

Object Tracker and Follower Robot using Raspberry Pi

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ABSTRACT:

Now a day the robotic systems towards being autonomous surveillance the need for more smart robots have become very essential. To identify and track the real time object is important. The application of object detection and tracking is in farming, military, civil, security and for commercial use especially for surveillance purpose. One of the aspect of tracking an object from its visuals has been taken up in this project. In this project robots can detect the object and rotate as left and right position and then move forward and backwards depends upon the object movement. It maintains the constant distance between the object and the robot. We will be using a Raspberry Pi processor board for computational purpose and driving of the robot. The camera attached to the system captures the images . By monitoring the incoming images the robot is able to decide to proceed in which direction it should go. It recognizes the shape, size and color of the object. With these calculations it proceeds towards the object and stops at a location near the object. In this way with the help of advanced technology the Object tracker and follower robot can achieve object tracking autonomously. We use Raspbian OS with python coding to identify the object.

Keywords: Raspberry Pi , Camera Module , Raspbian OS , Python

I. INTRODUCTION

Nowadays, the objective of the tracking of a moving object is to estimate some characteristics of interest (pose, velocities, accelerations, shape, size. from the information provided by the sensors. It has been widely studied and it constitutes a research domain itself. Furthermore, the necessary techniques to perform the tracking highly depend on the specific application. The aim of this project will be design and development of a real-time system to detect and track the objects .

Introduction of Embedded System :

An embedded system is one kind of a computer system mainly designed to perform several tasks like to access, process, and store and also control the data in various electronics based systems. Embedded systems are a combination of hardware and software where software is usually known as firmware that is embedded into the hardware. One of its most important characteristics of these systems is, it gives the o/p within the time limits. Embedded systems support to make the work more perfect and convenient. So, we frequently use embedded systems in simple and complex devices too. The applications of embedded systems mainly involve in our real life for several devices like microwave, calculators, TV remote control, home security and neighbourhood traffic control systems, etc.

II. LITERATURE SURVEY

2.1 Line follower and obstacle avoidance bot using arduino : It has been designed and developed by Aamir attar, Aadilansari, Abhishekdesai, Shahid khan, Dipashrisonawale to create an autonomous robot which intelligently detects the obstacle in its path and navigates according to the actions that user set for it. So this system provides an alternate way to the existing system by replacing skilled labor with robotic machinery, which in turn can handle more patients in less time with better accuracy and a lower per capita cost.

2.2 Object Detection and Tracking Robot using Android, Arduino and Open CV : It has been designed and developed by Sarbani Debroy , Neha Kumari , Purushottam Singh , Subhash Kude , Phiroz Sheikh aims to implement a robot which can detect motion and follow an object at the same time. This can be considered as a prototype for developing advanced models based on automated home security systems.

III. PROPOSED SYSTEM

The proposed system will have camera mounted robot with raspberry pi. The captured images will be processed to identify object. Till the object is detected the robot will be searching the object by moving around it. The code written on raspberry pi will control robot motors and camera mount to identify the same, once the object detected robot will be tracking the object by control of motor. The captured images will be processed to identify object. This is what we propose in this system rather than the existing system.

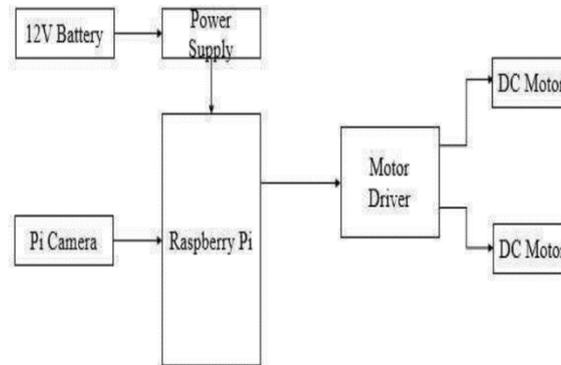


Fig 1 : Block Diagram of Proposed System

IV. HARDWARE REQUIREMENTS

The hardware requirements we are used in this project are:

4.1. Raspberry Pi :

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python.

It consist of 40 GPIO pins . The GPIO pins are one way in which the Raspberry Pi can control and monitor the outside world by being connected to electronic circuits.

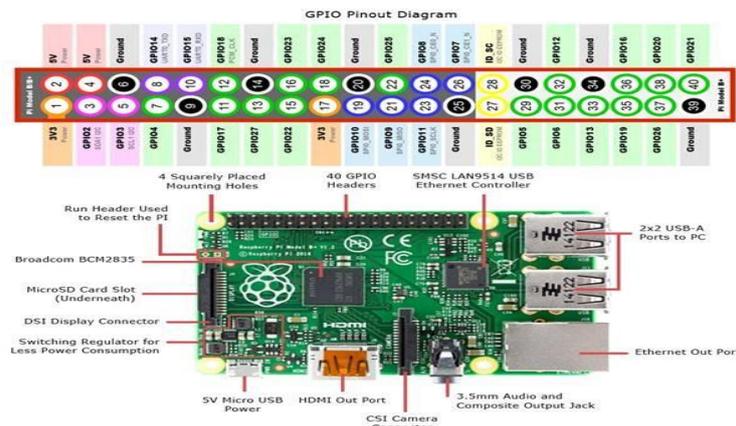


Fig 2 : Structure of Raspberry Pi

4.2. Pi Camera :

Pi camera module is a portable light weight camera that supports Raspberry Pi. It communicates with Pi using the MIPI camera serial interface protocol. It is normally used in image processing, machine learning or in surveillance projects. It is commonly used in surveillance drones since the payload of camera is very less.

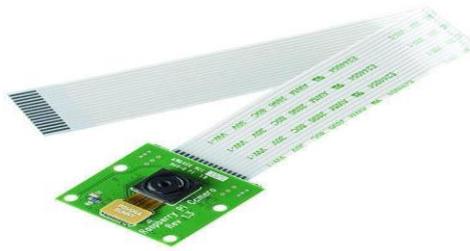


Fig 3 : Pi Camera

4.3. DC Motor :

A machine that converts D.C power into mechanical power is known as a dc. motor. Its operation is based on the principle that when a current carrying conductor is placed in a magnetic field, the conductor experiences a mechanical force.

4.4. Battery:

A rechargeable battery is an energy storage device that can be charged again after being discharged by applying DC current to its terminals.

Rechargeable batteries allow for multiple usages from a cell, reducing waste and generally providing a better long-term investment in terms of dollars spent for usable device time. This is true even factoring in the higher purchase price of rechargeable and the requirement for a charger.

4.5. L293D Motor Driver:

L293D is a dual H-Bridge motor driver, So with one IC we can interface two DC motors which can be controlled in both clockwise and counter clockwise direction and if you have motor with fix direction of motion the you can make use of all the four I/Os to connect up to four DC motors.

V. SOFTWARE REQUIREMENTS

PYTHON:

Python is a general purpose, dynamic, high level and interpreted programming language. It supports Object Oriented programming approach to develop applications. It is simple and easy to learn and provides lots of high-level data structures. It is easy to learn yet powerful and versatile scripting language which makes it attractive for Application Development.

NOOBS : New Out of Box Software

The Raspberry Pi Foundation obviously thought so as they have released NOOBS, a tool for streamlining installation, running multiple operating systems and easily configuring your OS options. NOOBS is a way to make setting up a Raspberry Pi for the first time much, much easier. You won't need network access, and you won't need to download any special imaging software.

VI. RESULT

The camera mounted in the robot captured the images. The captured images will be processed to identify object. Till the object is detected the robot will be searching the object by moving around it.

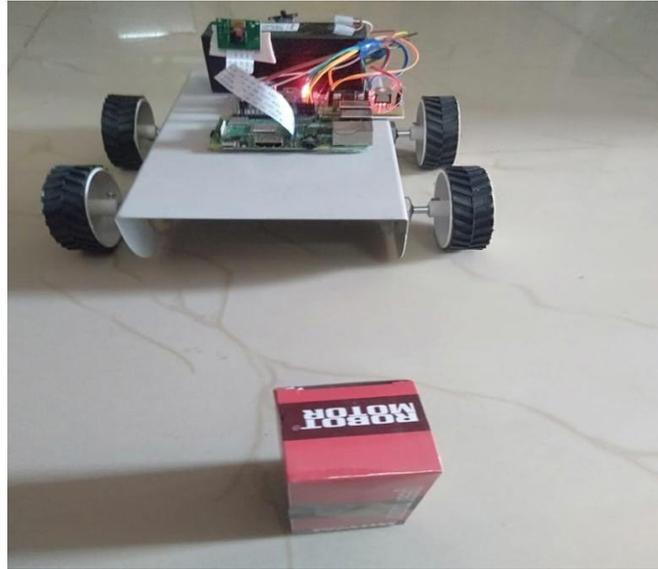


Fig 4 : Object Tracker and Follower Robot

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