transmitter module. The processor unit of the receiver module checks the received speed information for violation. It also has a level convertor for interfacing the receiver module with a computer. Whenever a vehicle with speed violation is detected, the vehicle information along with the speed information is sent to the computer via the convertor for further processing.

Literature Survey

The Hungarian national Office for research and technology supports the design for intelligent traffic system. They are working on the project “Advance Vehicles and vehicle-control knowledge center”.

The project supports the development of reliable and optimal control structures for urban traffic and for motorway systems. The intelligent and cooperative set-up of actuation and its linkage to the central control system is vital for avoiding traffic jams and accidents. Moreover, environmental costs (e.g. pollution) can be decreased. The control architecture of system is shown in Figure 1.

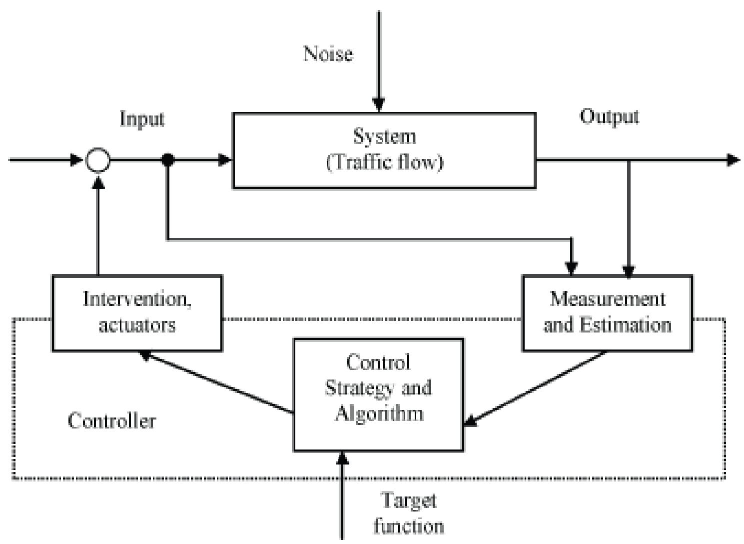


Figure 1: General traffic management and control structure.

Different technologies are used to automate the traffic control system. New Delhi has an underground control room from where the policing of the city is done using sophisticated technology.This Traffic Monitoring System has been installed at vulnerable locations to achieve monitoring and control incident detection, traffic data acquisition and traffic violation recording. High resolution digital IP cameras have been installed at the locations, which are remotely controlled and capture the flow of traffic and abnormal incidents.

Images in real time are transmitted through high band-width optical fiber-based network to control room where the monitoring system has a mechanism to analyze the transmitted data. The system has high performance digital video recording with advanced video contents analytics including motion and abnormal event detection, intrusion detection and stationary vehicle detection.

However, this system, of taking snapshot, is inefficient in monitoring all the vehicles. As the sizes of all vehicles are different due to which it is not possible to capture the image of vehicles of different sizes. This system requires no. of cameras at different angles to capture image at one traffic pole. This way of monitoring vehicles is costly as these cameras are little expensive. In spite of placing all these cameras, these may not work in night efficiently.

Fig 2a

Fig. 2b

Figure 2a shows a camera installed on a traffic pole.

Figure 2b shows a traffic signal pole.

In another approach of Intelligent Traffic Management System , it is found that Traffic movement on any road is not the same throughout the day. The problem with pre-programmed signals at red-light junctions is that occasionally vehicles pile up in one of the arms, while the signal is green for an empty road. Hence, at every red light, screens are used to display the traffic situation ahead . For this, various detectors are put up for controlling the signals.

These detectors help in controlling the traffic dynamically. On the anvil are video detectors, loop detectors and radar detectors. Video detectors visually assess the vehicle load and control the signal. For further help, loop detectors are used, which are put under the surface of the road and control traffic signals according to the weight on it at any point of time. Radar detectors work according to the sound of vehicles.

Again the system is costly due to the use of a number of high performance intelligent devices.

The Traffic Monitoring System in Korea has a solution which comprises a great number of cameras installed in various highway areas, streaming servers, encoding servers, admin web and client web sites. Video data are transferred via RTSP protocol. It uses industry advanced H.264 compression.

The cameras track the road conditions and report this information to encoding servers. Users from the Client web site send inquiries for viewing some cameras. These demands are transferred to the streaming servers located in various geographical areas of the country. The streaming servers address the encoding servers for the information of the specified cameras and the encoding servers send the required information.

Highway admin web serves for viewing, controlling and modifying the parameters of all the components of the traffic surveillance system like cameras, streaming and encoding servers, as well as viewing the information coming from various monitoring regions and highway areas.

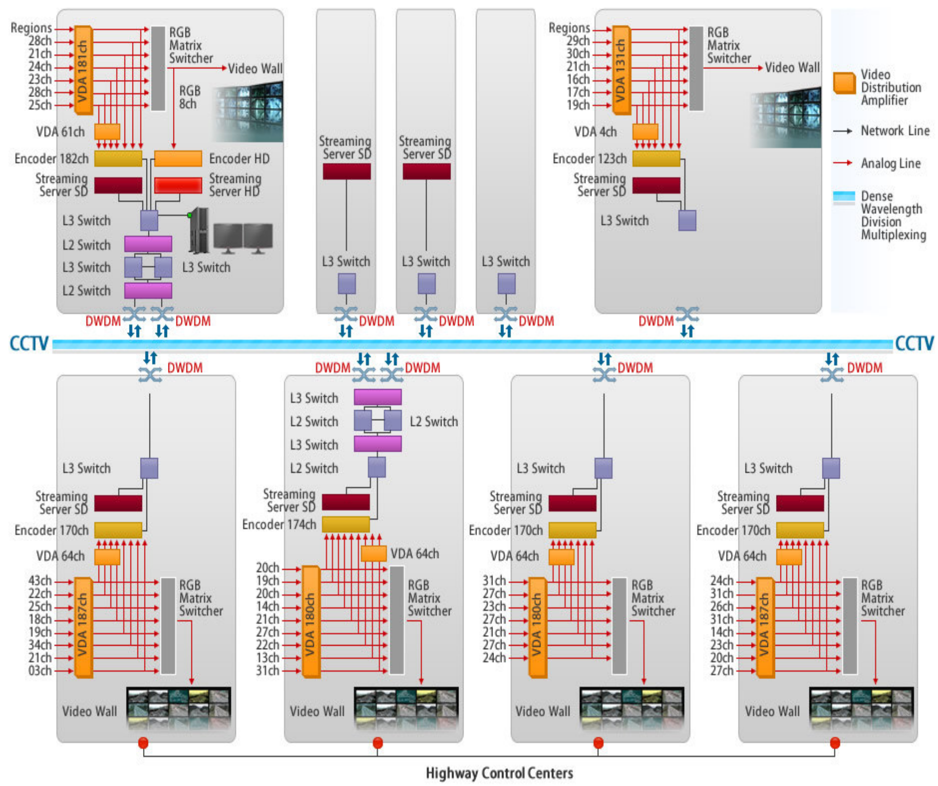


Figure 3.Diagramatic representation of traffic monitoring system in Korea.

Chapter 3. Research Methodology

Transmitter Module Circuit

The transmitter module is implemented as an embedded system. The processor used for this module is AT89C2051.Below is the circuit diagram for this module.

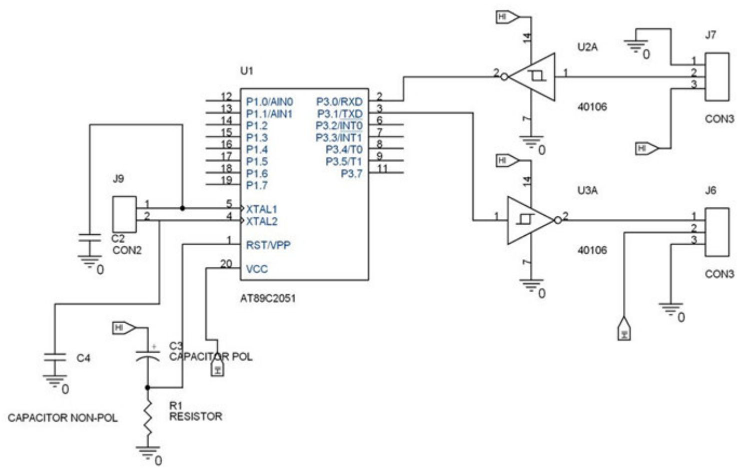


Fig. Circuit Diagram of Transmitter module

Circuit description

Sr. no.	PIN no.	Description
1.	4,5 of AT89C2051	Crystal oscillator is connected to provide clock frequency to the microcontroller.
2.	3 of AT89C2051	TXD connected to RF transmitter.
3.	2 of AT89C2051	RXD connected to RF receiver.

Receiver Module Circuit

The receiver module is implemented as an embedded system. The processor used for this module is AT89C51.Below is the circuit diagram for this module.

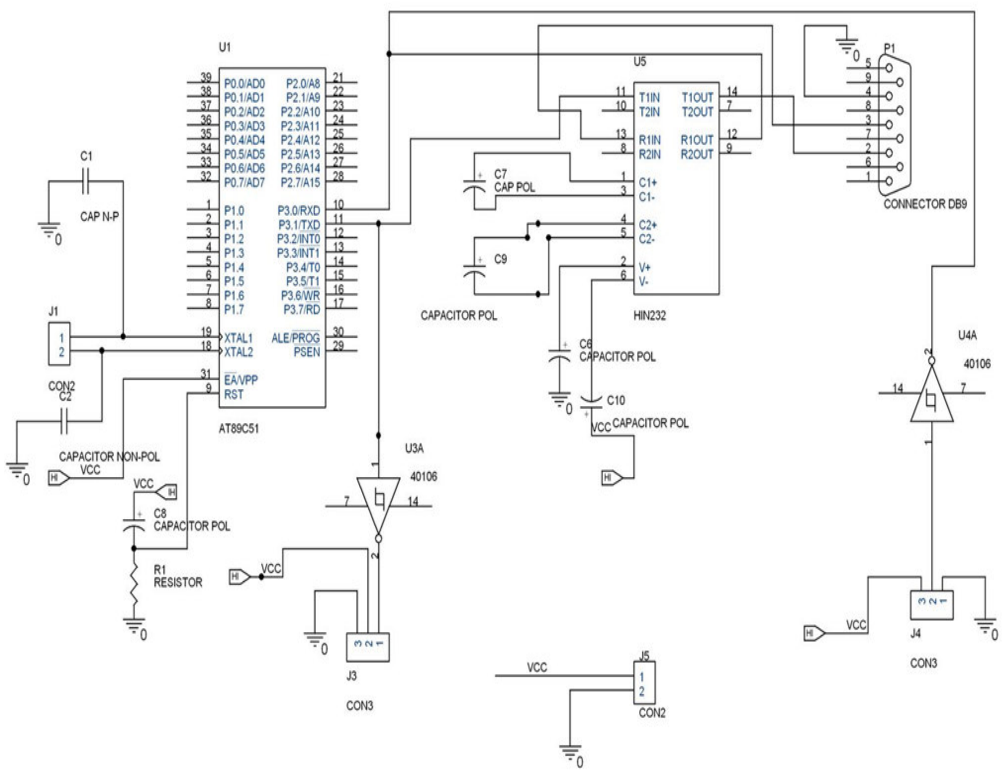


Fig. Circuit diagram of Receiver module

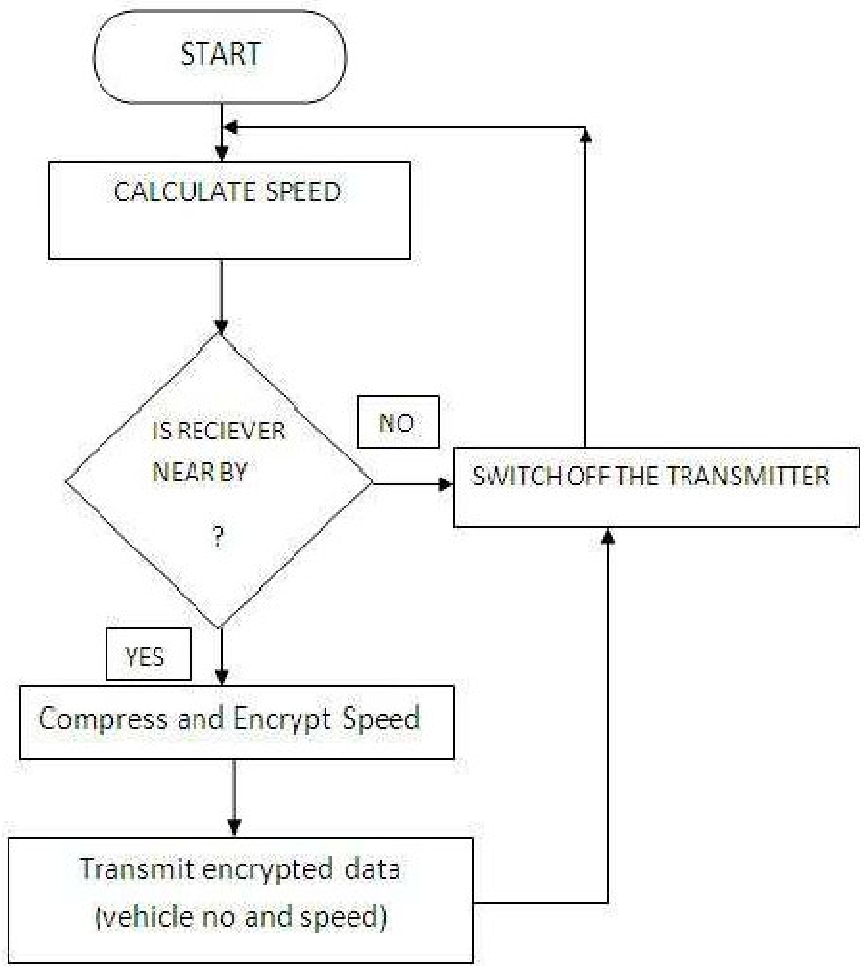
Circuit description

Sr. no.	PIN no.	Description
1.	18,19 of AT89C51	Crystal oscillator is connected to provide clock frequency to the microcontroller.
2.	12 of AT89C51	#INT0 connected to IR sensors.
3.	11 of AT89C51	TXD connected to RF transmitter and to pin 11 of MAX 232.
4.	10 of AT89C51	RXD connected to RF receiver and pin 12 of MAX 232.
5.	13,14 of MAX 232	Connected to com port of computer

Chapter 4. Design (Data Flow and Structure Flow)

Transmitter Module

In this module, embedded system which is to be embodied in prototype model of the vehicle is developed. Module is microcontroller based and will store the vehicle number on which it is installed.



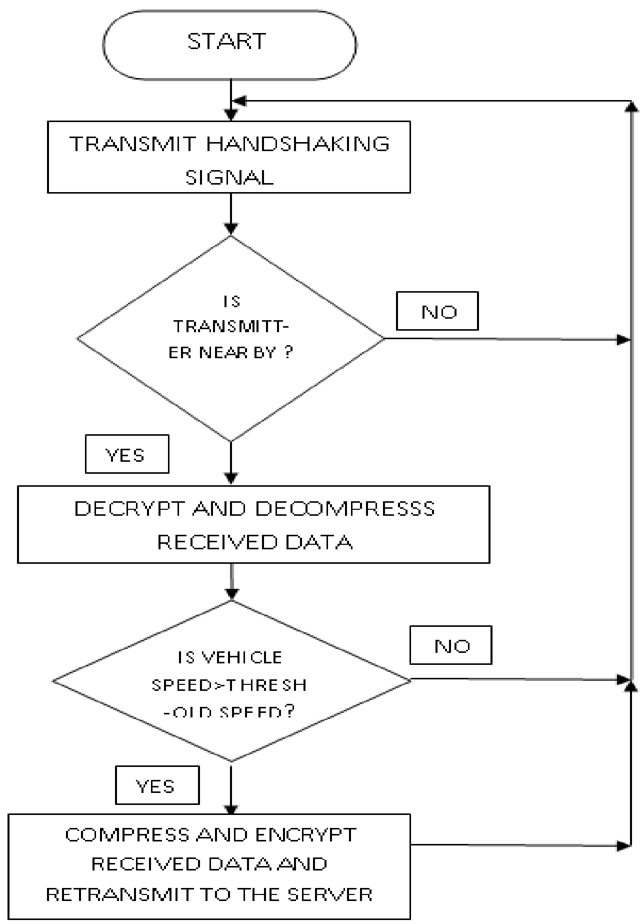
Flowchart of transmitter module

Microcontroller will continuously calculate the speed of the vehicle with the help of IR-slotted sensors mounted on the wheels of prototype model of vehicle.

It also contains a transmitter of a specific frequency which will transmit the stored vehicle number and its speed. System will also contain a receiver which will sense the receiver and then it will activate the microcontroller and transmitter to work. This receiver will enable the system to transmit the data when it will be in the range of receiver.

Receiver Module

In receiver module, an embedded system having receiver module is developed. This is a separate microcontroller unit which is placed at different squares for reception of transmitted data from vehicles. System will check the speed of the vehicle and if it exceeds the threshold speed, at which it is set, it will transfer data (vehicle number and its speed) to a computer for further processing. It has a transmitter which continuously transmits pulses of specific frequency. When any receiver in the transmitter module detects this signal, it turns on for its operations.



Flowchart of receiver module

Chapter 5 - Implementation Details

Requirements

Software Requirements

1. Windows XP
2. ORCAD
3. RIDE

Hardware Requirements:

1. Microcontrollers-8051 family.
2. RF Transmitter-Receiver Pairs.
3. IR Slotted Sensors.
4. Level Convertor.

Transmitter Module

The transmitter module is implemented as an embedded system. The micro-controller used for this module is AT89C51.

In this module, embedded system which is to be embodied in prototype model of the vehicle is developed. Module is microcontroller based and will store the vehicle number on which it is installed. Microcontroller will continuously calculate the speed of the vehicle with the help of IR-slotted sensors mounted on the wheels of prototype model of vehicle. It also contains a transmitter of a specific frequency which will transmit the stored vehicle number and its speed. System also contain a receiver which will sense the receiver and then it will activate the microcontroller and transmitter to work. This receiver will enable the system to transmit the data when it will be in the range of receiver.

Receiver Module

Technical specifications of components used

3.1.1. IC-AT89C51 and IC-AT89C251 features

- Compatible with MCS-51™ Products
- 4 Kbytes of In-System Reprogrammable Flash Memory
- Endurance: 1,000 Write/Erase Cycles
- Fully Static Operation: 0 Hz to 24 MHz
- Three-Level Program Memory Lock
- 128 x 8-Bit Internal RAM
- 32 Programmable I/O Lines
- Two 16-Bit Timer/Counters
- Six Interrupt Sources
- Programmable Serial Channel
- Low Power Idle and Power Down Modes

These are microcontroller ICs belonging to 8051 family of microcontrollers compatible with MCS-51 Products. Since they operate at avery low voltage of 5 Volts they are ideal for our project. They have 4 Kbytes of In-System Reprogrammable Flash Memory . This feature of the ICs helps in programming as well as re-programming of memory so as to vary traffic rule specifications contained in the memory as per requirement.

Two 16-Bit Timer/Counters present in the IC chip eliminates need for external timers required in the calculation of speed as well as in data transfer operations.Of the available six interrupt sources available in IC, one is used by IR sensors to generate pulses.Programmable Serial Channel is used for communication with a computer.

3.1.2. RF transmitter-receiver pair features

- Range: 328 feet [100 meters]
- Input: 110 - 240V AC
- Power: 500W
- Channels: 2
- Signal coding: 4 bits
- Static current: = 6mA
- Sensitivity: > = -95dB
- Frequency: 433MHz
- Working modes: toggle

- Unit dimensions: 8.5 x 4 x 2.3cm [3 x 1.5 x 1”]

These RF transmitter-receiver pairs are used for the purpose of establishing wireless communication between transmitter and receiver modules of the system. They operate at 433Hz frequency which is ideal for communication within the system since it is out of audible range as well as ranges of widely used different communication devices.

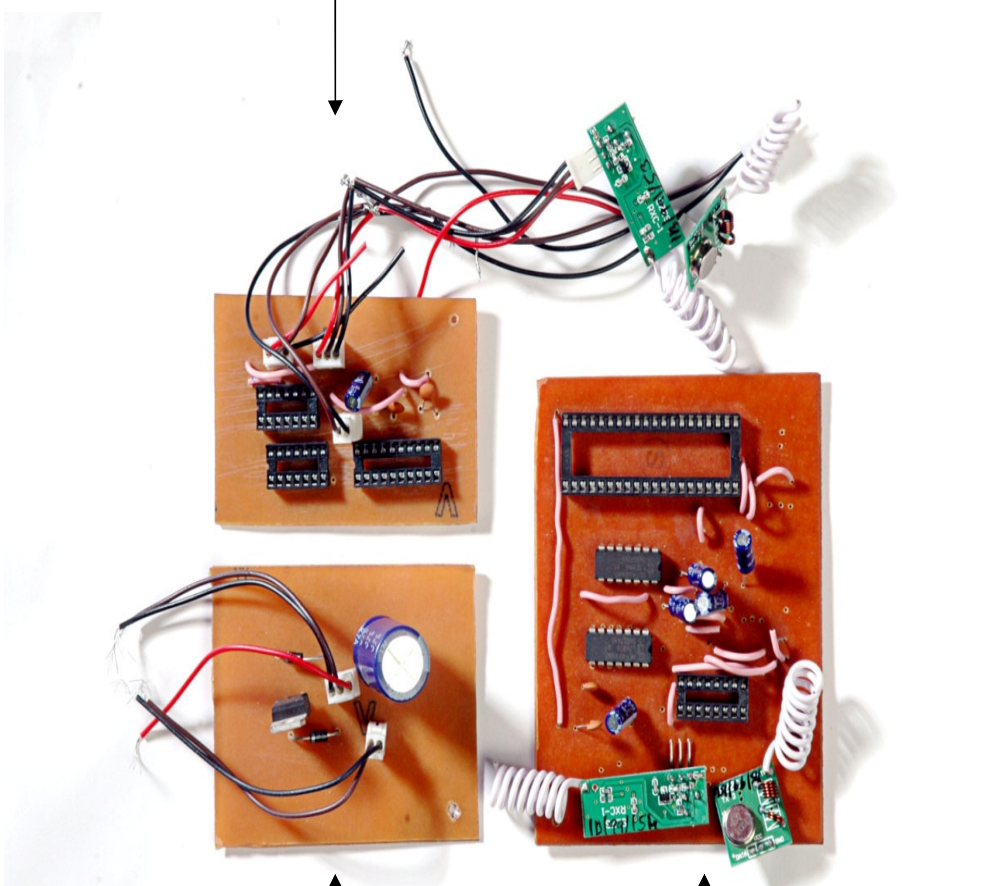
3.1.3. MAX 232 Level Convertor features

- Operates From a Single 5-V Power Supply
- Has 1.0-uF Charge-Pump Capacitors
- Operates at up To 120 kbit/s VS+
- It has two drivers and two receivers
- Low supply current is 8 mA
-

The MAX232 is a dual driver/receiver that includes a capacitive voltage generator to supply voltage levels from a single 5-V supply. Each receiver converts inputs to 5-V TTL/CMOS levels.
These receivers have a typical threshold of 1.3 V, a typical hysteresis of 0.5 V, and can accept ±30-V inputs.
This component helps in the transfer of vehicle and speed information from receiver module to a computer port.

Snapshots

Transmitter module



Power Supply

Receiver module

Snapshots of Transmitter module simulation

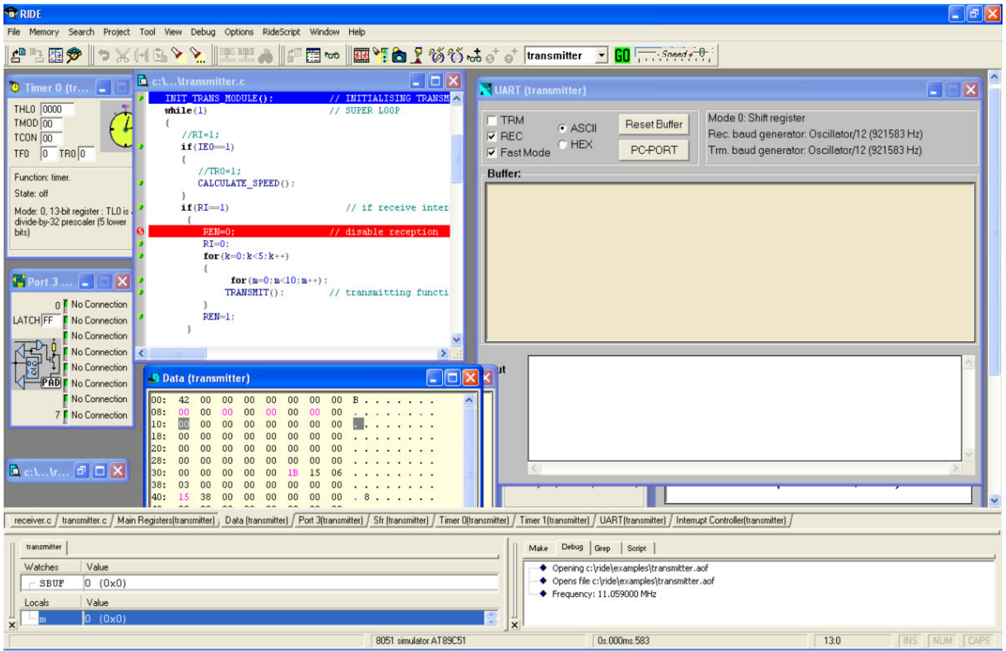


Fig. Serial Buffer is empty

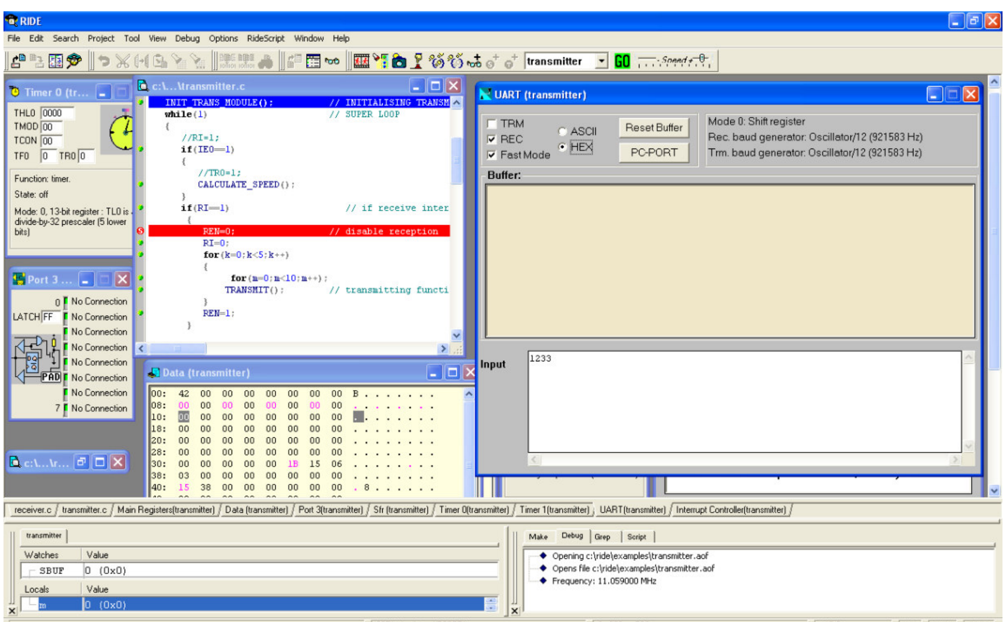


Fig. Input given to buffer

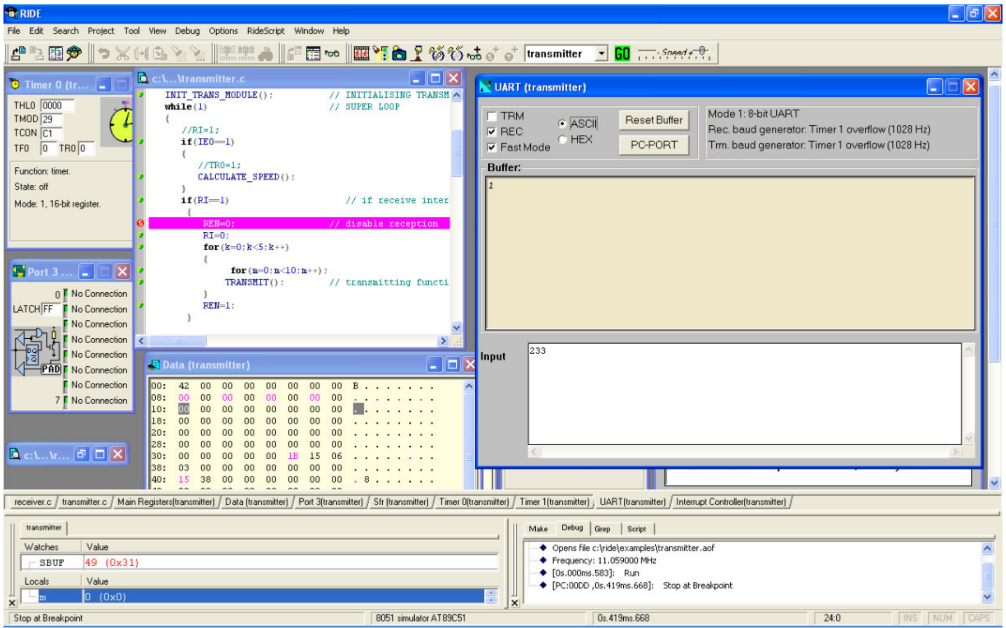


Fig. Data received by the module in SBUF

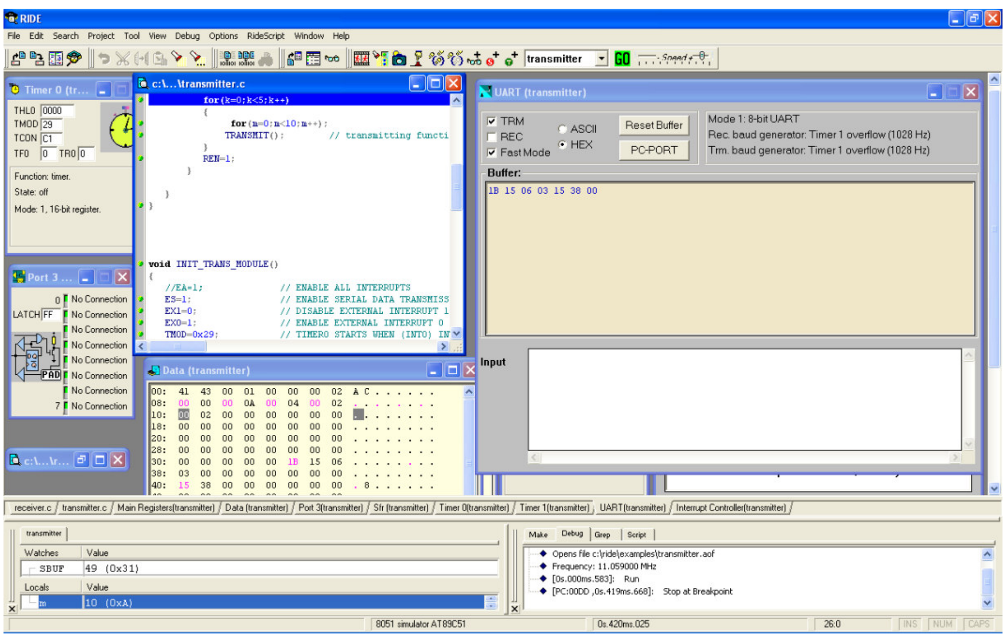


Fig. Transmission started, after receiving handshake signal from receiver module, from SBUF

Snapshots of receiver module simulation

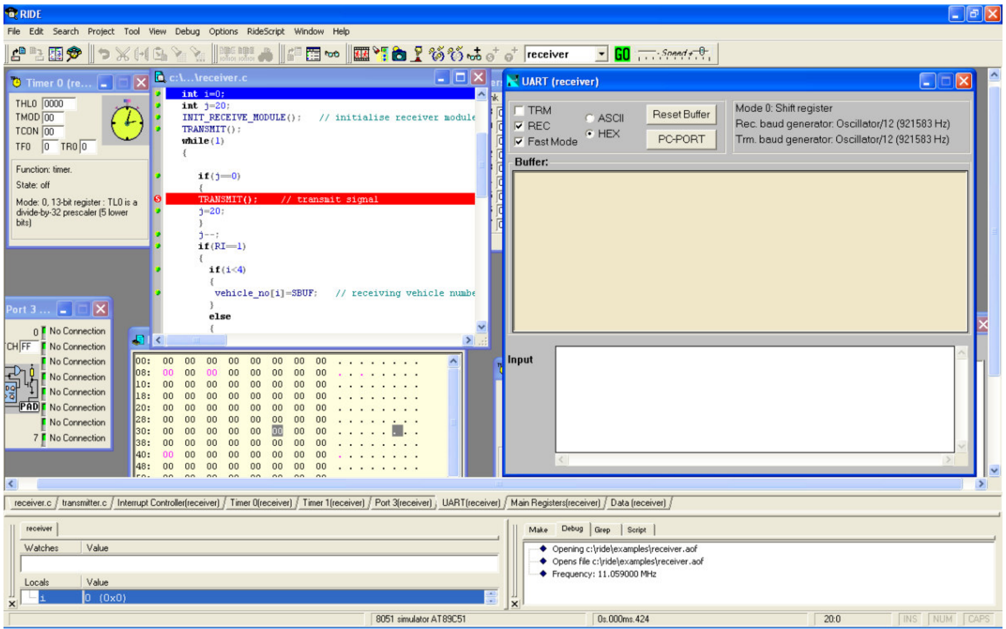


Fig. Buffer of the module is empty initially

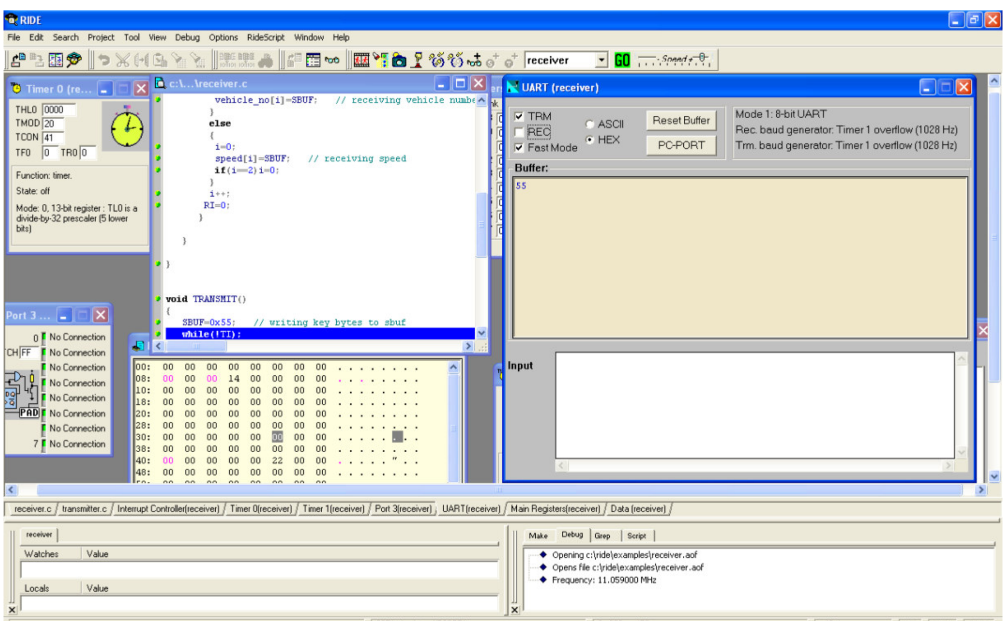
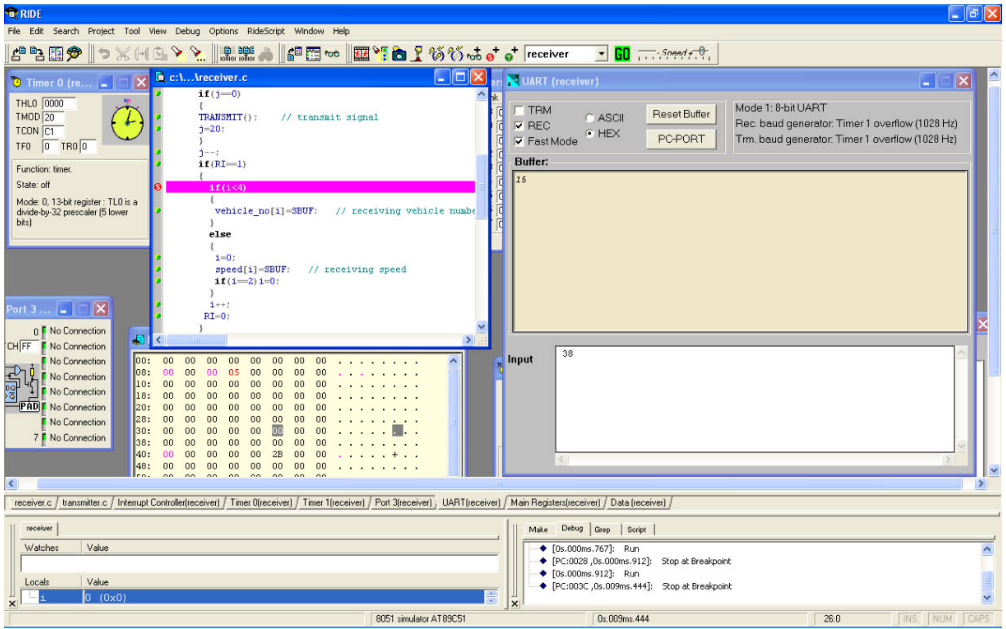


Fig. Handshake signal transmitted through Buffer



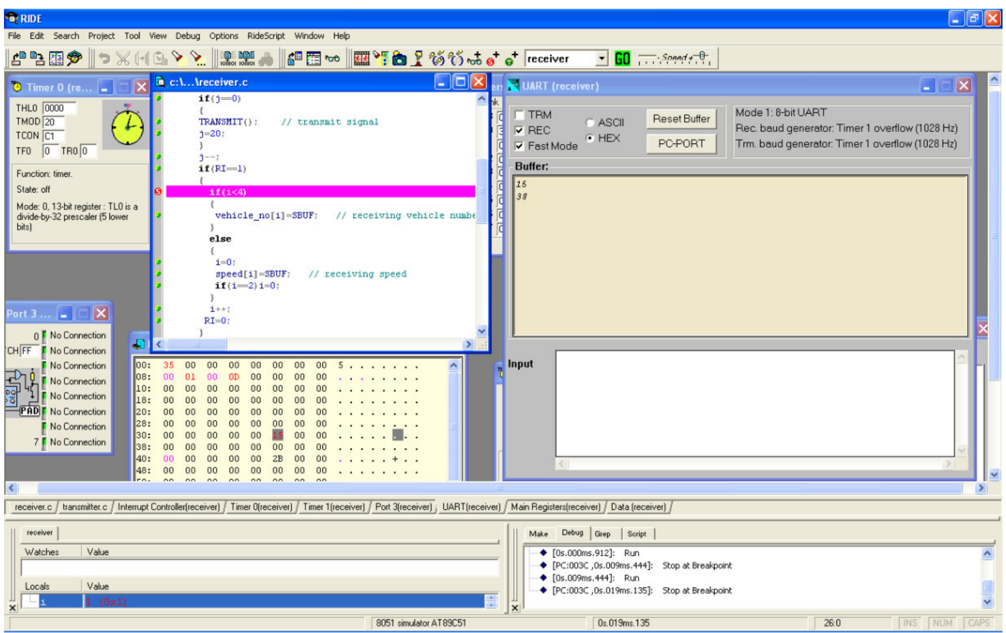


Fig. Data received coming from transmitter module through buffer

Conclusion and Future Scope

Conclusion

The remarkable advances in computers, communications, electronics, control, and other related technologies have found important applications in the traffic monitoring system.

This project uses applications of these technologies in building a wireless traffic monitoring system using embedded systems. This project demonstrates effective incorporation of new information and communication technologies to implement road safety activities in a better way. Modern traffic systems can readily take advantage of innovation in computing and communications, utilizing inexpensive and easy-to-configure wireless systems
to enable real-time high-speed data collection to support the traffic department in a wide range of traffic control activities.

Future Scope

The traffic rule violations are not limited to speed violation. The proposed monitoring system can be further extended to other violations like signal-crossing violation and zebra-crossing violation. Signal violation can be monitored using directional receivers and light sensors.

The zebra crossing violation can be determined by sensing a virtual line drawn at zebra crossings.

The receiver module in the system developed consumes power from an A.C source. This can create a disturbance or lead to a breakdown of entire traffic monitoring process when there are power failures. However, in future, system can be developed which is entirely driven by solar energy through the use of solar cells.

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Publications

PUBLICATIONS

Sr. No	**Authors**	**Title of paper**	**Conference Name**	**Venue**	**Date**	**Pg No.**
National Conference :						
1. **2.** **3.**	Amit Prakash Kawaljot Singh Bagga Gaurangi Wanjari	Traffic Monitoring System	SPANDAN-2010 National Conference on Recent Trends in Engineering and Technology	Y.C.C.E. Campus, Wanadongri, Hingna road, Nagpur**.**	26/2/10	24