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Automatic Domestic Vaccum Cleaner

Tilak Saxena[1], Yash Tiwari[2], Mohd Amaan[3], Vikas Kumar[4], Ritvik Shukla[5]
[1]*Assistant Professor,* [2, 3, 4, 5]*Undergraduate Students, Department of Electronics and Communication Engineering, Axis Institute of Technology & Management, Kanpur, India*

Abstract: ***In this paper, completely different geometrics of Arduino, Bluetooth and Ultrasonic sensors associated with mechanical devices. Automation could be a terribly broader space of analysis and an amazing quantity of analysis which has already been exhausted. However, during this paper, we've got tried enquiring the choice approach for different mechanical as well as electronical work that's done by Automation as well as manual system by fixing it during a approach in order that it result for constant.***
Keywords: Arduino (Mega-2560), Bluetooth (HC-05), Ultrasonic Sensor (SR-05), Motor Driver (L-298), Charging Module.

I. INTRODUCTION

Automatic domestic vacuum cleaner is moreover known as mechanical force move, is an innovation that empowers the supply to transmit the electrical strength to an mechanical burden via automation using Arduino. This development is attracting a vast collection of usage from household vacuum cleaner to excessive machines used in hospitalities thinking of its solace and higher purchaser encounter. Presently nowadays, this improvement is swiftly developing from hypotheses towards the standard segment of a business thing, if there should be an occasion of sharp contraptions. Basically, the automatic domestic vacuum cleaner makes use of Arduino and automation to price itself, after which it deliver mechanical energy to the specific target. Automatic domestic vacuum cleaner makes use of automation, which works the system on loop until ultrasonic sensor align it to change the functionality.

A. Fundamental Principles Of Automation

Automatic force circulate is procedure that's nearly control the process on loop to generate mechanical work. Using automated systems to their full potential also requires a comprehensive deployment plan. When the proper steps to automation are taken, the typical adoption obstacles (cost and time) can be significantly reduced, unlike other forms of investment like equipment upgrades. This is due to the fact that automation may be implemented gradually when meticulously tailored and calibrated to our system unique requirements and operational conditions. Equipment and automation system integration is a multidisciplinary endeavor that necessitates the use of sound engineering principles. Software development can frequently be isolated and conducted separately from machinery and construction activities since software plays a vital role in automation initiatives. In practice, numerous disciplines need to be engaged and involved through all stages of development, from design reviews and hazard the operability studies through operational readiness exercises, because the software will be controlling actual machines.

II. LITERATURE REVIEW

In this, we discussed about the various publications that we draw inspiration from. An energy-efficient model of an omnidirectional, D-shaped autonomous robot that uses wireless sensors, bumpers, ultrasonic sensors, Arduino uno, and ESP8266 to use the least amount of energy while maintaining all of the capabilities of a vacuuming robot [1]. The device ability to support a 5kg payload, wireless operating, and onboard charging, all of which make it easier for us to climb the robot upstairs [2]. The number of parts, including DC motors, servos, l298 motor shields, ultrasonic sensors, and microcontrollers like the Arduino Uno are introduced. The motor shield L298 drives the DC motor while the Arduino Uno microcontroller treats the ultrasonic sensor as a robot driver and the DC motor as a distance detector. The floor cleaning robot automatically seeks for a non-impediment direction when the ultrasonic sensor detects an obstacle in front of it. When the distance recorded by the ultrasonic sensor is less than 15 cm, the sensor distance value is calculated. Many circumstances were discovered by testing the ultrasonic sensor's distance measurements. You will reach the stage of a cleaning robot prototype for cleaning the floors of roads at distances more than 15 cm [3]. Several industries, including industrial power plants, military applications, home chores, agricultural applications, etc., use robots and electromechanical devices to automate work processes. Robots are dependable ways to move things, clean up an area, etc. in settings where human interaction is either difficult or potentially dangerous for human health, such as chemical and nuclear power plants [4].

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It also includes information on "how to reduce the expense of your robot. They talked about the cleaning robot design process at the beginning of the paper. Choosing a cleaning and mopping procedure to follow is the first step, followed by the chassis' mechanical design [5]. The different functionalities for dirt detection and adaptive tiling scheme for selective area coverage are also introduced [6]. Since everything in the modern world is being modernized so the robot will be built with various functionalities for greater performance [7].

A. Proposed Technique

In this we discuss about the working of the module and its part. Arduino work as the main source of interaction which commands all the functionalities of the drivers as well as other machines. It helps the device to work in the control loop using automation. Energy supplied to the Arduino of (3V-7V) will be directed to all motor drivers (11V). We can control this device automatically as well as manually. The IOT based programming has been proposed in such a way such that it support both the technologies.

III. OBJECTIVE

The given module main aspect is to implement a multi-direction domestic robot which can climb stairs as well as also provide different functionalities. It also has a different interactive design. The aspect to implement the multi-tasking device which can perform more than one things at a time such as sweeping, mopping and climbing stairs. The device is also design in such a way to consume less energy and provide larger output.

IV. METHODOLOGY

The Arduino Mega is a microcontroller board, which controls the whole process. The overall system can be operated under two modes of operation namely, human control mode and automatic mode. Human control mode can be done by means of Bluetooth sharing between the 2 devices using their MAC address. The ingenious floor cleaner robot can be manually operated using android application by pairing the mobile phone with the Bluetooth module. The next mode of the system operation is automatic mode of operation. Under automatic mode of operation, the robot can perform all the operations autonomously without any human support to do the needful. Ultrasonic sensor interfaced with Arduino Mega R3 microcontroller is helpful to detect the obstacle in the floor cleaning path. If the sensor detects any hurdles in its path while moving, then the robot changes its path without stopping the cleaning operation. The path of the floor cleaner is in zig-zag motion . By this zig-zag path, the robot can reach the corners efficiently and do cleaning process more effective manner. A motor driver module has been incorporated to drive the wheels of the motors and the mops at back. In the automatic mode of the ingenious floor cleaner robot there are three different operations can be performed.

The three different operations of the ingenious floor cleaner robot include.

1) Both sweeping and mopping .
2) Only sweeping.
3) Only mopping

These three operations can be changed through the switch provided. If the floor is highly dirty, then it needs both seeping and mopping. If the floor is with only few hand- picked dust but not with dust then it needs sweeping alone. If the floor has few tiny dust particles then it needs mopping alone. For mopping purpose water sprayer is attached to spray water automatically.

V. BLOCK DIAGRAM

In this, we provide the power supply of 3V-7V and 11.V to Arduino as well as to motor driver respectively. All motor drivers are connected to Arduino for command and control purposes. Six motor drivers are proposed to use in this device for drive purpose. Each of the four motor drivers has connected to the two geared D.C. motors of 12V for movement of the device. Rest two motor drivers are used to control four battery operated motors. Respective, motor drivers are used for mopping and vacuum purposes. One dual sided battery operated motor is connected motor driver which helps settling down the vacuum pump up and down as per use. Two one-sided battery operated motor is used for sweeping while rest one-sided battery operated motor is used for mopping. Ultrasonic sensor is used to sense the objects and change the control loop of the automation. While Bluetooth is used to control the device manually which purposes the connectivity to the remote.

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The below block diagram shows how the system of automatic domestic vacuum cleaner works:

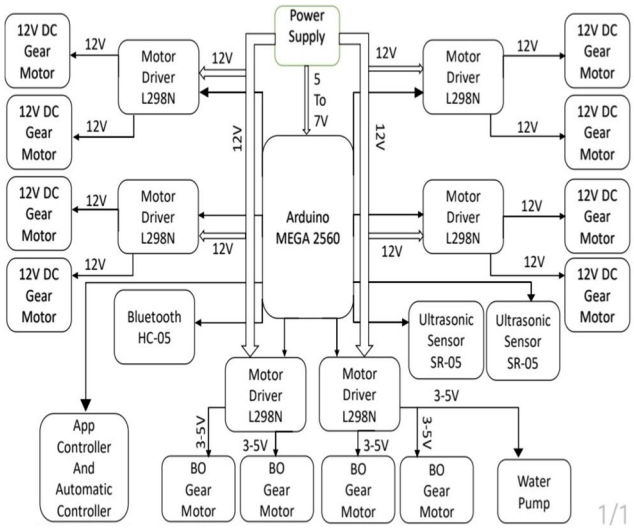


Figure1. Block Diagram

VI. WORKING

The working of the device mainly depends on the Arduino and design. As all the four battery operated motors are two motor drivers and other eight geared D.C. motors are connected to four different motor drivers. The motor driver gets controlled by the Arduino. When ultrasonic sensor detect an obstacle it send the signal, followed by which device changes the direction of its movement. While the other different tasks are also controlled by the Arduino as per instructions.

VII. RESULTS AND DISCUSSIONS

The research was conducted through stages as follows:

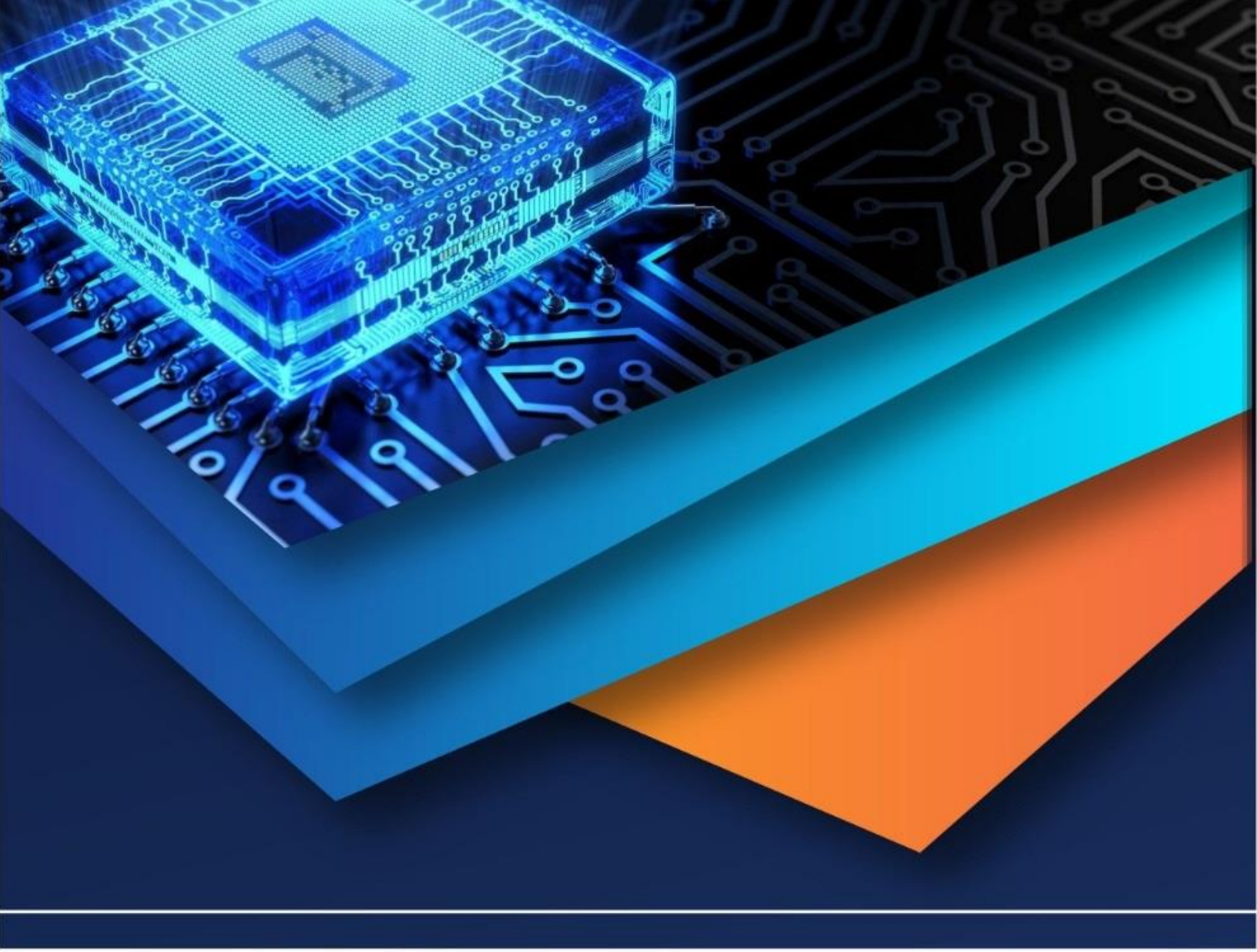
As this device has been designed in many building blocks such as physical structure as well as mechanical structure. All the design as well electronical behavior of the device works as per the records mentioned. The stair climbing functionality also works fine because of the muti-dimensional structure of the device. The Arduino as well motor driver controls all the movement of the device smoothy while the multitasking operations were also measured.

VIII. CONCLUSION

In our daily lives, automation is incredibly important. since automation cuts down on labor, costs, and other factors. With the use of robotics, many automated procedures in business, healthcare, and offices may be completed. One crucial activity that requires concentration is automating cleaning operations. This endeavor sheds light on hover cleaner progress. Innovative floor cleaner has two modes that may be selected by the user. Both sweeping and mopping procedures are included. As households become more automated, convenience increases and time spent on household chores decreases. Although hoover cleaners have made housecleaning simpler, they can occasionally be too noisy and awkward to be used frequently. The ability of this equipment to climb stairs is a major feature. This project's central location was chosen with consideration for the dust seen in Indian homes. It is particularly beneficial because it is essential to maintaining society's cleanliness.

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