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Driving Robot Using Colour Detection

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Abstract - With the advancements in technology, we develop various methods to control any real time system digitally. The main purpose of developing such system is to make it more user friendly. Similarly, we have implemented a system which processes a real time colour image using image processing on MATLAB software. We are processing the continuous images frame taken from the camera, on the software and detect the green colour from that image frame using some mathematical calculation on the software and use the colour to control another real time robot to move forward, backward, left and right. This is done by serial communication using RF module which transmits the signal and receives it on the receiver which is placed on the robot. This implies the combination of both digital worlds with the embedded system in the real world.

Keywords – MATLAB, GUI (Graphical User Interface), LCD ***(Liquid Crystal Display).***

1. INTRODUCTION

Image Processing is a strategy in which we change over the picture into advanced form and process the pictures utilizing scientific operations. Here, the info can be a picture, a Combination of pictures, or a multimedia application; and the nature of the article might be either a picture or combinations of pictures video or multimedia applications which can be identified with the article. It is most recent developments done in the recent field along with its prototype and ideas for different alignments of business. Picture Processing frames center research region inside designing and software engineering disciplines too1.

A. Motivation of Image dealing

The Concept of image handling is categorized into 4 groups. They are:

Observation- Observe the items that are not noticeable.
Image identification and retrieval - To make a superior picture.
Estimation of example –Motivation Measures different protests in a picture.
Image remembrance – Treat the objects in an image.

Digital image handling is not fully strained for a long time to alter the resolution of the pictures snatched or taken by the camera. It is not easy to find the exact resolution to build the brightness of the photo2. Different other applications are: -

- Image identification and retrieval
- Scientific field
- Remote Recognition
- Broadcasting and computing
- Machine/Robot vision
- Design identification

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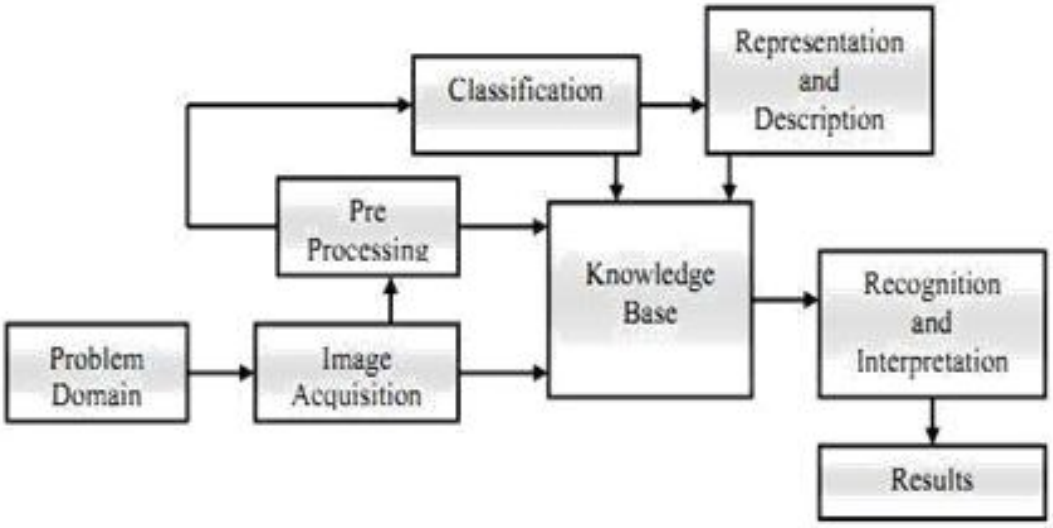
- Video identification and recognition
- Minute particles identification and recognition



Fundamental steps in digital image processing

• Problem Domain: -The very first step is to get the objective of the project.
• Image Acquisition: - The second step of the basic treads of digital identification and retrieval is image acquisition which means to capture the image which is already in digital form.
• Pre-Processing: -The third step is to process the image using mathematical expressions according to the objective of the project.
• Representation and Description: Representation contains fresh pixel information, forming either the partition of area or every one of the focuses in the district itself. Picking a representation is just piece of the solution for changing fresh data information into a shape4 reasonable for ensuing PC preparing. Identification deals with removing qualities that outcome in some analytical or are basic for differentiating one class of objects from another3
• Knowledge Base: - Knowledge may be as essential as identifying territories of a picture where the information of intrigue is known to be found, thusly compelling the interest that must be led searching for that information. The data base also can be extremely baffling, for instance, an interrelated summary of all noteworthy possible defects in a materials examination issue or a photo database containing high assurance satellite photos of an area with respect to change-acknowledgment applications.
• Recognition and Interpretation: - Recognition is the procedure that relegates a mark, for example, "vehicle" to a protest in view of its descriptors.

Commonly used software for image processing are: -
• MATLAB
• FIJI
• AVIZO
• SCRIBE
• ZEROTH

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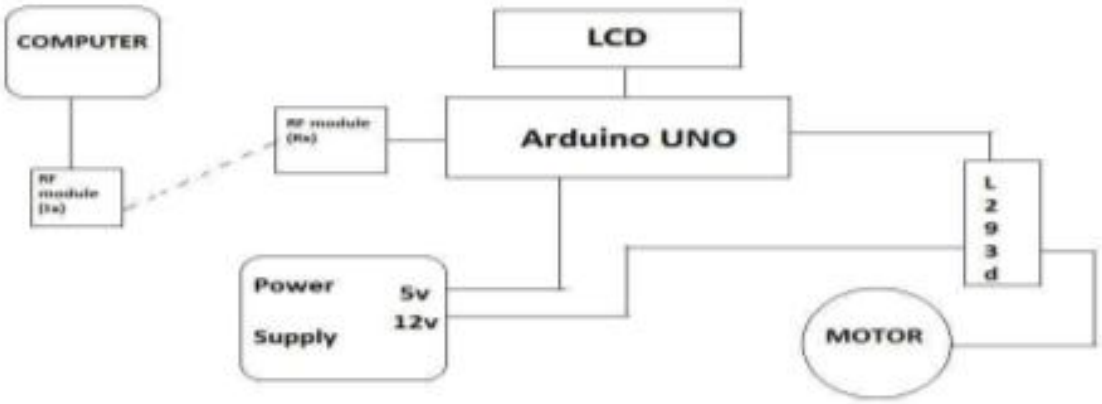
Based on the concept of image processing and embedded system, we have implemented our system in which we are driving the robot using a colour (we have used green colour) by creating5 a user-friendly interface and detecting the colour in MATLAB4. For driving the robot wirelessly, we used ARDUINO UNO and RF module which communicate one system to another serially.

Here, the logical diagram represents the basic functionality6 of our system. The transmitter of RF module is connected to the computer. The robot consists of Arduino Uno, an LCD, RFmodule The robot consists of Arduino Uno, an LCD, RFmodule receiver, motor driver IC(L293D), power supply and DC motors. The power supply is used to provide 12-volt DC to motor driver IC(L293D) to Move the motors and 5-volt DC to the Arduino Uno and LCD. The idea behind this system is that the computer's camera acquires the images and the MATLAB code processes these images and it sends the signal through RF transmitter to RF receiver. The Arduino Uno then process the signal according to which it commands the motor driver IC to run the motors.



2. EXPECTED OUTCOME

The expected outcome in this project is to create the GUI in MATLAB which activates the camera of the computer and four different blocks are present for different directions i.e. forward, backward, left and right. When the green colour is present in any of these blocks then the robot drives in that particular direction where green colour is present otherwise the robot stops. The robot movements are controlled using Arduino Uno7. Secondly, the LCD (Liquid Crystal Display) which is connected on the robot should display the direction where the robot is moving for example if the robot is moving forward, then it should display "MOVING FORWARD". Similarly, it should display for the other directions as well.

3.RESULTS AND DISCUSSION

The robot finally designed is shown in the given figure.

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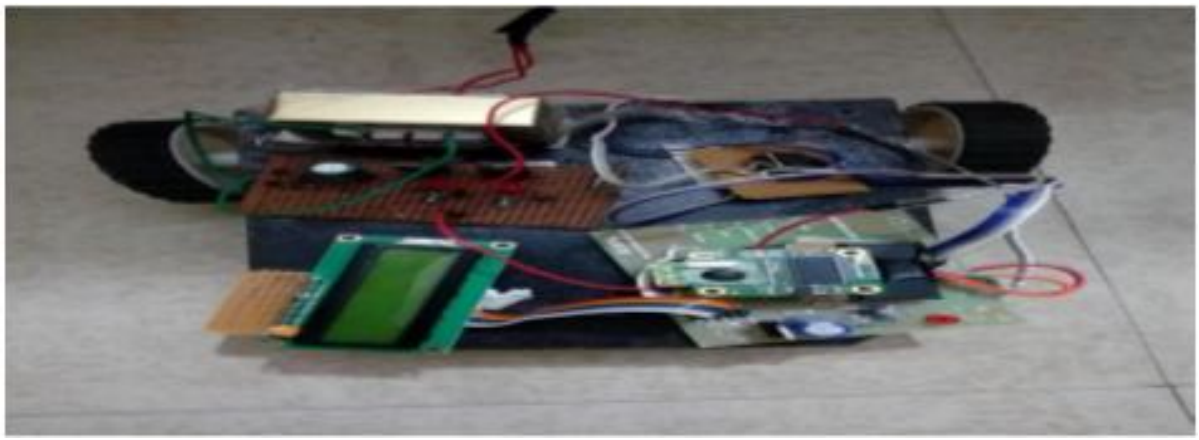

Figure 3- Final Design

1) When we turn on the robot, a message is displayed 'MONITORING'.

Figure 4-LCD display before accessing the system.

1. After this message, the different messages appear for the directions as we move the robot. If the robot is moving backward, then it is displayed as:

Figure 5-Displaying backwards.

If the robot is not moving, then it is displayed as:

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Figure 6- Displaying stop

If the robot is moving forward, then it is displayed as:

Figure 7- Displaying forward

4. CONCLUSION AND FUTURE SCOPE

In this system, we have focused on image processing of real time objects and detect the green colour from those objects. This project helps us in connecting the digital world with the physical world. This provides a better user-friendly interface through GUI to the user and it adds to the benefit of the user. It also helps in using the everyday objects to control any system which is better than controlling the system using remote control. This system can be made more efficient by using other than green colour such as red or blue for detection and control the system. We can also add an arm to the robot which can be used for pick and place of different objects for the user.
Further improvement in this field can be done by use of gestures. Instead of only detecting the colour, we can add different gestures to control the robot which is much user friendly and are easy to control for common people.

5. APPLICATIONS

This system can find application in the field of controlling the wheel chair for the handicapped. For example, if a person is physically disabled and cannot walk then he can control the wheel chair using this concept for movements. Another application of this system can be in the industrial field6. For example, the robot can move and adding an arm to it, it can pick and place heavy objects from one place to another.

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