Synchronization of Traffic Signal

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Abstract:- This project is a unique idea about avoiding traffic jams and saving time, fuel and money. On many of the main roads and highways there are traffic signals. By the time, a car crosses one traffic signal, it enters into another. The same thing repeats for the following signals, resulting in wastage of fuel, time and money.To overcome this miserable situation, we are proposing a new project based on synchronization between two adjacent signals. Generally, all signals are controlled individually by means of separate ON/OFF switches to start signaling sequence. This creates a chaos as one traffic signal has no communication with its adjacent signal. In our project, we plan to create a synchronization between their operation. In spite of synchronization, if traffic jam occurs, a signal shall be sent to the previous traffic signal, warning the driver of the of the jam. This will also help to clear the traffic jam a lot faster as the drivers would then resort to alternative routes.

Keyword —8951 Microcontroller, Tactile bump sensor, Android Smart phone.

I. INTRODUCTION

Among the few things which characterize major, populated cities in our nation is the amazing local transport system, which mainly compromises of the Railways and equally important land transportation systems which regulates the proper functioning of the local trains almost round the clock. Taking into consideration the large amount of traffic commuting everyday on roads, the land transport system is responsible for safe and sound transportation of the people in this perennially busy city which never sleeps. We have come to announce an end to gridlock. For those who navigate on congested roads may soon have their problem of ever increasing travel time, solved, permanently.
Traffic in a city is very much affected by traffic light controllers. When waiting for a signal, the driver loses time and the car uses fuel.

II. Previous work

To make signaling more intelligent and efficient, we exploit the emergence of novel technologies such as communication networks and sensor networks as well as the use of more sophisticated algorithms for setting traffic lights. The Intelligent Traffic Control System is formed as a network of embedded systems to avoid or minimize in the least the problem of traffic jams. It thus, attempts to alleviate one of the most major problems our cities face in today's world.

III. OPERATOINAL CIRCUIT DIAGRAM

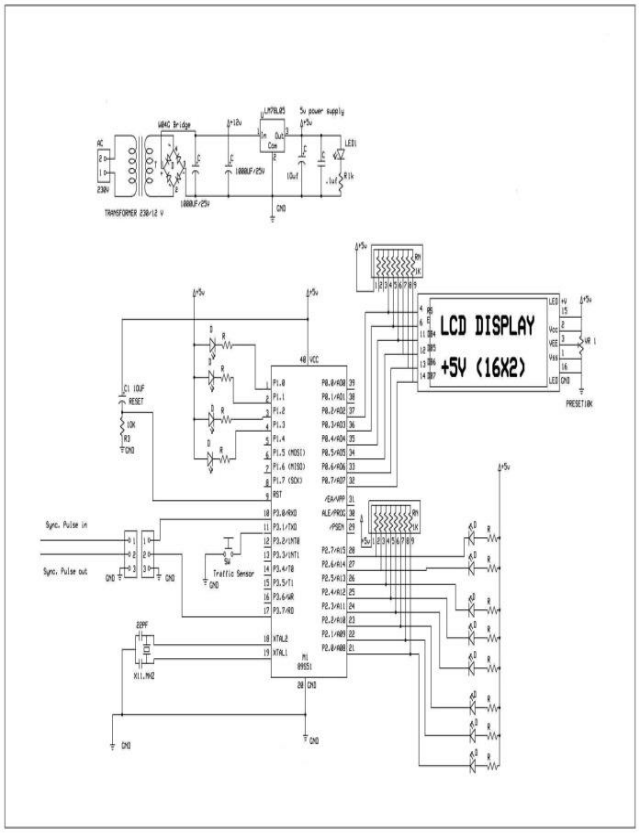

Fig. 1 Operational Circuit Diagram

To overcome the shortcomings of 8051, we use an In-System Programmable AT89S51 microcontroller which requires a 5V operating voltage. The VCC of 5V is connected to the last pin of the microcontroller IC while the pin number 20 is grounded.The pins 18 and 19 being oscillator pins have a crystal oscillator connected to them. The frequency of the crystal is 11 MHz. Two 22 pF capacitors connected with the crystal push the crystal into oscillation.The pin number 9 being the RESET pin is connected to a power ON reset which will reset the device whenever VCC is applied to the controller 8951.

A. The port 0 of the controller is connected to the 16*2 LCD in 4-bit mode in which 8-bit data is sent twice over the 4 bit connection. The project status will be displayed over the LCD.
B. The entire 8-bit port 1 and 4 bits of port 2 are connected to the red, yellow and green LED's representing traffic signal with common anode current limiting resistors.

C. To achieve synchronization between two signals, whenever a signal goes green, it will send a trigger to the next signal with the approximate time required to reach there. On receiving the trigger, the next signal will start its cycle in such a manner that it most probably goes green at the end of the time interval sent to it by the previous signal.

D. On being turned ON, a traffic signal will wait for the duration till it receives a 'sync pulse in' on its pin number 0 of port 3. After being turned ON and completing one cycle it will give out a 'sync pulse out' through the pin number 7 of port 3. Thus, while it will wait for the 'sync pulse in' only once, it will emit a 'sync pulse out' signal after the completion of its every cycle.

E. The pin number 1 of port 3 is connected to the traffic sensor. A tactical bump sensor is used in this case. Depending on the width of the pulse generated by the sensor, the traffic along the road between two sensors is judged. If a traffic jam is prevalent, a message shall be displayed over the LCD screen of the previous signal, informing drivers and asking them to detour.

F. A step down transformer is used to step down 230V supply to 12V which is further pulled down to 5V by the bridge rectifier and smoothed by the couple of filters on either sides of voltage regulator IC 7805.

IV. CIRCUIT COMPONENTS

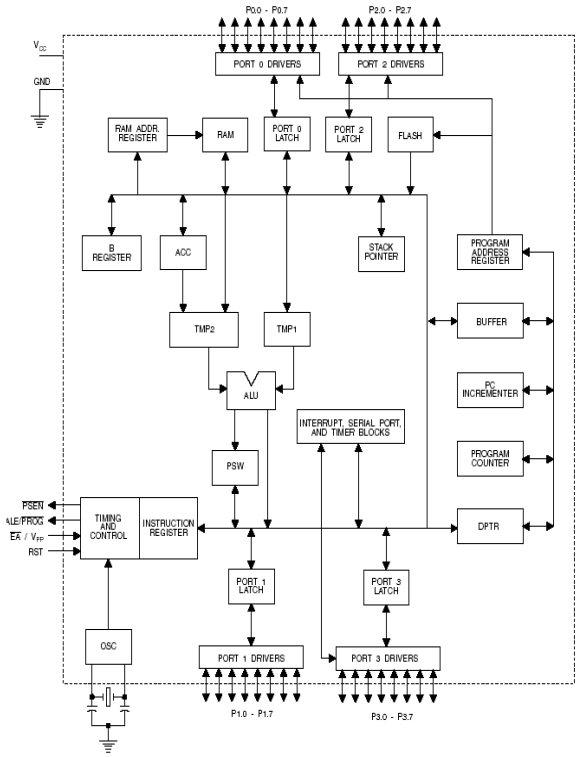

Fig. 2 Architecture of 8951 Microcontroller

The AT89C51 is a low-power, high-performance CMOS 8-bit microcomputer with 4K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Phillips's high-density nonvolatile memory technology and is compatible with the industry-standard MCS-51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Phillips AT89C51 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications.

Tactile bump sensors are great for collision detection but they work very fine for user buttons and switches as well. There are many designs possible for bump switches, often depending on the design and goals of the robot itself. But the circuit remains the same. They usually implement a mechanical button to short the circuit, pulling the signal line high or low. Bump sensors are mainly preferred over IR sensors in our circuit mainly cause of the invariant output provided by them and also their resistance they offer to change in output due to environmental conditions.

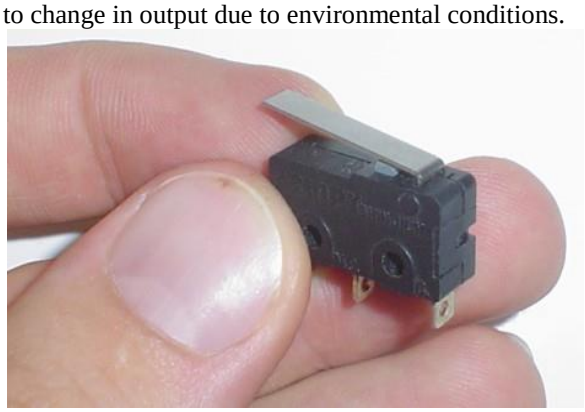

Fig. 3 Tactile Bump sensor

The bump sensor will be placed beneath a small road belt. Its pulse width depends on the speed of the vehicle passing over it. Thus, it enables to monitor traffic condition between two signals.

V. CONCLUSION

By realization of the above proposed system, we can avert most of traffic problems and jams along the highways and main roads. The above designed system will save a lot of precious time of the commuters in cities. While designing the above system, we learnt about the various aspects of a digital electronics circuit and microcontroller programming using embedded C language. We also learnt about the various techniques of etching and fabrication used for PCB's.

We will also learn about the difficulties and challenges facing the practical implementation of projects.

VI. REFRENCES

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