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REAL-TIME DETECTION OF SIGNAL LIGHTS FOR DRIVING ASSISTANCE APPLICATIONS USING INTEGRATED APPROACH

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ABSTRACT:

For a Driving Assistance System, which is designed to improve safety on the roads, knowledge about the type of lane border markings and other painted road objects is required. Furthermore, information about the position of the painted objects can be used by other systems to create a correct perception of the road. Most of the road accidents were caused by carelessness of drivers. To reduce the number of traffic accidents and improve the safety and efficiency of traffic for many years around the world and company studies have been conducted on intelligent transport systems (ITS). Intelligent vehicle, (IV) the system is part of a system which is designed to assist drivers in the perception of any dangerous situations before, to avoid accidents after sensing and understanding the environment around itself. In this paper, it proposes architecture for driver assistance system based on image processing technology. Integration of both matlab and embedded system technologies together used here to implement this enhanced concept.

INTRODUCTION:

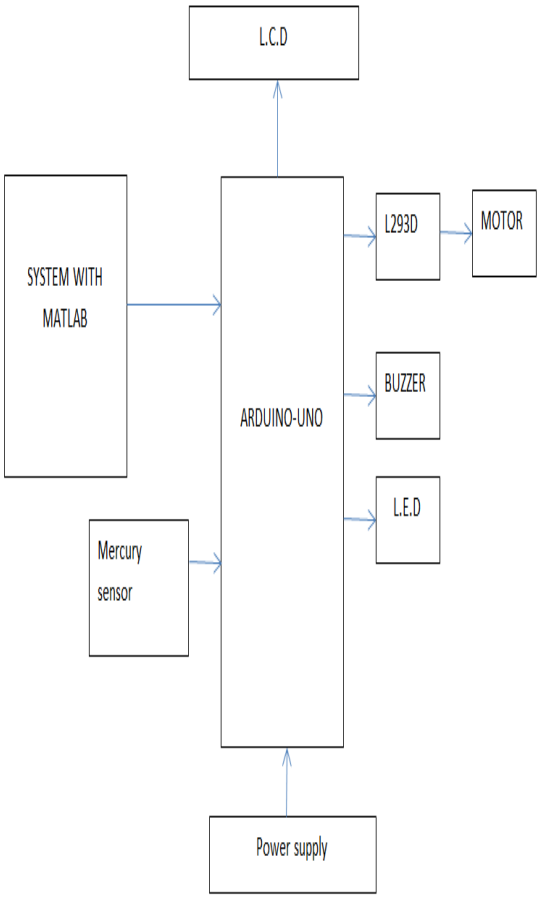
The correct perception of the road ahead can improve the way the car is manipulated. Recognizing from a certain distance the painted road objects, knowing the number of lanes and their type, can help the driver assistance system take the correct decision in changing or remaining on the same lane. For these reasons this work is focused on extracting information about the road ahead, treating each painted sign as an individual object, instead of detecting lanes as a whole. The location and the type of the painted objects found can be used by another application that will analyze them and give a correct position of the car and a good perspective of the road. Lane detection and tracking is the focus of many researchers, ever since the camera and computer technology allowed the problem to be tackled. In lane detection, several key problems have to be solved: choosing an appropriate lane model, developing an image processing based technique for delimiting features extraction, lane model matching to the extracted features, and probability based tracking. There are multiple solutions for each of the sub-problems, and a comprehensive survey of these techniques can be found in [1]. The model-based tracking approach to lane detection is robust against noise, and allows the use of less than perfect features, extracted with simple and fast algorithms. However, the quality of the extraction of lane delimiting features remained an active concern. In [2] a comparative analysis of the most popular marking extraction techniques is presented, and the best results are found to be provided by the algorithms that compare the brightness of the feature pixel with the brightness of its neighbors at specific distances, which account for the size of the marking to be found and for the perspective effect. Unfortunately, not all traffic scenarios can be handled in the model-detect-track approach. These situations call for a more refined approach to lane delimiting features extraction. For these reasons, some researchers have dedicated their work to the problem of identifying the lane delimiters, and the painted road objects, as standalone elements. Identifying these objects individually makes the system independent on the lane shape, and may provide valuable information to a driving assistance system. The Road Sign Recognition (RSR) is a field of applied

computer vision research concerned with the automatical detection and classification of traffic signs in traffic scene images acquired from a moving car.

LITERATURE SURVEY:

The method presented in [3] uses histogram-based image segmentation and then applies decision trees on basic geometrical features to decide whether a painted object is a lane marking or not, and also to decide whether a set of objects are part of the same lane border. In [4] the painted road objects are extracted as polygons, and their basic properties such as length, parallelism and direction are used to decide whether they are possible lane delimiters or pedestrian crossings. In [5] we find a technique for extracting the rectangular painted objects by the use of an analytical model of the expected pixel intensity based on rectangle parameters, and the search for the parameters that minimize the error between the expectation and the image data. The aim of this technique was to identify lane delimiters in intersection scenarios. A system that is able to identify and classify a wider range of painted road objects, not only lane marking delimiters, is presented in [6]. The segmentation is based on intensity levels and connected components analysis, and the classification uses a radial basis function classifier. Instead of using the painted road markings for lane detection, some authors use the already detected lane as a guide in the search for specific objects such as arrows. The work presented in [7] uses the hypothesis that the arrows are in the middle of the lane, and therefore restrict their possible locations. The detection and classification of arrows is done by pattern matching on inverse perspective mapped images. Vehicle localization has a vast and varied literature based on the use of GPS devices. A number of methods try to augment GPS with inertial sensors [4] and map matching methods [17], [19] to overcome GPS dropouts due to occlusion of satellites. Our interest is in low-cost accurate solution and hence, we do not focus on differential GPS and other augmentation services [8]. Apart from GPS, the use of any other sensors for localization results in drift over time due to accumulation of errors. In this work, we avoid drift by localizing against road markings that, when surveyed previously, provide absolute location. To our knowledge, such an approach has not been tried before. Our method, while it can be used by itself, is more suited for use after integration with a general purpose localization system consisting of visual odometry and location recognition, such as [12]. The common method for driftless localization in the literature is the use of a map registered to global coordinates. Such maps are built using simultaneous localization and mapping (SLAM) methods [20] using stereo vision [12], monocular vision [2], and lidars [11]. Road marking detection is a subject that has not been explored much previously. Veit et al. [23] provide an overview of existing road marking detection methods. However, they focus only on detection and not on classification of the road markings. Vacek et al. [22] use detection of lane markers to guide road marking detection and thus, cannot function in the absence of clear lane markings. Noda et al. [16] compute an eigenspace on a template by perturbing an ideal template under different illumination, scale, blur, and motion blur conditions. Classification is performed using eigenspace analysis.

PROPOSED TECHNIQUE:



MATLAB software used here to recognize signaling lights and sign boards for intimating vehicle driver, if he/she is in drowsiness. Mercury sensor is used to detect fall down condition of vehicle as indication of vehicle rash driving. If any rash driving or signal crossing occurs, automatically buzzer will on and motor will stop. This concept is a combinational approach of both MATLAB and embedded system.

ARDUINO: The Arduino Software (IDE) allows you to write programs and upload them to your board. In the Arduino Software page you will find two options:
1. If you have a reliable Internet connection, you should use the online IDE (Arduino Web Editor). It will allow you to save your sketches in the cloud, having them available from any device and backed up. You will always have the most up-to-date version of the IDE without the need to install updates or community generated libraries.
2. If you would rather work offline, you should use the latest version of the desktop IDE.
Code online on the Arduino Web Edito To use the online IDE simply follow these instructions. Remember that boards work out-of-the-box on the Web Editor, no need to install anything.
Install the Arduino Desktop IDE

LIQUID CRYSTAL DISPLAY: The LCD is used for the purpose of displaying the words which we are given in the program code. This code will be executed on microcontroller chip. By following the instructions in code the LCD display the related words. Fig shows the LCD display.

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Fig. : LCD Display

The LCD display consists of two lines, 20 characters per line that is interfaced with the PIC16F73.The protocol (handshaking) for the display is as shown in Fig. The display contains two internal byte-wide registers, one for commands (RS=0) and the second for characters to be displayed (RS=1). It also contains a user-programmed RAM area (the character RAM) that can be programmed to generate any desired character that can be formed using a dot matrix. To distinguish between these two data areas, the hex command byte 80 will be used to signify that the display RAM address 00h will be chosen Port1 is used to furnish the command or data type, and ports 3.2 to 3.4 furnish register select and read/write levels.

DC MOTORS

The direct current (DC) motor is one of the first machines devised to convert electrical power into mechanical power. Permanent magnet (PM) direct current converts electrical energy into mechanical energy through the interaction of two magnetic fields. One field is produced by a permanent magnet assembly; the other field is produced by an electrical current flowing in the motor windings. These two fields result in a torque which tends to rotate the rotor. As the rotor turns, the current in the windings is commutated to produce a continuous torque output. The stationary electromagnetic field of the motor can also be wire-wound like the armature (called a wound-field motor) or can be made up of permanent magnets (called a permanent magnet motor).

In either style (wound-field or permanent magnet) the commutator. acts as half of a mechanical switch and rotates with the armature as it turns. The commutator is composed of conductive segments (called bars), usually made of copper, which represent the termination of individual coils of wire distributed around the armature. The second half of the mechanical switch is completed by the brushes. These brushes typically remain stationary with the motor's housing but ride (or brush) on the rotating commutator. As electrical energy is passed through the brushes and consequently through the armature a torsional force is generated as a reaction between the motor's field and the armature causing the motor's armature to turn. As the armature turns, the brushes switch to adjacent bars on the commutator. This switching action transfers the electrical energy to an adjacent winding on the armature which in turn perpetuates the torsional motion of the armature.

Permanent magnet (PM) motors are probably the most commonly used DC motors, but there are also some other type of DC motors(types which use coils to make the permanent magnetic field also) .DC motors operate from a direct current power source. Movement of the magnetic field is achieved by switching current between coils within the motor. This action is called "commutation". Very many DC motors (brush-type) have built-in commutation, meaning that as the motor rotates, mechanical brushes automatically commutate coils on the rotor. You can use dc-brush motors in a variety of applications.

CONCLUSION:

In conclusion, we have taken the first steps in creating a system that is capable of detecting lanes and warning a possible lane departure, detect traffic signs and thus helping the driver by giving fast and precise information. In the near future we would like to integrate traffic sign recognition, and pedestrian crossing detection. However, the supreme objective of this project is to take advantage of the power of internet in cars, which has a big potential. Our plan to achieve this is to create an intelligent system that communicates through a device that is capable of connecting to the internet and to give and receive feedback to and from other users.

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