



TRAFFIC DENSITY ANALYZER CUM SIGNALLING SYSTEM FOR METRO CITIES

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ABSTRACT

In present, vehicular traffic is increasing throughout the world, especially in large urban areas. As the number of road user's increase constantly and current resources & infrastructures being limited; a smart traffic control will become a very important issue in the future. These needs have led to an ever increasing demand for an "intelligent" traffic control system. Therefore, optimization of traffic control to better accommodate this increasing demand is needed. Our project will demonstrate the optimization of traffic lights in a city using wireless sensors. Traffic light optimization is a tough problem. With multiple junctions, the complexity increases as the state of one light node influences the flow of traffic towards many other nodes. We proposed a traffic light controller that allows us to control and study different situations of traffic density. We sense the density of traffic using infra-red sensors. The key role behind the implementation of the "Traffic density based light control system" is to make use of an AT89C51 controller which performs processing of the real time data provided by the infra - red sensors, eventually controlling the traffic flow via the LED traffic lights.

Keywords: Infra-red Sensors, LED's, 89C51 Microcontroller.

INTRODUCTION

Now a days traffic jams and heavy traffic are killing a lot of time especially in metro cities. Unnecessary traffic jams takes place which kills a lot of time for the public .To avoid that traffic density analyzer which controls and analyses the traffic density. This project uses 8051 microcontroller and IR sensors .The purpose of this project is to

overcome the draw backs in the normal traffic light controlling system and to design an intelligent traffic controlling system which overcomes the problem of heavy traffic in the cities. In this project we are going to use IR communication to analyze traffic density. IR Transmitter will emits the IR light from LED. And the emitted light will be identified by the IR receiver when



any obstacle detected. We will place IR sensors in all 4 roads. When any obstacle detects means traffic is identified by the sensor. The sensors are interfaced with microcontroller. Then according to the sensor values the corresponding traffic signals will be activated. LED of red, yellow and green are used.

EMBEDDED SYSTEM

An embedded system is a special-purpose computer system designed to perform one or a few dedicated functions, sometimes with real-time computing constraints. It is usually embedded as part of a complete device including hardware and mechanical parts. In contrast, a general-purpose computer, such as personal computer, can do many different tasks depending on programming. Embedded systems have become very important today as they control many of the common devices we use.

Since the embedded system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product, or increasing their liability and performance. Some embedded systems are mass-produced, benefiting from economies of scale.

Physically embedded systems range from portable devices such as digital watches

and MP3 players, to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants. Complexity varies from low, with a single micro controller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure.

In general, "embedded system" is not an exactly defined term, as many systems have some element of programmability. For example, Handheld computers share some elements with embedded systems — such as the operating systems and microprocessors which power them — but are not truly embedded systems, because they allow different applications to be load and peripherals to be connected.

8051-MICROCONTROLLER

Microcontroller is a general purpose device, which integrates a number of the components of a microprocessor system on to single chip. It has inbuilt CPU, memory and peripherals to make it as a mini computer. A microcontroller combines on to the same microchip:

The CPU core

Memory(both ROM and RAM)

Some parallel digital i/o



Microcontrollers will combine other devices such as:

A timer module to allow the microcontroller to perform tasks for certain time periods.

A serial I/O port to allow data to flow between the controller and other devices such as a PIC or another microcontroller.

An ADC to allow the microcontroller to accept analogue input data for processing.

Microcontrollers are:

Smaller in size

Consumes less power

Inexpensive

Micro controller is a standalone unit, which can perform functions on its own without any requirement for additional hardware like I/O ports and external memory.

The heart of the microcontroller is the CPU core. In the past, this has traditionally been based on a 8-bit microprocessor unit. For example Motorola uses a basic 6800 microprocessor core in their 6805/6808 microcontroller devices.

In the recent years, microcontrollers have been developed around specifically designed CPU cores, for example the microchip PIC range of microcontrollers.

HARDWARE COMPONENTS

Transformer:

Transformer is a static device used to convert the voltage from one level to another level without change its frequency.

There are two types of transformers

1. Step-up transformer
2. Step-down transformer

Step-up transformer converts low voltage level into high voltage level without change its frequency.

Step-down transformer converts high voltage level into low voltage level without change its frequency.

In this project we use step-down transformer which converts 230V AC to 12V AC [or] 230V AC to 5V as shown below.

Rectifier

The purpose of a rectifier is to convert an AC waveform into a DC waveform (OR) Rectifier converts AC current or voltages into DC current or voltage. There are two different rectification circuits, known as 'half-wave' and 'full-wave' rectifiers. Both use components called diodes to convert AC into DC.

Capacitor Filter

The capacitor-input filter, also called "Pi" filter due to its shape that looks like the Greek letter pi, is a type of electronic filter. Filter circuits are used to remove unwanted or undesired frequencies from a signal. A



typical capacitor input filter consists of a filter capacitor C1, connected across the rectifier output. The capacitor C1 offers low reactance to the AC component of the rectifier output while it offers infinite reactance to the DC component. As a result the AC components are going to ground. At that time DC components are feed to Regulator.

An infrared sensor includes two parts namely the emitter & the receiver (transmitter & receiver), so this is jointly called an optocoupler or a photo-coupler. Here, IR LED is used as an emitter whereas the IR photodiode is used as a receiver.

The photodiode used in this is very sensitive to the infrared light generated through an infrared LED. The resistance of photodiode & output voltage can be changed in proportion to the infrared light obtained. This is the fundamental IR sensor working principle.

The type of incident that occurred is the direct otherwise indirect type where indirect type, the arrangement of an infrared LED can be done ahead of a photodiode without obstacle. In indirect type, both the diodes are arranged side by side through a solid object ahead of the sensor. The generated light from the infrared LED strikes the solid

surface & returns back toward the photodiode.

IR sensors use three basic Physics laws like Planck's Radiation, Stephan Boltzmann & Wein's Displacement.

SOFTWARE AND CODING

KEIL MICROVISION

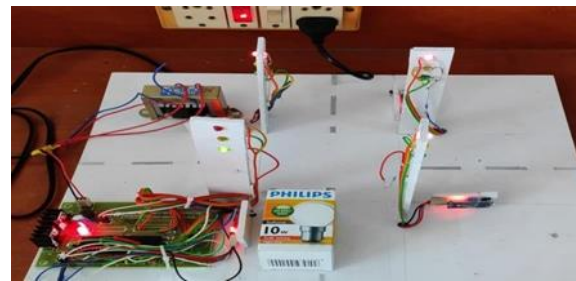
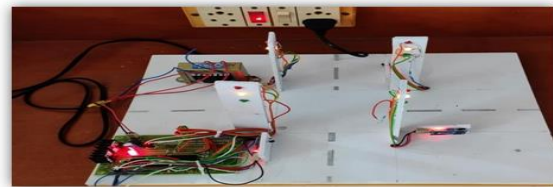
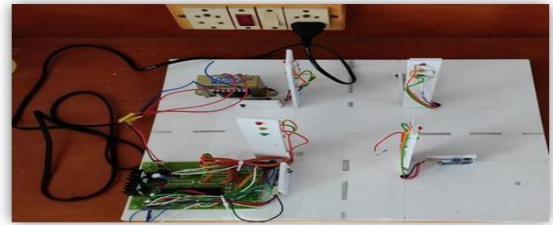
KeilMicro Vision is a free software which solves many of the pain points for an embedded program developer. This software is an integrated development environment (IDE), which integrated a text editor to write programs, a compiler and it will convert your source code to hex files too. μ Vision is a window-based software development platform that combines a robust and modern editor with a project manager and make facility tool. It integrates all the tools needed to develop embedded applications including a C/C++ compiler, macro assembler, linker/locator, and a HEX file generator. μ Vision helps expedite the development process of embedded applications by providing the following:

- Full-featured source code editor.
- Device Database® for configuring the development tool.
- Project Manager for creating and maintaining your projects.

- Integrated Make Utility functionality for assembling, compiling, and linking your embedded applications.
- Dialogs for all development environment settings.
- True integrated source-level and assembler-level Debugger with high-speed CPU and peripheral Simulator.
- Advanced GDI interface for software debugging on target hardware and for connecting to a Keil® ULINK™ Debug Adapter.
- Flash programming utility for downloading the application program into Flash ROM.
- Links to manuals, on-line help, device datasheets, and user guides.

The μ Vision IDE and Debugger is the central part of the Keil development toolchain and has numerous features that help the programmer to develop embedded applications quickly and successfully. The Keil tools are easy to use, and are guaranteed to help you achieve your design goals in a timely manner.

RESULT



CONCLUSION

Nowadays, traffic congestion is a main problem in major cities since the traffic signal lights are programmed for particular time intervals. However, sometimes the demand for longer green light comes in at the one side of the junction due to huge traffic density. Thus, the traffic signal lights system is enhanced to generate traffic-light signals based on the traffic on roads at that particular instant. The advanced technologies and sensors have given the capability to build smart and intelligent embedded systems to solve human problems and facilitate the life style. Our system is



capable of estimating traffic density using IR sensors placed on either side of the roads. Based on it, the time delay for the green light can be increased and we can reduce unnecessary waiting time. The whole system is controlled by PIC micro controller. The designed system is implemented, tested to ensure its performance and other design factors.

FUTURE SCOPE

The Future scope includes Profiling of the traffic by storing the data and managing the traffic lights according to the collected data. The Profiling can also be used for Traffic study and the variation in traffic density throughout the day, week, month or a year. Further, we can optimize this system for the emergency Vehicles such as Ambulance. The traffic data collected can be used to locate different routes for a specific daily vehicle to avoid the congestion problem.

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