

Travelmate Robot: Smart Touchless Trolley

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Abstract: Robotic technology has increased appreciably in past couple of years. Such innovations were only a dream for some people a couple of years back. But in this rapid moving world, now there is a need of robot such as “Travel mate Robot” that can interact and co-exist with them. To perform this task accurately, trolley needs a mechanism that enables it to visualize the person and act accordingly. The trolley must be intelligent enough to follow a person in the crowded areas, vivid environment and in indoors and outdoors places. The image processing carried out to get the information about the surroundings visually is a very important thing. The following points should be carefully noted while doing the processing. Travelmate Robot reducing the human intervention to a minimum. This will reduce the time delay and human efforts in luggage management system. Now a days-everybody uses a luggage for travel especially to airport all of them dragging out heavy luggage. Passenger need to carry his /her own luggages. This is very slow and expensive process. And it becomes hectic journey. This problem can be overcome by automatic luggage follower system.

Keywords: IoT, robots, travel assistance.

1. Introduction

The Internet of Things (IoT) is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and connectivity which enable these objects to connect and exchange data. Each thing is uniquely identifiable through its embedded computing system but is able to inter-operate within the existing Internet infrastructure. The IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention

In supermarkets, everything is in a manual process and now, in this emerging world everyone needs to save their precious time so, many have started to purchase online which is much easier and flexible. By making a manual process into an automated one, will reduce the manpower and saves more time.

We design Human following trolley using image processing. It is necessary to make trolley such as “Human following trolley which interacts and co-exists with them. To perform this task accurately, trolley needs to avoid obstacles and also it must be intelligent enough to follow a person in a crowded area, rich environment and indoor and outdoor places. From the input

image color tag will be detected and selected as foreground. Recognition of the detected user to be followed.

2. Literature Survey

Jayant Nivrutti Patil et al. [1] This paper represents a method for controlling a robot using Raspberry Pi and an application built in the android Platform. The robots controlled by mobile phone via moving the Robot upward, backward, left and right side by the android application and Raspberry Pi. The android phone and raspberry pi board is connected through wifi. A signal is generated from the android app and which will be received by the raspberry pi board and the robot works according to predefined program. The android app is command center of robot. The program is written in the python language in the raspberry pi board. The robot performs the same activity as the human hand works.

K. Akhila et al. [2] This paper proposes a method for controlling a Robotic arm using an application build in the android platform. The android phone and raspberry pi board is connected through Wi-Fi. As the name suggests the robotic arm is designed as it performs the same activity as a human hand works. A signal is generated from the android app which will be received by the raspberry pi board and the robotic arm works according to the predefined program. The android application is the command center of the robotic arm. The program is written in the python language in the raspberry board. The different data will control the arm rotation.

Akshay Chalke et al. [3] This paper proposes to build a robotic cart which is able to track and follow the target in unstructured environments. This paper will help to reduce the human efforts in domestic and industrial applications. A person following robot is desired in many applications. A follower robot can be more helpful in medical and military purpose where every human effort is precious and can cost us to a great extent. In this article, we introduce a new approach towards a follower robot. More specifically, our approach is to design a control system which can carry luggage as well as follow the target person.

Muhammad Sarmad Hassan et al. [4] The primary goal of this work was to design and fabricate a robot that not only tracks the target but also moves towards it while doing the tracking. In order to make things simpler, a unique handmade tag was placed on the person that the robot needs to follow. The object

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has to be unique for the robot to recognize it and carry out the objective. The simple tag removes this problem of uniqueness and makes the task fairly easy.

3. Methodology

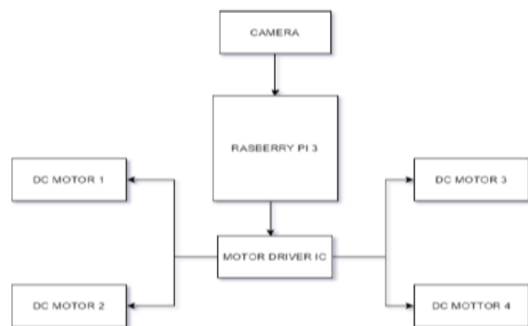


Fig. 1. Block diagram

Camera will continuously capture the images of the unique tag and continuously compares it to the original captured image. All processing is carried out using a raspberry pi. The trolley is mechanically designed, and electrical components are also used. The L298N is a dual H-Bridge motor driver which allows speed and direction control of DC motors at the same time. The module can drive DC motors that have voltages between 5 and 35V, with a peak current up to 2A.

Motor drivers acts as an interface between the motors and the control circuits. A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. DC motors are used for movement of robotic wheels, i.e. to move right-left, forward or backward direction.

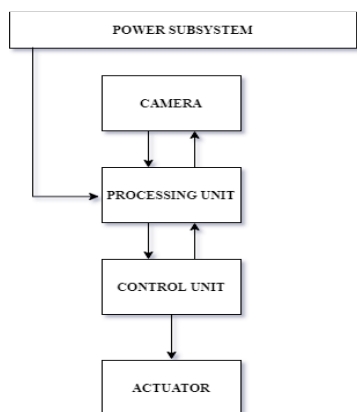


Fig. 2. Functional diagram

Figure shows the functional diagram of the project. The first phase is the detection of a tag by means of a camera and carrying out the substantial processing in the processing unit. The processor that we have used is Raspberry Pi 3. After the detection of tag next phase is to establish a serial communication between the processor and control unit. By using object tracking mechanism trolley will be moving in the direction of the colored tag.

This project used HSV color detection concept. The HSV color space is more intuitive to how people experience color

than the RGB color space. As hue (H) varies from 0 to 1.0, the corresponding colors vary from red, through yellow, green, cyan, blue, and magenta, back to red. As saturation(S) varies from 0 to 1.0, the corresponding colors (hues) vary from unsaturated (shades of gray) to fully saturated (no white component). As value (V), or brightness, varies from 0 to 1.0, the corresponding colors become increasingly brighter. The hue component in HSV is in the range 0° to 360° angle all lying around a hexagon as shown figure 3 [3]. With RGB the color will have values like (0.5, 0.5, 0.25), whereas for HSV it will be (30°, $\sqrt{3}/4$, 0.5). HSV is best used when a user is selecting a color interactively It is usually much easier for a user to get to a desired color as compared to using RGB. This object tracking algorithm is called centroid tracking as it relies on the Euclidean distance between (1) existing object centroids (i.e., objects the centroid tracker has already seen before) and (2) new object centroids between subsequent frames in a video.

Object tracking is the process of:

1. Taking an initial set of object detections (such as an input set of bounding box coordinates).
2. Creating a unique ID for each of the initial detections.
3. And then tracking each of the objects as they move around frames in a video, maintaining the assignment of unique IDs.

Furthermore, object tracking allows us to apply a unique ID to each tracked object, making it possible for us to count unique objects in a video. Object tracking is paramount to building a person counter.

4. Conclusion

The human following trolley is experimented and implemented, which captures the tag using camera and follows the particular human. So this device is cost-effective, and it reduces human efforts. Also, this device is utilized for various places like malls, hospitals, railway platforms etc. The project is developed with low cost, low power Consumption by taking into account on the changing trends in retail shopping, we come to a conclusion that the Intelligent Shopping cart is most certainly a necessity one for the Retail marketing store to step up their portfolios, to cope up with the advancement in technology and to save time and manpower. With the aid of automatic following cart, supermarket owners need to purchase and can easily install it under shopping cart. Users can enjoy shopping without pushing shopping carts themselves. As the cart is controlled by a microprocessor it can follow the user and equipped with on board billing system. In the era where humans are investing more and more on technology for their comfort, the intelligent shopping cart is worth marketing one.

References

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