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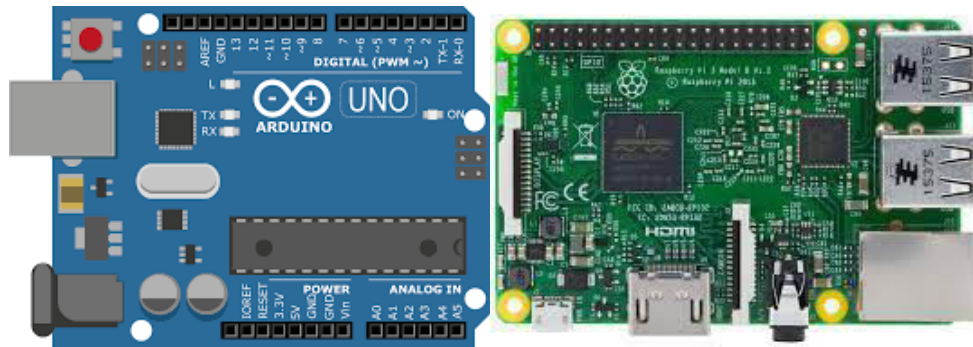
Self-Driving Image Processing Car using Arduino & Raspberry Pi

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ABSTRACT: The project aims to build a monocular vision autonomous car prototype using Raspberry Pi as a processing chip. An HD camera along with an ultrasonic sensor is used to provide necessary data from the real world to the car. The car is capable of reaching the given destination safely and intelligently thus avoiding the risk of human errors. Many existing algorithms like lane detection, obstacle detection is combined together to provide the necessary control to the car. Our idea is to implement a self-driving vehicle which uses a pattern matching technique to overcome the problem. In our project, we planned of using a special pattern which will be deployed on the road. These patterns are a special pattern that is used for detection of the pathway and it detects the type of road. Hence using this technology, we can implement a self-driving car in India. Our prototype would use a modelled car which has a Raspberry pie to process the captured images from the camera and send it remotely on remote computer process it and send back. Similarly, we have various sensors around the car to detect the surrounding obstacles. The camera will be able to capture specific pattern on the road. The pattern is like a pathway for the modelled car, that makes it easier to drive on roads in India. Our prototype uses a hybrid combination of the existing technology as well as the newly implemented methodology of detecting special pattern marked on the road for providing better results.

KEYWORDS: Raspberry Pi, Arduino Uno, Lane Detection, Image Processing.



ARDUINO UNO

RASPBERRY PI

I. INTRODUCTION

Machine learning and AI has made human lives so at ease that we wish to automate everything. From bread toaster to schooling system everything is automated. Similarly automated vehicles are the new technological development in the field of automobile. Driving is one of the most complicated activities humans routinely do. A road accident is the worst incident that could ever happen while driving as they happen quite a lot and the majority of them are caused by human error. Self-driving cars are being developed from day to another. It is a creative invention where the car is operated by a computer. It is hard to convince people that having a self-driving car is safe as they cannot trust a machine to keep them safe. A self-driving car is purely analytical that it acts exactly like a smart computer as there are no emotions or distractions involved because computers are faster and smarter to take actions than our minds. As a result, a future full of self-driving cars might be a better one. In this paper, a self-driving car prototype is proposed where new hardware components and methodologies are used in a self-driving car. The system consists of a raspberry pi as the main component that runs the algorithms, cameras attached with the raspberry pi. Also, there is an important component in



the system which is the Arduino as it is responsible for the car motors and their motions. Arduino receives signals from the raspberry pi and based on them, it takes the appropriate decision for the car. The car consists of two main sub-systems which are distance measurement, Road sign detection, and lane detection. Firstly, stereo vision dual cameras are used, so that the car can recognize the distance between itself and any other obstacles in front of it to avoid any chance of collision. This method is applied in a self-driving car as it calculates the distance and helps the car to be aware of the external environment more accurately than any other sensors used for some of the self-driven car prototypes like ultrasonic. Secondly, one of the dual cameras is also responsible for capturing and detecting the road lanes by applying some filters on the video frames from the camera to enhance them.

II. OBJECTIVES

This research focusses on studying the self-driving Image Processing Car using Arduino & Raspberry Pi

- The driverless vehicles will decrease congested traffic and create a smoother traffic flow, making the streets safer for everyone
- Autonomous cars could open up doors for people with disabilities, providing them safe and reliable transportation.
- With autonomous cars accidents can also be avoided.

III. SCOPE OF PROJECT WORK

- Self-driving cars will be able to eliminate crashes.
- Self-driving cars will be able to eliminate unnecessary Trafficking.
- The remote system can also determine what speed the modeled car should travel, what direction it should travel following the specific pattern(pathway) provided for the modeled car on the road.

IV. METHODOLOGY

A. Mechanism:

- Arduino based autonomous car has to be designed.
- Arduino is programmed with Arduino software. (IDE)
- Raspberry Pi is used for image processing.
- Camera is used to capture the image and sent to the Raspberry pie for processing.

B. Software implementation:

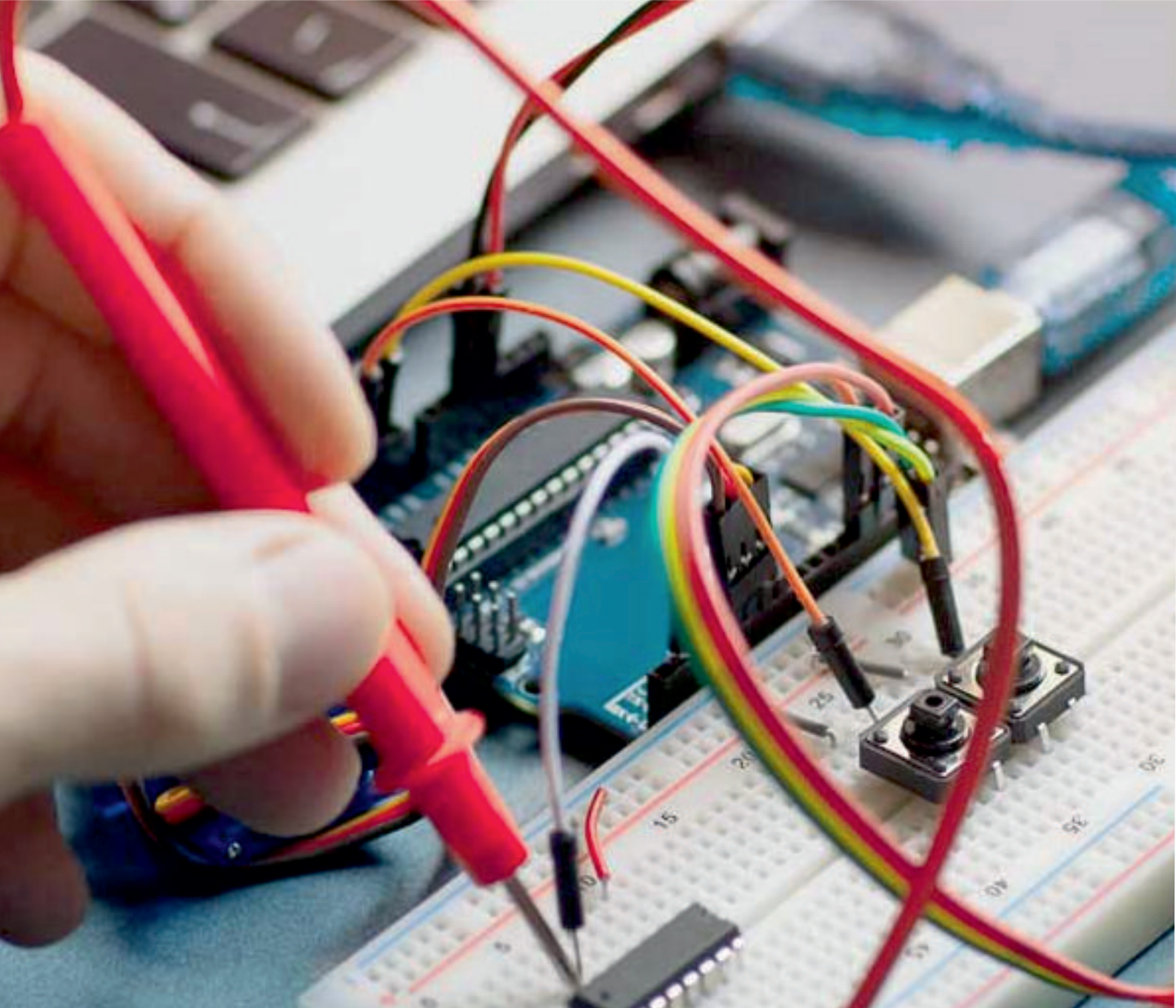
- Software part programming is through Arduino Uno software (IDE).
- Easy to write a code and upload it.

C. Hardware implementation:

- Arduino Uno kit
- Raspberry Pi kit
- Jumpers, Motors, Power supply, etc.

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