

Traffic Sign Recognition  
Senior Project Proposal

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## **Abstract**

The Traffic Sign Recognition project aims to create a system using MATLAB that will identify a variety of traffic signs. Common traffic signs, such as STOP, CURVE, CROSSWALK, and DO NOT ENTER. These signs may be in various lighting conditions, backgrounds, and may be partially obscured. There will be several subsystems in the MATLAB program, each completing a particular task involved in the processing of the digital image. Among other requirements, the system will identify the sign, highlight it, and suggest an action based on the type of sign.

## **Introduction**

The objective of the Traffic Sign Recognition project is to identify a traffic sign from a digital photograph. The sign may be viewed from various angles and in many diverse background situations. The sign will then be highlighted after identification. All image processing will be done in MATLAB. Initially, the system will be designed to identify specific signs (stop, crosswalk, curve, etc.). Ultimately this system will be able to identify several signs.

## **Overall System Block Diagram**

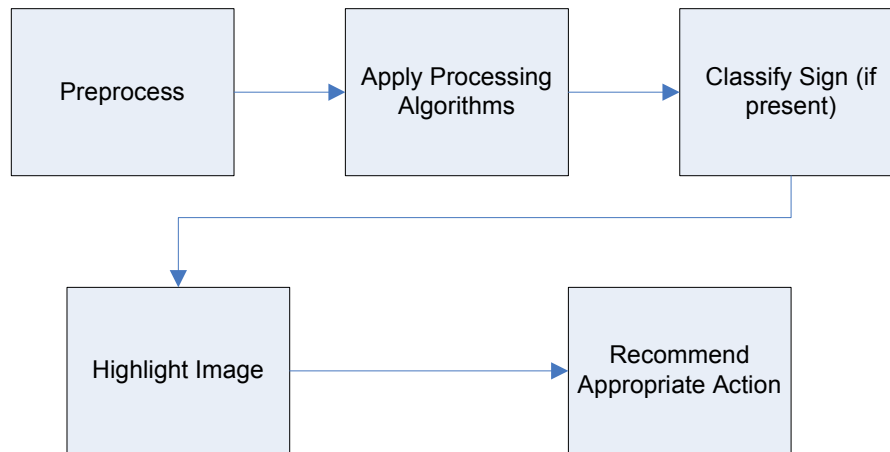


Figure 1 – Overall system block diagram

Input to the system will be an image loaded from the computer's hard drive. Preprocessing including contrast, brightness, clarity will then be performed. The actual image processing including color detection and edge detection will be applied next, and the software will then attempt to determine if a sign is present. If present, the sign will be classified and highlighted. Figure 1 shows the overall system block diagram. To allow for future expansion, action will be recommended to a hypothetical vehicle based on the nature of the sign observed.

## **Functional Description**

### **Preprocessing Block**

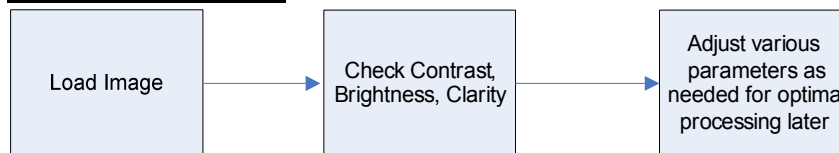


Figure 2 – Preprocessing block

Preprocessing will load the image as well as check contrast, brightness, and clarity. Figure 2 shows the flow of the preprocessing block. If these parameters are off from our desired values for these, adjustments will be performed. This will allow the design team to be able to ensure that the image is suitable for processing. If the software

cannot obtain the contrast or brightness needed, it may not be able to identify if there is a sign in the image.

### **Image Processing and Recognition**

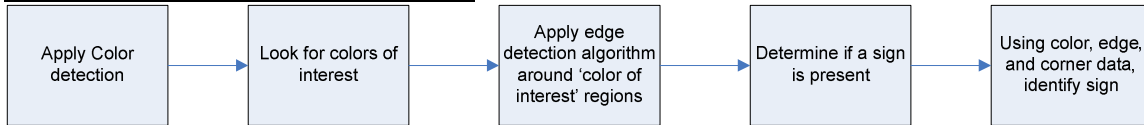


Figure 3 – Image Processing and Recognition (Apply Algorithm block)

This block will process the actual image, and is where the majority of this project is contained. First, the system will detect colors and then look for colors of interest. Colors like red, yellow, and white that constitute road signs will be considered colors of interest. The image processing and recognition block is represented in Figure 3. The system will then define the region in which these colors are concentrated and outline the shape of the sign. If no sign is present, there will not be any sign to identify; nothing (or an error) will be output. With the data gathered from the image, the system will determine if a sign is present and will proceed identify it if possible.

### **Output**

This subsystem will take the data and create the final output. Output subsystem is show in Figure 4 which shows the flow of the block. Without a sign identified, nothing will be output. If a sign has been identified the system will outline that sign and depending on the type of sign it is, generate a decision variable. This variable will be reserved for future use and could be implemented for an autonomous vehicle control at a later time.

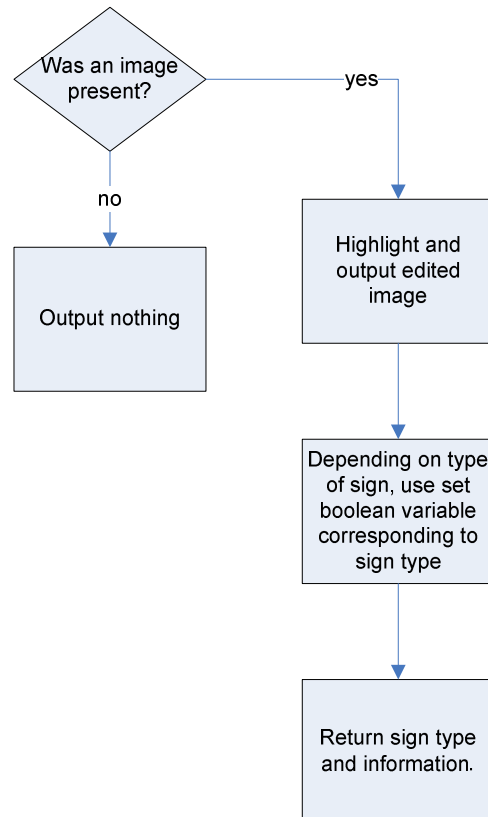


Figure 4 – Output block

## Overall System Block Diagram

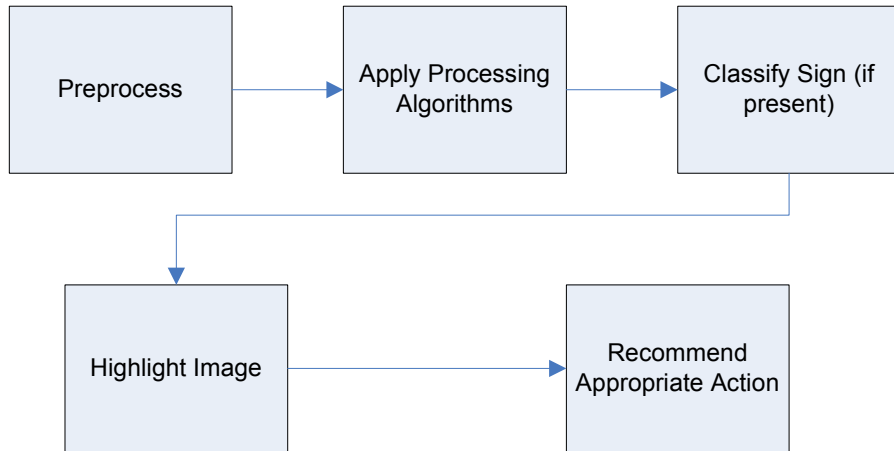


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## Functional Description

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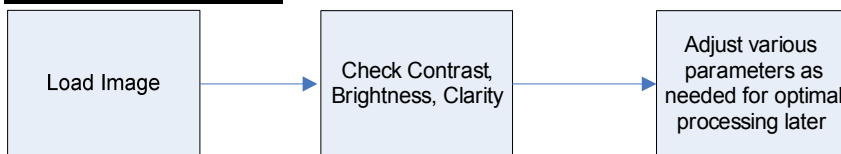


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### Image Processing and Recognition

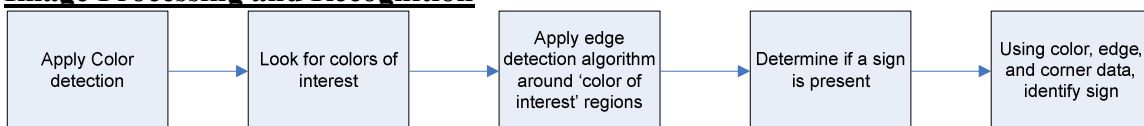


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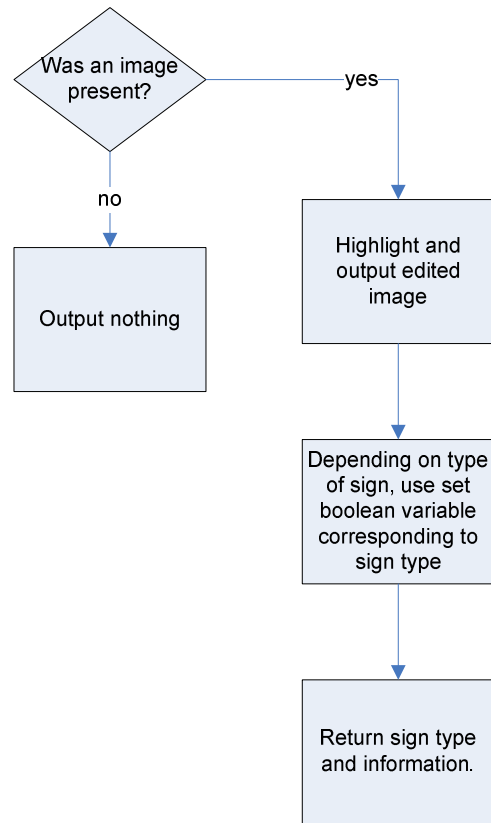


Figure 4 – Output block

## **Functional Requirements**

Preprocessing shall check contrast, brightness, and clarity. This block shall make sure the image is ready to have image processing done to it. After passing through this preprocessing block, the image shall be ready to have processing algorithms applied to it.

The application of processing algorithms shall take the preprocessed image and find colors of interest and look for shapes relating to the sign or signs we are searching for. This block shall find regions of interest on the image and these shall be further processed to obtain the type of sign. This is done in the following block.

The classify sign block shall take the regions of interest passed from the algorithms block. These regions shall be analyzed and used to compare to 'templates' of known signs. This allows for the system to identify exactly what sign is contained in the image that was processed.

The highlight image subsystem shall create some sort of distinguishing box or highlight around the actual sign.

The recommend appropriate action subsystem shall give a recommended action as an output based on the type of sign encountered.

## **Schedule**

| Date                             | Task                            |
|----------------------------------|---------------------------------|
| January 24 <sup>th</sup> , 2008  | Preprocessing                   |
| January 31 <sup>st</sup> , 2008  | Color Processing                |
| February 7 <sup>th</sup> , 2008  | Color Processing                |
| February 14 <sup>th</sup> , 2008 | Edge Detection                  |
| February 21 <sup>st</sup> , 2008 | Edge Detection                  |
| February 28 <sup>th</sup> , 2008 | Sign Classification             |
| March 6 <sup>th</sup> , 2008     | Sign Classification             |
| March 20 <sup>th</sup> , 2008    | Sign Highlighting               |
| March 27 <sup>th</sup> , 2008    | Sign Identification             |
| April 3 <sup>rd</sup> , 2008     | Sign Identification             |
| April 10 <sup>th</sup> , 2008    | Sign Identification             |
| April 17 <sup>th</sup> , 2008    | Begin final report preparation  |
| April 24 <sup>th</sup> , 2008    | Final report/presentation       |
| May 1 <sup>st</sup> , 2008       | Prepare for final presentation. |