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Automation of Floor Cleaning Robot

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Abstract: ***In the present-day scenario, all the members of a family are busy with their work and are not getting proper time to clean the house. The cleaning robot helps to clean and mop the floor. This is done by simply pressing a switch and the robot does the work. This also cuts down the labour used in factories for cleaning the floor. Above is the case, motivated for the design and development of an automatic cleaning and mopping robot that does all the cleaning and mopping work with a simple press of a button. This robot can be controlled manually with the help of a mobile Blynk app. The main motto of the project is to make this affordable and suitable for Indian users and factories. The development of the robot starts with the design of a simple and most effective chassis for the robot which is a very important part as it has to carry all the weight on the robot. The electronics part where, the type of motor and its specification that should be used to run the bot, the sensors to be used, the microcontroller, the motor drivers, the wheels, and other electronic components to be used on the robot are decided. Further, the assembling of the components will be done and finally testing and calibrating the device. A robot that is capable of efficient dust cleaning and mopping of the floor of a given room is the main aim of the robot. It is aimed to make the robot economic and feasible for the economic class society. The target time of operation of the robot is one hour. The developed robot will be useful for household applications and industries. This helps to keep the workspace and house clean without physical labour. Also, the device will clean the room with a single switch of a button.***

Keywords: Automation, Sensors, Embedded System, Arduino, Blynk.

I. INTRODUCTION

We are living in the embedded world. you are surrounded by many embedded products and your daily life largely depends on the proper functioning of these gadgets. television, radio, cd player of your living room, washing machine or microwave oven in your kitchen, card readers, access controllers, palm devices in your workspace enable you to do many of your tasks very effectively. Apart from all these, many controllers embedded in your car take care of car operations between the bumpers and most of the time you tend to ignore all these controllers. Some old people cannot clean their house on their own and living alone and also there are people might be suffering to clean the hospital rooms in this covid period. for those, we are making this project and this can clean the floor in three ways i.e., mopping the floor, cleaning the dust through a vacuum pump, and wetting the floor before mopping. the commands were given through the blynk app mobile application. The robot can move automatically or manually, everything is been operated through commands.

II. RELATED WORK

Uman Khalid, Muhammad Faizan Baloch [1] proposed a floor cleaning robot equipped with Swedish wheels. It can be used in crowded places such as houses, train stations, airports, etc. the robot can perform its work in autonomous and teleoperated mode. Moreover, the robot can pivot around without turning, can avoid obstacles and is provided with automatic power management ability. And meanwhile, the kinematics for its control and controlling methods are studied and demonstrated. This new structure, smooth locomotion capability and high working efficiency are verified by experimentation. In the early 90s, Denning Company and Windsor Industry Company of America developed a kind of cleaning robot called RoboScrub.

The robot uses ultrasonic range finders for obstacle detection and feature extraction. In addition, they are provided with high precision laser-based navigation system. This paper presents a new floor cleaning robot, which can move along all directions by its Swedish wheels and has four cleaners with automatic switching capability.

B R Santosh Kumar [2] proposed floor cleaning using automatic and manual modes. They have used RF modules for wireless communication between remote and robot having a range of 50m. In the automatic mode, the robot controls all operations itself and changes the lane in case of hurdle detection and moves back. In the manual mode keypad is used to perform the expected task and to operate the robot. It follows a zigzag path.

To make the whole system wireless, RF modules have been used in automatic and manual with a 50m range. For user convenience, an automatic water sprayer is attached which automatically sprays water for mopping, therefore no need to attach wet cloth again and again for mopping.

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Pallavi Bangare, Akshay Chougule, Shubham Shinde [3] proposed the main objective of the project is to perform both wet and dry cleaning autonomously. Initially, the inputs are received from the IR sensor. The battery supply is used in this system so that the robot becomes more reliable. The transducers used are the Infrared sensors which convert the light signals into an electrical signal. The motors used in the system play an important role. Motors are used in the function of the movement of the robot.

Also, the mechanism of wet cleaning is done using the motor. The memory system used in this system plays an important role to remove the deadlock in the operation. Thus, the EEPROM and RTC work together to avoid deadlock in the cleaning operation. The IR sensor provides the signal indicating the presence of an obstacle in the path of the robot. If there is any obstacle between the paths then the robot will turn its direction with respect to its current direction and if there is no obstacle then it moves in the current direction. After some intervals, the vacuum pump will start working for some time automatically.

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III. PROPOSED SYSTEM

This system consists of a facility to control automatically as well as manually, it can clean the room by watering the floor and also cleans by using a vacuum.

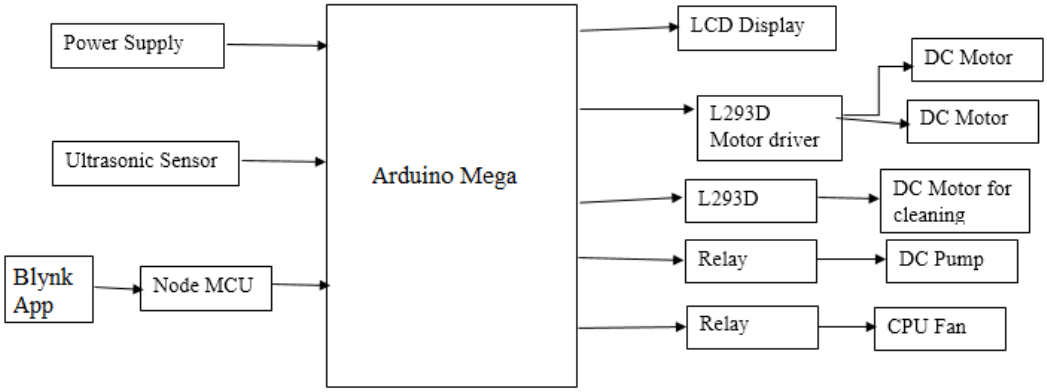

Figure 1 Block diagram of the proposed system

The robot starts by activating a simple switch. It simultaneously starts cleaning and mopping the floor. It follows per set path starting from one end of the room and finally completes the entire room cleaning. After reaching the other end of the room, the robot changes its direction and follows the path perpendicular to the previous path. A robot changes the path if it encounters an obstacle. It can also be controlled by mobile phone using a Blynk app

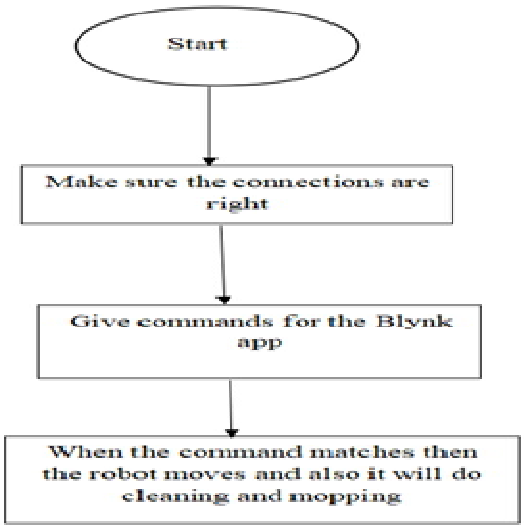

Figure 2 Flow chart of the proposed system

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IV. SOFTWARE DESCRIPTION

A. Arduino IDE

By default, NodeMCU and Arduino Mega use Lua scripting language to program NodeMCU. Here, we are going to learn how to program NodeMCU using Arduino C++ language. Arduino is a prototype platform (open-source) based on easy-to-use hardware and software. It consists of a circuit board, which can be programmed (referred to as a microcontroller) and a ready-made software called Arduino IDE (Integrated Development Environment), which is used to write and upload the computer code to the physical board.

B. Blynk App

Blynk is a platform with iOS and android apps to control Arduino, raspberry pi, and the likes over the internet. it's a digital dashboard where you can build a graphic interface for your project by simply dragging and dropping widgets. You'll also need to install the Blynk Arduino Library, which helps generate the firmware running on your ESP8266. Download the latest release from https://github.com/blynkkk/blynk-library/releases, and follow along with the directions there to install the required libraries.

V. RESULTS AND DISCUSSION

The Blynk application should be downloaded and the account is created to control the robot.

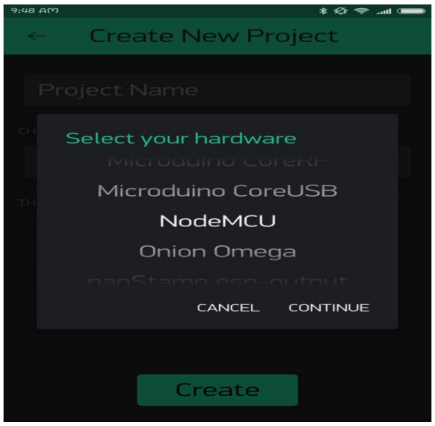

Figure 3 Blynk app login

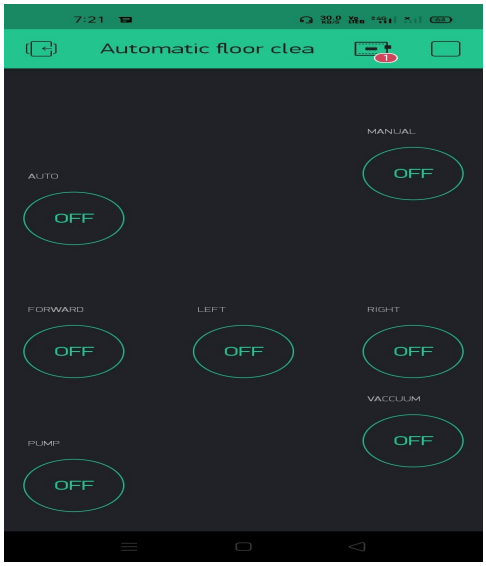

Figure 4 Application interface

When the application is launched the interface will be shown as above in the fig-4. From this application, we can control the robot manually.

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VI. CONCLUSION

This research facilitates efficient floor cleaning. Since in the project the floor cleaner is incorporated with different devices like DC motor(s), ultrasonic sensors etc., so it will be easy to handle it also saves time and will work automatically for cleaning purpose at homes and offices. With a simple algorithm and program, the cleaner will be able to cover large floor areas as well as find its way into and out of small corners. As the cleaner traverses the room, the sweeper installed in it will manage to pick up a significant amount of dirt. Manual Sweeping might not be that effective as it will not be picking up everything in as it is not in sight but using the automatic floor cleaner it can be done easily.

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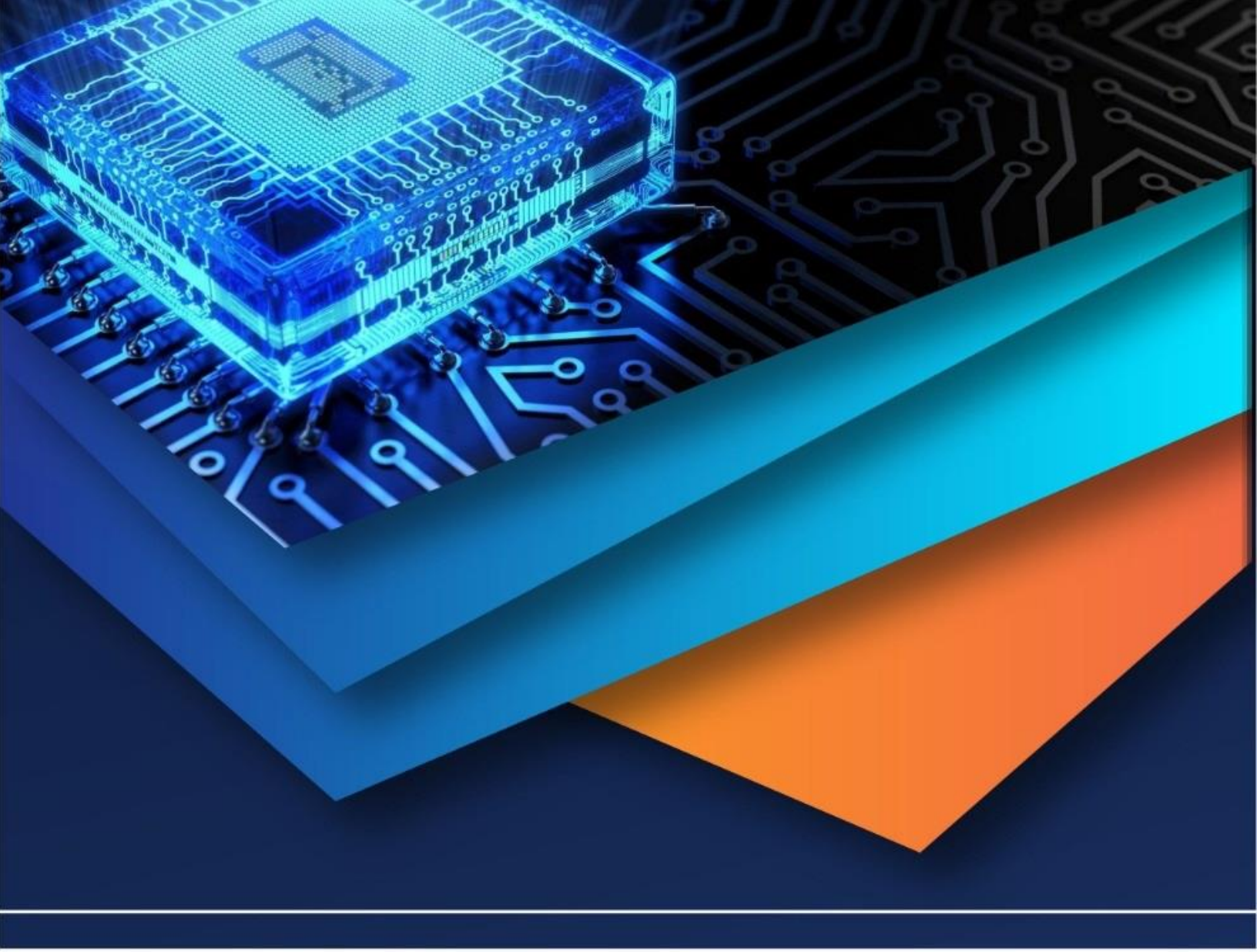

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