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A Density Based Traffic Control System Using Image Processing

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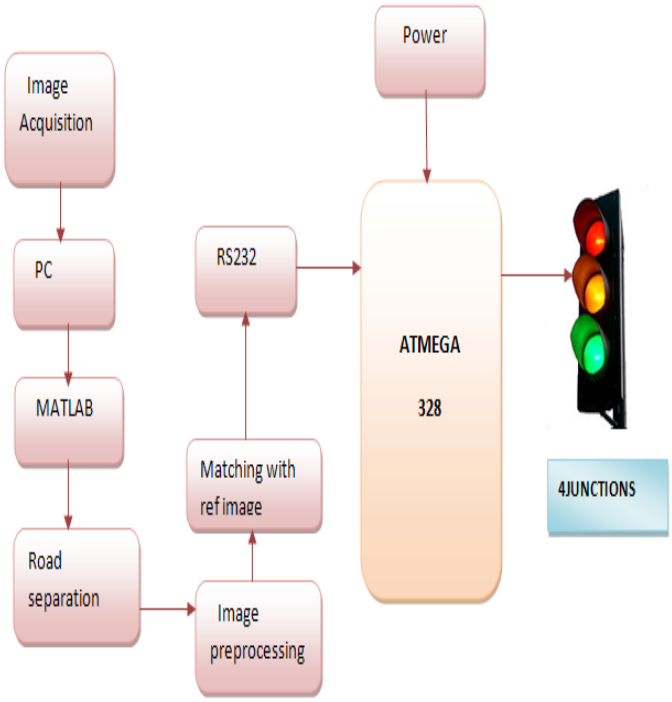
Abstract

The frequent traffic jams at major junctions call for an efficient traffic management system in place. The resulting wastage of time and increase in pollution levels can be eliminated on a city-wide scale by these systems. The project proposes to implement an intelligent traffic controller using real time image processing. The image sequences from a camera are analyzed using thresholding method to find the density. Subsequently, the number of vehicles at the intersection is evaluated and traffic is efficiently managed. The project also proposes to implement a real-time emergency vehicle detection system. In case an emergency vehicle is detected, the lane is given priority over all the others. Hardware control is done by microcontroller.

Block Diagram:

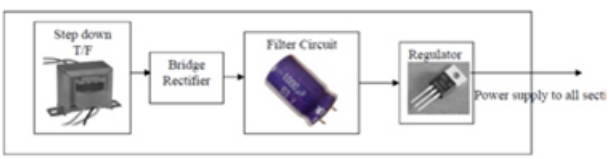


INTRODUCTION:

Current traffic control techniques involving magnetic loop detectors buried in the road, infra-red and radar sensors on the side provide limited traffic and require separate systems for traffic counting and for traffic surveillance.Inductive loop detectors do provide a cost-effective solution, however they are subject to a high failure rate when installed in poor road surfaces, decrease pavement life and obstruct traffic during maintenance and repair.Infrared sensors are affected to a greater degree by fog than video cameras and cannot be used for effective surveillance. In contrast, video-based systems offer many advantages compared to traditional techniques. They provide more traffic information, combine both surveillance and traffic control technologies, are easily installed, and are scalable with progress in image processing techniques. This project tries to evaluate the process and advantages of the use of image processing for traffic control. Implementation of our project will eliminate the need of traffic personnel at various junctions for regulating traffic. Thus the use of this technology is valuable for the analysis and performance improvement of road traffic.

POWER SUPPLY:

The input to the circuit is applied from the regulated power supply. The a.c. input i.e., 230V from the mains supply is step down by the transformer to 12V and is fed to a rectifier. The output obtained from the rectifier is a pulsating d.c voltage. So in order to get a pure d.c voltage, the output voltage from the rectifier is fed to a filter to remove any a.c components present even after rectification. Now, this voltage is given to a voltage regulator to obtain 5V constant dc voltage.



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MATLAB:

MATLAB (matrix laboratory) is a multi-paradigm numerical computing environment and fourth-generation programming language. Developed by MathWorks, MATLAB allows matrix manipulations, plotting of functions and data, implementation ofalgorithms, creation of user interfaces, and interfacing with programs written in other languages, including C, C++, Java, and Fortran.Although MATLAB is intended primarily for numerical computing, an optional toolbox uses the MuPAD symbolic engine, allowing access to symbolic computing capabilities. An additional package, Simulink, adds graphical multi-domain simulation and Model-Based Design for dynamic and embedded systems.

Components of an Image Processing System

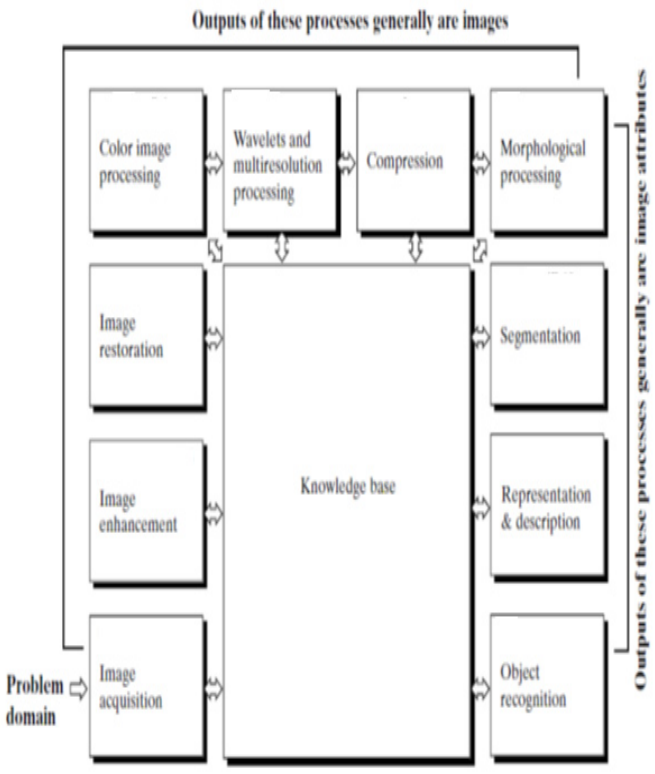

Image acquisition is the first process. Note that acquisition could be as simple as being given an image that is already in digital form. Generally, the image acquisition stage involves preprocessing, such as scaling. Image enhancement is among the simplest and most appealing areas of digital image processing. Low level processes involve primitive operations such as image preprocessing to reduce noise, contrast enhancement, and image sharpening.

A low-level process is characterized by the fact that both its inputs and outputs are images. Mid-level processing on images involves tasks such as segmentation (partitioning an image into regions or objects), description of those objects to reduce them to a form suitable for computer processing, and classification (recognition) of individual objects.

Segmentation:

Segmentation involves separating an image into regions (or their contours) corresponding to objects. We usually try to segment regions by identifying common properties. Or, similarly, we identify contours by identifying differences between regions (edges).

ATMEGA 328:

The ATmega88 through ATmega328 microcontrollers are said by Atmel to be the upgrades from the very popular ATmega8. They are pin compatible, but not functionally compatible. The ATmega328 has 32kB of flash, where the ATmega8 has 8kB. Other differences are in the timers, additional SRAM and EEPROM, the addition of pin change interrupts, and a divide by 8 presale for the system clock. The schematic below shows the Atmel ATmega328 circuit as it was built on the test board.

The power supply is common and is shared between all of the microcontrollers on the board. The ATmega328 is in a minimal circuit. It is using its internal 8 MHz RC oscillator (divided by 8). With the ATmega328 I needed to both burn a boot loader and download Arduino sketches. The boot loader is programmed using the ISP programming connector, and the Arduino sketches are uploaded via the 6-pin header.

Be aware that programming the Arduino boot loader into the ATmega88, ATmega168, or ATmega328 microcontroller will change the clock fuses, requiring the addition of an external crystal. The crystal shown on the schematic is only required when the ATmega328 is going to be used as an Arduino, although it may be desired in any real world application. I typically run them at 16 MHz, but they will run as high as 20 MHz

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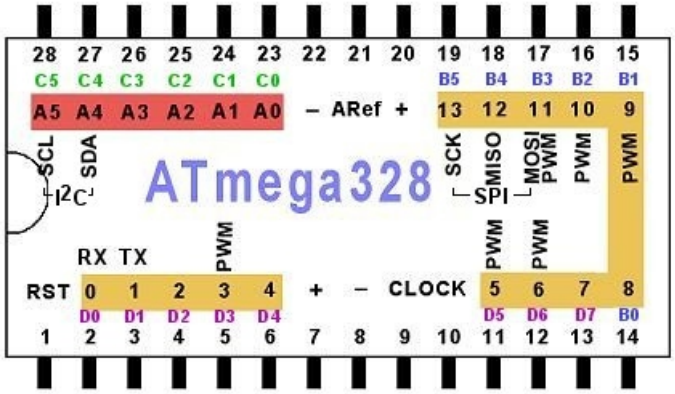

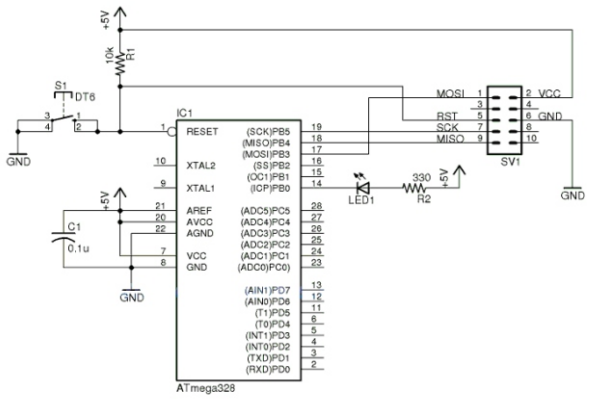

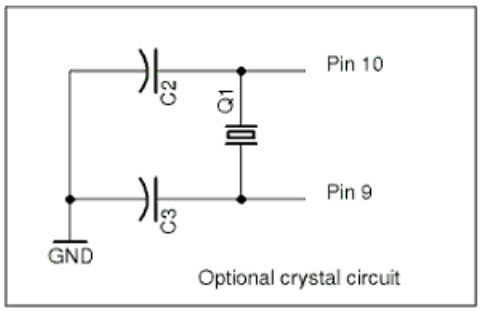

Advantages:

Reliability
Ease of Operation
As we can improve transportation security by implementing it.
No need of human supervision

APPLICATIONS:

Main roads
Highways

Conclusion:

Hence this project is implemented using ATMEGA 328 controller and image processing.

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