

Robo Maid (Vacuum Cleaner)

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ABSTRACT

We live in a world filled with technologies. Robotics is one of the biggest advancements in it. The first digitally operated and programmable robot was invented by George Devol in 1954 and was ultimately called "the Unimate". This ultimately laid the foundations of the modern robotics industry. As years pass by, the robotics is flourishing well and is also a replacement for humans in many activities. Now-a-days the robots are programmed with various activities. The robots do the things which are programmed to them and hence the robot scientists came up with the idea of using in household works. There are robots out in the world which does household chores. It is one of the smarted ideas. Hence the domestic robots have entered but still it is immature and new in the global market. However these domestic robots are used for cleaning and mopping the houses. The purpose of this project is to clean and sweep the house with the use of remote control and sensor given to it. The main objective is to create a vacuum robot prototype using Arduino and IR Remote control.

KEYWORDS: Arduino, Remote Control, Vacuum, Home cleaning, Motor

INTRODUCTION

Among various robots present in the world, only some are programmed for house cleaning robots. Our project deals with such kind of robots. The robot is named as 'ROBOMAID' since it is going to clean and sweep the houses. The components used are Arduino, IR receiver, Servo motor, DC motor, IR remote control, battery, Jumpers, Motor driver and LED. It is a simple automated robot which is controlled by the IR remote control. Arduino here acts as the brain of the robot. It will execute the output according to the input given by IR remote. The motors used are DC motor for movement (forward and backward) servo motor for directions (right and left). A led is used indicating the battery level.

LITERATURE SURVEY

ROOMBA

Launch Date: 2002

Type of use: Dry Vacuum

Technology used: IR, RF and auto-charging mechanism

Properties: Easy to use

Power consumption: High (33W)

Noise created: Noisy

Manufacturer: iRobot (American)

Price: \$500

SCOOBA

Launch Date: 2005

Type of use: Wet Washing of Floor

Technology used: IR with virtual wall accessories

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Properties: scrubs hard floors automatically sweeps and pre-soaks, scrubs, then squeegees your floors

Power consumption: Low (5 W)

Noise created: Less Noisy

Manufacturer: iRobot (American)

Price: \$500

BRAAVA

Launch Date: 2006

Type of use: Floor Mopping for Hard Surfaces

Technology used: IR with virtual wall accessories for industrial cleaning

Properties: Easy to use, Cleans effectively

Power consumption: Medium (7.1W)

Noise created: Noisy

Manufacturer: iRobot, KITECH, Sony

Price: \$700

NEATO

Launch Date: 2010

Type of use: Vacuum Cleaning

Technology used: Laser range finder technology

Properties: Better suction power, effective clean pickup for more surface types.

Power consumption: High (30W)

Noise created: Noisy

Manufacturer: Neato-Robotics XV Series

Price: \$399

DYSON

Launch Date: 2016

Type of use: Vacuum Cleaning

Technology used: Real-time monitoring camera with 360deg rotation, turbo brush for efficient cleaning and auto charging mechanism

Properties: Bumps into thin things

Power consumption: High (28W)

Noise created: Noisy

Manufacturer: DYSON

Price: \$1000

COMPONENTS USED

ARDUINO:



ARDUINO is an open source platform used for building electronic projects. It consists of programmable circuit board which is the microcontroller, and also a software which is used to write and upload the computer code to the circuit board such as IDE (Integrated Development Environment). It does not need a separate hardware to load new codes in the board and rather can use USB cable. It uses a simplified version of C and C++ programming languages. It reads an input and gives the corresponding output. It runs on Windows, Mac and Linux. It is inexpensive compared to other microcontroller platforms. It is a simple, clear programming environment for beginners and also flexible enough for advanced users.

SERVO MOTOR:



Servo motor is a self-contained electrical which rotates part of the machine with high efficiency and great precision. It has certain capabilities that regular motor doesn't have. It makes use of regular motor and pairs it with a sensor. If an object is to be rotated at some specific angles or distance, then we can use this motor. If the motor is DC powered then it is a DC servomotor and if AC powered then it is an AC servo motor. The position of servo motor is decided by electrical pulse and its circuitry is placed beside the motor. They are used in home electronics, toys like cars, airplanes, and many more devices.

DC MOTOR:



The electric motor operated by DC. It is an electrical motor that converts direct current electrical energy into mechanical energy. DC motors have the advantage of higher starting torque, quick starting and stopping, reversing, variable speeds with voltage input and they are easier and cheaper to control than AC. It is used widely in Home automation, Automobile, Medical care, Electronic products.

MOTOR DRIVER:



Motor driver acts as a bridge between the motors and the control circuits. It requires high amount of current whereas the controller circuit works on low current signals. So the function of motor drivers is to take a low-current control signal and then turn it into a higher-current signal that can drive a motor.

IR REMOTE CONTROL:



IR remote control is a wireless device used to operate audio, video and other electronic equipment within a room using light signals in the infrared range. Infrared light requires line of sight to its destination. Low-end remotes use only one transmitter at the end of the unit and have to be aimed directly at the equipment. High-quality remotes have many IR transmitters at different angles to occupy the room with signals.

IR RECEIVER:



The battery used is the 9V battery. It has a rectangular prism shape with rounded edges and a polarized snap connector at the top. It has both terminals in a snap connector on one end. The smaller circular terminal is positive, and the larger hexagonal or octagonal terminal is the negative contact. These batteries are so small and light in weight.

An infrared receiver, or IR receiver, is hardware that sends information from an infrared remote control to another device by receiving and decoding signals. The cable from the receiver to the connection block needs to accommodate both signal data as well as power since the receivers are active devices.

LED:

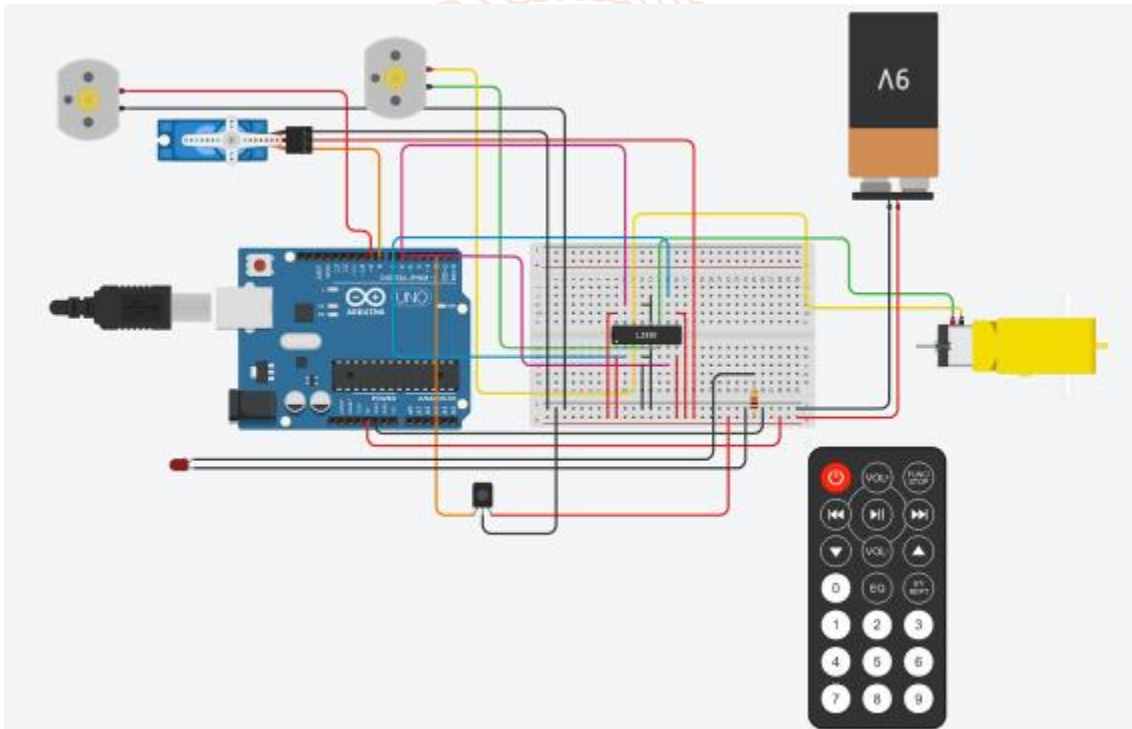


Light Emitting Diode is a semiconductor device that emits infrared or visible light when charged with an electric current. It is made from a very thin layer of fairly heavily doped semiconductor material and depending on the semiconductor material used and the amount of doping, when forward biased an LED will emit a colored light at a particular spectral wavelength.

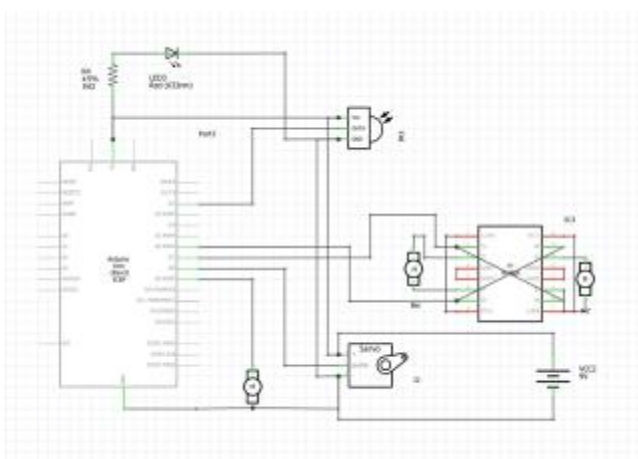
BATTERY:



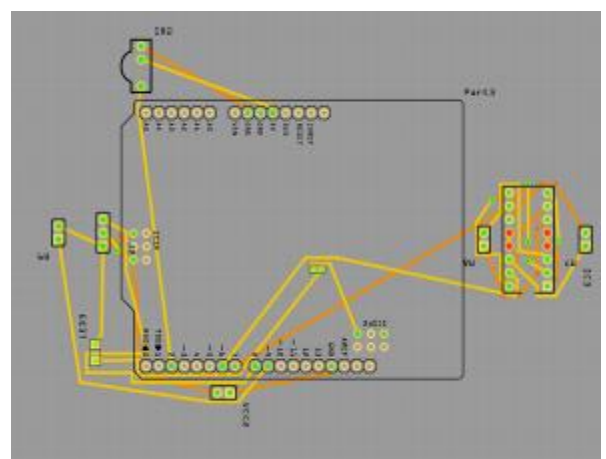
IMPLEMENTATION AND DESIGN



Circuit Design



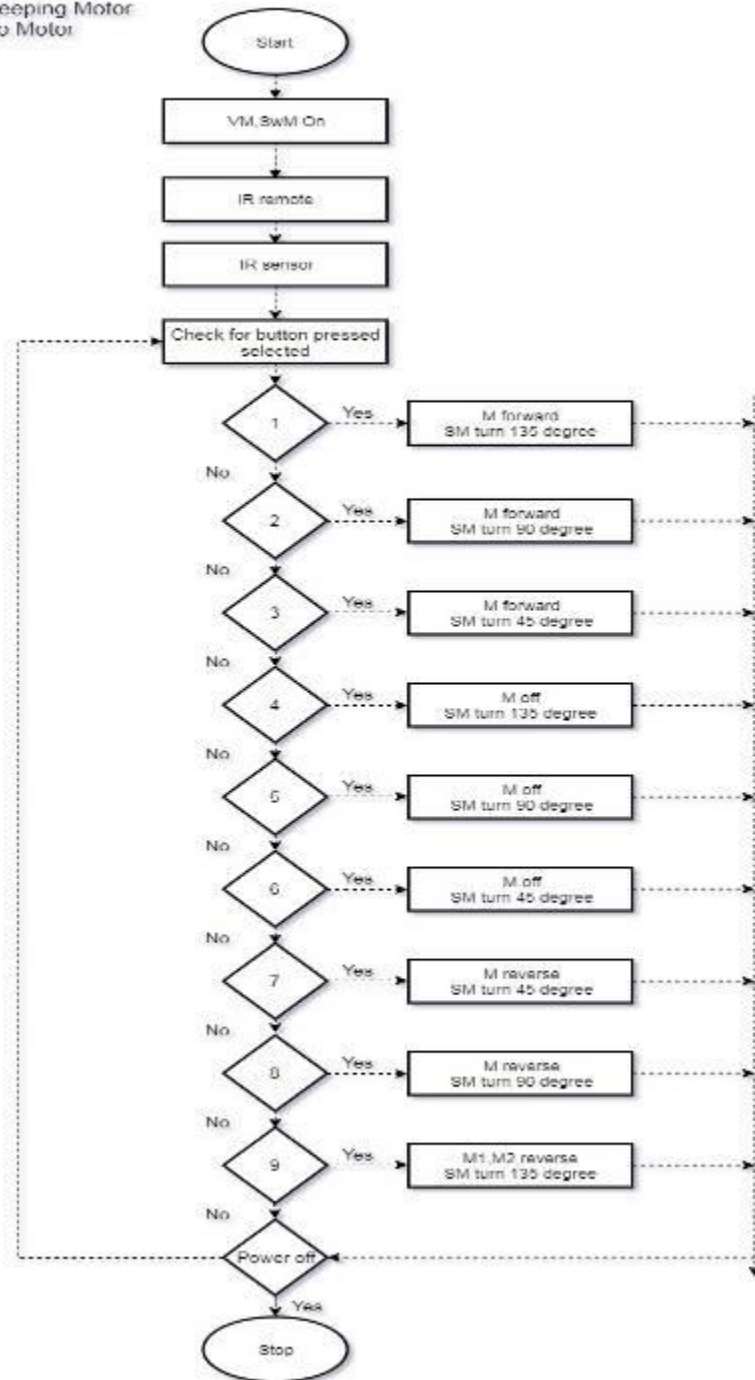
Schematic Design



PCB Design

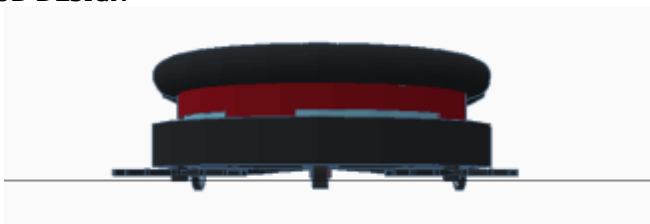
SOFTWARE IMPLEMENTATION

M - Motor
 VM - Vacuum Motor
 SwM - Sweeping Motor
 SM - Servo Motor

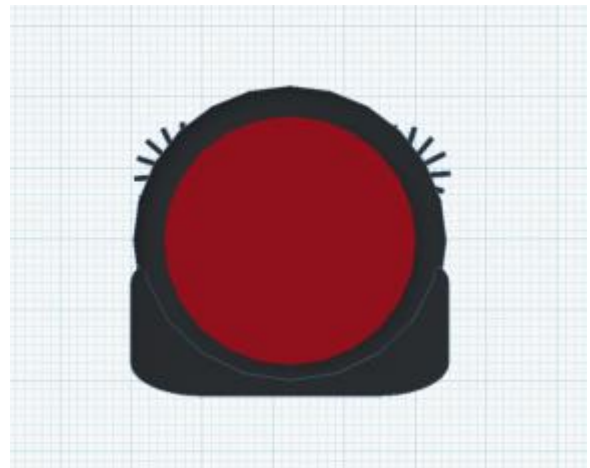


Flow chart

3D DESIGN



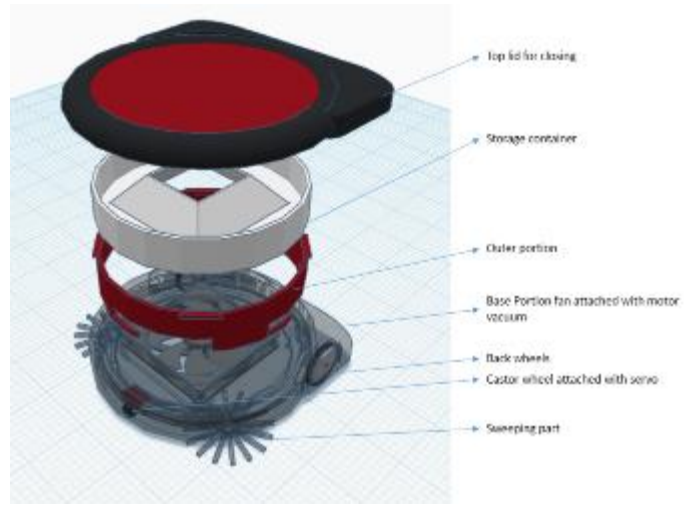
Front view



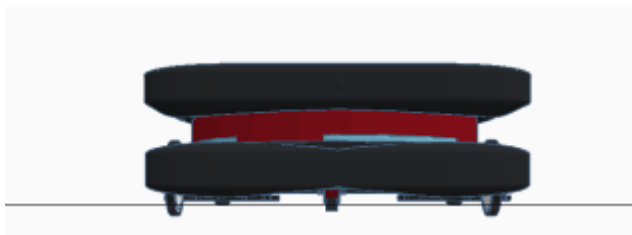
Top view



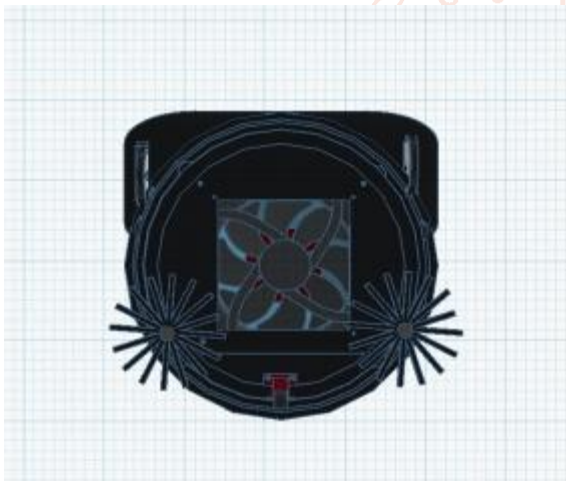
Side view



Interior view



Back view



Bottom View



Side view

COMPONENTS USED

Component	Component
Arduino Uno R3	1
DC Motor	3
Micro Servo	1
Battery	As required
Red LED	1
1 kΩ Resistor	1
H-bridge Motor Driver	1
IR sensor	1
IR remote	1
Jumper Wires	As required
Castor wheel	1
Wheels	2

CONCLUSION

There are so many housecleaning robots around the world but they are very expensive due to many components. And hence this robot is designed with less complexity and less number of components compared to the other robots out there in the market. It is user friendly. This robot may help the people and also saves time.

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