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Smart Floor Cleaner Controlled by Raspberry Pi and Intelligent IOT

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ABSTRACT: In this present situation, human beings are leading a busy life. People have irregular and heavy working times. In such a condition people will always find a solution for saving time and reduce workload. Nowadays manual work is taken over by robotics. The proposed paper, an autonomous and manual mode is done by the robot, the robot that capable of gulping, mopping, obstacle detection, and water spraying. The robot is mainly designed for old age people, handicapped and working women. The hardware and software operations are controlled by Raspberry Pi.

KEYWORDS: Raspberry pi , L293D, IR Sensor, IOT

I. 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 be 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 both manual and automatic mode. Manual mode operation is done with the help of the android app and it controls the instruction such as mopping, gulping, pumping, and movements the robot. The automatic mode is controlled by an obstacle sensor like IR Sensor. The Infrared sensor emits some kind of radiation into the surrounding and that sense obstacle. 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 mopping, gulping, pumping and controlling wheels. L293D 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 captured picture which shows on the mobile screen, and this picture which helps to control the manual mode operation.

II. RELATED WORK

A Lot of innovative cleaning robots are present in the market, all are different in their structure, technology, and method but all are similar in their function like mopping and sucking. Some of the published paper is described below.

ShripadMalavadikar, SwapnilMungale, ToshikaJohri, HarshadLokhande, in that paper "Automatic cleaner robot" in this paper the robot which is able to do both manual mode and automatic mode. The hitting into an object that avoided by using Ultrasonic sensor and IR sensor. The sweeping and mopping that done simultaneously. The robot that will remember its path by a mechanism Docking station, That starts mapping its area.

The next paper proposed by PoojaD.Rathod, Puja V.Wandile, Kiran S. Mohitkar, PallaviG.Jiwode In this paper "Multipurpose smart floor cleaning system by using Android Device" The robot is a multipurpose, used for both

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industrial and domestic application. Here use a PIC microcontroller to control all device. And using an Android app for controlling the automatic command, The android app that operated by Bluetooth module that interfaced with a microcontroller.

Another paper published by H.G.T.Milinda “Mud and dirt separation method for floor cleaning machine “ in this paper image processing technology that used to identifying mud and dirt. The algorithm that contains plane segmentation, threshold defining for MSER function, mud detection, residual filter, and thresholding.the filling morphology technic that used to enhancing background, RGB method is also used.

III. HARDWARE AND SOFTWARE DISCRIPTION

- RASPBERRY PI
- L293D
- IR SENSOR
- CAMERA
- WATER PUMP, MOP, AND SUCKING UNITS

RASPBERRY PI

The raspberry pi is a platform to do a project, it is an open source. Here we using a raspberry pi as the main component, it is a miniature form of the computer its size is credit card sized. It has many features are in build, so the size that maximum reduced. The inbuilt components such that camera module, Wi-Fi module, USB ports, HDMI, Ethernet, Bluetooth, speaker, mica, etc. It has the ability to interact with the world easily. The data transfer rate is high, because its size is less. The controller starts up to 2800

L293D MOTOR DRIVER IC

L293D is motor driver IC is a driver IC that help to operate two motor simultaneously by using the H bridge concept . It using to interface two motors and that two motors operate simultaneously .The motor driver Ic that control the direction of motors and reduce the back emf produced by the motor during its working time. The driver ic that receive signal from the controller and transmit to the motor .It has two pin one for draw current and another for supply voltage to motors . The controller and driver IC are connected by the general purpose pins in the Raspberry pi .The H bridge concept is that the circuit thatswitches based on the polarity that applied to the load .The h bridge concept that mainly used in this type of robots for the backward movement of motors . Available in 16-pin DIP, TSSOP, SOIC packages

WEB CAMERA

The web camera that connected with the Raspberry pi by using a in build camera module present in the pi controller .The camera that connected on the robot, it capture the front view of the floor and the captured image that passed to the android app. The image that help to operate the manual mode. The image that help while the operator not present near the machine .

IR SENSOR

The IR sensor is module to detect the presence of obstacle. It is a obstacle detector . When the robot is moving in a direction ,The mode of operation is automatic ,so no one is there for controlling the robot .The system automatically

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detect the presence of object and change the direction . IR sensor that emit continuously in order to sense object . The IR sensor that consist a PIN diode and a pre amplifier, these are embedded to an a single chip or a module.

MOP, SUCKING AND WATER PUMP

The mop ,sucking and water pump are the essential part of the cleaning machine. Mop which is used to clean the surface and sucking unit which collect the dust particle in the floor.water pump which is used to pumping the water to the floor cleaning the dirt on the surface while mop is used. Mopping and sucking are the important parts in the cleaning machine. Both automatic and manual mode of operation the cleaning task is done.

IV. EXPERIMENTAL RESULTS

The smart floor cleaner controlled by raspberry Pi and IOT technique that can operate in both manual and automatic mode with the help of mobile android app and IR sensor respectively . the raspberry pi is the main controller in this project we need to connect Wi-Fi and camera, we use raspberry pi so it contains inbuilt camera module and Wi-Fi module also. The mopping and sucking processes is done while operating the machine. The robot can move left, right, backward and forward also. the mop, sucking and water pump also be controlled by the android app. App that contain a page that shows the front image of the floor and so we can control from any where.

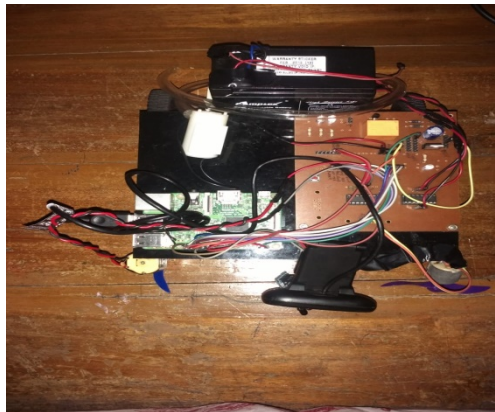


Fig 1.Smart floor cleaner. The manual mode is controlled by android app and automatic mode operate with the help of IR sensor.

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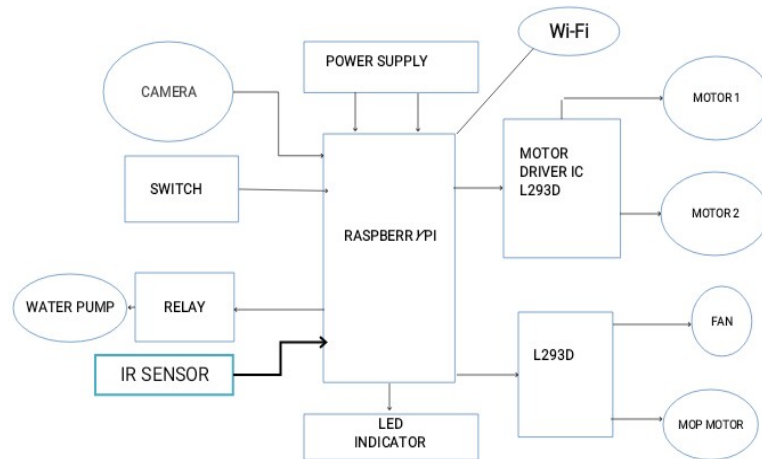


Fig 2. Block diagram of the smart floor cleaner, the main controller is Raspberry pi, IR sensor, relay and L293D driver IC.

V. CONCLUSION

The proposed paper which results an efficient floor cleaning machine with mopping, sweeping operations. This robot which works on both manual and automatic mode. The system which also provide obstacle detection by using IR sensor. The obstacle detection range is 10 cm. the robot that mainly focusing to reduce time and it help full to working women, old age people and handicapped people. By using the mobile app the manual mode is easily controlled.

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