SMART VACUUM CLEANER ROBOT

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ABSTRACT

Automation is one of the trending subjects surrounding the manufacturing industry in the 21st century. Not only does it help manufacturers keep up with growing global demand, it also helps create new job opportunities as well as help a manufacturer progress into the 21st century. With the advancement of technology, robots are getting more attention of researchers to make life of mankind comfortable. This paper discusses the design of prototype of Automatic Vacuuming robot . The robot works autonomously within a confined space and requires human intervention only to transfer it from one room to another. The robot is designed to replace human efforts with automation and can be a radical technology if made affordable

Keyword: - *Raspberry Pi , Motor Driver circuit, web cam, auto detect*

1.INTRODUCTION

To reduce the workload people is always find a solution. Nowadays time is also a factor, to consume time it is also one of the important tasks in all electronic device. Every successful product, behind it a lot of hard work is there, a lot of innovations, that may he failed or partially successful, when we considering a cleaning robot or machine all the innovative products are the same in the way they're a function but all are different technology and method are applied for making it simple and use full. It is an embedded system based project and it works on automatic mode. The automatic mode is controlled by an obstacle sensor like ultrasonic Sensor. The ultrasonic sensor emits ultrasonic waves into the surrounding and that sense obstacle ,when the obstacles is present the ultrasonic waves send back give command to ultrasonic sensor to stop. The embedded system is controlled by Raspberry Pi, is raspberry 3 model b+,1.4GHz 64-bit quad-core processor, dual band wireless LAN, Wi-Fi module, etc. Raspberry is an inbuilt module, such as Wi-Fi, camera, Bluetooth, Ethernet, HDMI and etc. we are using four motors, for brushes, controlling wheels and motor for vacuum. L298N is the driver IC which help to switch purpose and interfacing A web camera which is helps to capture the picture of the floor while the robot is running. The web cam is used for image processing and to detect the dock station.

1.1 Problem Statement

Nowadays, people lead busy life. People in urban have abnormal and long working hours. In such a situation an individual will always find ways of saving time
1 for career-oriented and deaing women t's hard to handle home together with job work
2.Normally floor is cleaned with the utilization of dry mopped or wet mopped using the hand as a base tool they need to be scrubbed hard on the surface
 3. The cleaning module includes cleaning varied surfaces Ike cement floors, and highly polished wooden or marble floors
4. The rough surface areas like cement floors, are covered with heavy dust which consumes longer in cleaning

1.2 Solution Strategy

For time-saving purposes the House Cleaning Robot is important, which is an
1. Autonomous robot for floor cleaning application reduces time in existence t does sweeping and mopping tasks at a time, I also detects obstacles, and has an automatic water sprayer.
2. Automated Floor Cleaners are designed for cleaning offices, homes also in collages in one of the modest, his robot makes decisions on the premise of humans or various sensors which are employed in this robot.

2. METHODOLOGY

Raspberry pi is the heart of the project. We use raspberry pi 3 model for image processing. The raspberry pi has 40 pins, from these twenty are incoming pins and twenty are outgoing pins. Ultrasonic sensor and I R sensor are connected to incoming pins of Raspberry pi . The Ultrasonic sensor is used to detect obstacle which is present in the path. The ultrasonic sensor sends the ultrasonic waves through transmitter and receives back to the receiver of ultrasonic sensor. If the obstacle is present in the path of robot the ultrasonic sensor detect it and send command to Raspberry pi to stop the robot. If there is no any obstacle in the path robot keep working.
I R sensor is used to detect the the level of floor . when stairs are present in the room then it will detect the level or height of the stairs and stop the robot from working. Two motor driver circuits are connected to output pins of Raspberry pi. The input signal of motor driver circuit is given by Raspberry pi and output pins of motor driver circuit is connected to motor which are used for motion of brushes and motion of wheels. There is another one motor is used which is known as suction motor or vacuum motor. This motor create the pressure inside the container and sucks the dust from floor into the container.
The web cam is used for image processing. The exact location of dock station is determined by web cam. It also helps to detect the obstacle . when the battery level reaches the minimum level or below than 20% , it send command to web cam to search the dock station and goes to dock station to charge the robot.
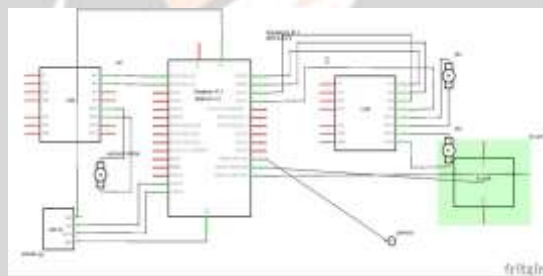
Fig -1: Circuit Diagram
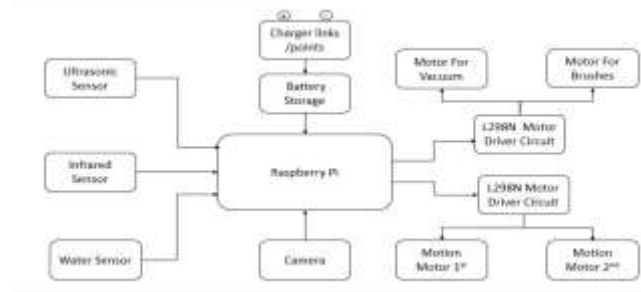
Fig -2: Block Diagram

Battery-operated cleaning robot cleans and mops at the same time using a smartphone connection. Raspberry Pi 3 is the main controller used to control the cleaning robot. It is a Raspberry Pi 3 model based on Raspbian buster OS. Raspberry Pi 3 is open-source software in which hardware can be easily used. Raspberry Pi 3 is

energized by 1a 2V, DC battery. Bluetooth electronics app controls cleaning robot with an android device. This app communicates using Bluetooth to an HC-05 Bluetooth module in the robot. An ultrasonic sensor is used for obstacle detection which transmits the ultrasonic waves from its sensor head and again receives the echo waves and sends its output signal to the Raspberry Pi 3 will stop the robot immediately and the buzzer will be actuated. The ultrasonic sensor is connected to the servomotor, which helps in the rotation of the ultrasonic sensor. The ultrasonic sensor measures the distance between the robot and the obstacle in front of it. If any obstacle is present in front of the robot, the IR sensor gives a signal to an ultrasonic sensor is used for which transmits the ultrasonic waves. The L298N driver circuit is used to drive the DC motors simultaneously in all directions. Raspberry Pi 3 sends the signal to the motor driver circuit that controls and drives the wheel.

Fig-3: Interior View of Robot

3. CONCLUSIONS

      We have developed an automatic cleaner robot that will performs dry cleaning as well as wet cleaning. This robot operates in an automatic mode have some additional features like scheduling for the specific time. This robot is designed with the motive of helping people to clean their house daily. This is very useful for working women's, old age peoples and handicapped peoples.

      Today, the vacuum cleaner has been effective in minimizing the amount of work for the domestic cleaner. It has also reduced the time and energy to clean. In other words, vacuum cleaner today has become a percieveable and essential household appliances for most domestic homes, business, and work. Today people use vacuum cleaners for many different reasons. It can be used to vacuum at home, business, work, car, or environmental purposes. In conclusion, vacuum cleaners are one of the greatest household benefits ever invented because it immensely to the world impact on Environmental and health.

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