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Solar Vacuum Cleaner & Floor Cleaner Robot

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ABSTRACT- Here we propose a smart floor cleaning robot that allows for remote floor cleaning. The bot makes floor cleaning very easy and a fast process using a wireless robotic cleaning system. The user may sit at a place, start a bot and clean wherever needed. The system consists of a transmitter app. This app is run in an android mobile phone that allows user to transmit command based on user input. Based on these commands the transmitter sends movement commands to the robot. The transmitter is an android mobile phone that allows user to transmit commands to the robot. The robot consists of 2 cleaning pads with a water sprayer for efficient cleaning. The robot has 2 motorized rotating cleaning scrubs for the cleaning part. On receiving the movement commands from the android. On receiving the movement commands from the android device through Bluetooth receiver. The microcontroller on receiving the commands, decodes them and thus operates the motors in order to achieve the desired motion. Even the sprayer and cleaner mechanism can be controlled by the android app user. This makes floor cleaning a very easy, fast and an effortless process.

KEYWORDS- Solar energy, Floor cleaning mechanism, Ultrasonic Sensor

I. INTRODUCTION

Cleaning machine is very much useful in cleaning floors and outside ground in hospitals, houses, auditorium, shops, bus stands and public place etc. In modern days interior as well as outside cleaning are becoming an important role in our life. Cleaning of waste is a very important one for our health and reduces the man power requirement. Many of floor cleaning machines are available but we developed machine is very simple in construction and easy to operate. Anybody can operate this machine easily. Hence it is very useful in hospitals, any large area space. The time taken for cleaning is very less and the cost is also very less. Maintenance cost is less. Much type of machines is widely used for this purpose. In our project we have made the machine to operate in a fully mechanical way with a little amount of electrical components. The Floor cleaner is of very simple construction and is very easy to operate, anyone can operate it without any prior training of any sorts with safety. It is very important one in any hospitals, hotels, bus stands etc. Robot is an electro-mechanical machine and is used for various purposes in industrial and domestic applications. Robot appliances are entering in the consumer market, since the introduction of I-Robots. Many related appliances from various companies have been followed. Initially the main focus was on having a cleaning device. As the time pass on many improvements were made and more efficient appliances were developed. In this research work a floor cleaner robot based on ATMEGA 2560- have been developed. This cleaner robot is an electric home appliance, which works in two modes as per the user convenience "Automatic and Manual". Unlike other floor cleaner robots this is not a vacuum cleaner robot. It performs sweeping and mopping operation. Detachable mop is used for wet mopping. It works on 12V supply.

II. LITETUARE SUREVEY

M RANJIT KUMAR (2016) "The regular floor cleaning machines is most generally utilized as a part of airplane terminal stages, railroad stages, healing centers, transport stands, and shopping centers and in numerous other business places. These gadgets require an electrical vitality for its activity and not easy to use. In India, particularly in summer, there is control emergency and the vast majority of the floor cleaning machine isn't utilized successfully because of this issue, especially in transport stands. In this work, demonstrating and investigation of the floor cleaning machine was finished utilizing appropriate financially accessible programming. From the limited component investigation, we watch that the feeling of anxiety in the physically worked floor cleaning machine is inside as far as possible".

AISHWARYA PARDESHI This paper presents the look, developed and fabricated model of programmed cleaner robot. This type of robot performs automated function with extra features like choose and place mechanism and dirt



container with air vacuum mechanism. this type of labour is straight forward and helpful in betterment of life variety of a mankind.

MOHSEN AZADBAKHT ETAL [2014] “Design and fabrication of a tractor powered leaves collector machine equipped with suction-blower system”- “The authors explained about the fabrication of leaves collector machine by tractor powered blower. He has frame the machine by using chassis, pump, blower, gearbox, hydraulic jack. They concluded total power consumption of that machine is around 14634 W which can cover up to 20m range in distance”

MANREET KAUR[2014] “Design and fabrication of floor cleaner robot(manual and automatic).the author designed a robot to clean floor in both automatic mode as well as manual mode. His robot was equipped with ir sensors for obstacle detection, four motors and water pump.He concluded with convenience of dual mode operation of easy floor cleaning”

III. OBJECTIVE OF PROJECT

The purpose of this project is to design and implement a Vacuum Cleaner which runs on solar energy and is operated by mobile application and uses machine learning algorithms to clean. This smart vacuum cleaner cleans both dry and wet floor as well. Its main objective is to maintain and keep your surroundings. To develop a machine that helps in easy and quick cleaning.

1. To reduce human efforts.
2. To save the time.
3. To reduce the cost.
4. To prevent injuries due to tripping or slipping.
5. Injuries due to slips and trips on level floors are a major cause of accidental injury or death.
6. Bad practice in floor cleaning is itself a major cause of accidents.
7. To remove grit and sand which scratch and wear down the surface.
8. To remove allergens, in particular dust.

IV. BLOCK DIAGRAM

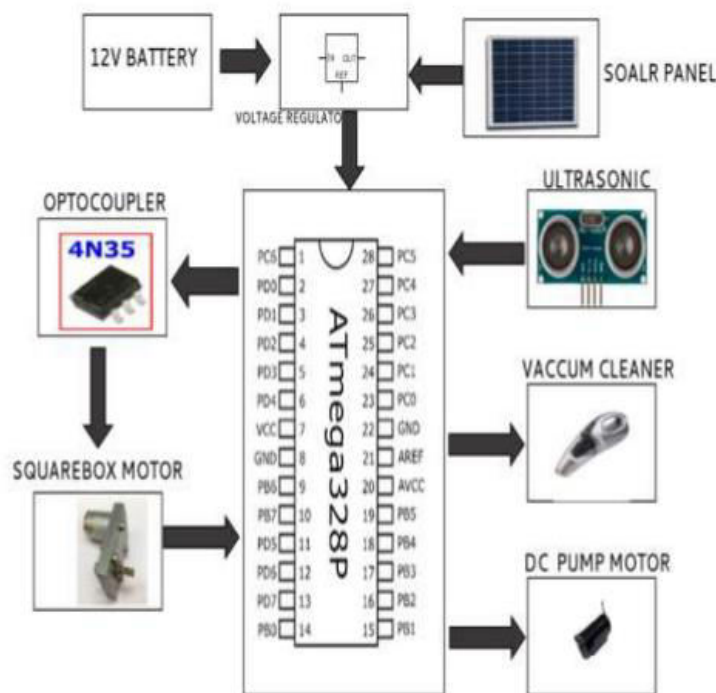


Fig.1 Block Diagram



V. WORKING

Vacuum cleaner works on the principal of Bernoulli's equation. Which state that as the speed of air increases, the pressure decreases. Air will always flow from a high-pressure area to low pressure area. The power supply from battery is applied to the D.C motor. The suction arrangement consists of impeller (fans), and flexible housing. The D.C motor is coupled with the impeller (fan) and it consists of a greater number of blades. It is fixed above the frame stand, so that air suction is forced from the ground. An impeller gets the rotating motion through DC motor which can be powered by either power supply or from battery which can get charged by solar power. Then there's the housing of the impeller which is connected to exhaust and intake hoses. When the fan starts rotating, pressure inside the housing decreases as the impeller throws out all the air from the exhaust hose. A low-pressure area (partial vacuum) is left behind in the compartment. When air enters through the suction tube to fill this area and leaves this airflow, like the flow of water, suction is created. Dust and Leaves will enter the housing. The Waste and leaves will be fed into the blades. Collected waste through delivery pipe can be disposed easily..Solar Vacuum floor cleaning machine constructed by using vacuum blower Which is Ideological Designed and Built, DC electric motor (12V DC, 3000 rpm) is selected for working of this machine, suction arrangement and frame are sheet metal Material mainly used for building the required body. Motor is coupled with the impeller which is mounted inside the impeller housing. Suction pipe is attached to inlet of the blower which helps in Suction of debris, dust and dried leaves. Delivery pipe is attached to outlet of the housing. The frame is mounted on four wheels which are fixed in corresponding dimension to obtain the forward and return movement of the machine. Solar panel is also called as Photovoltaics that collects energy from sun in the form of sun light and convert it into electricity that can be used for Running the machine by charging the batteries of the machine. On the frame, assembly of impeller, housing, battery, solar panel and motor is mounted. A plastic bag is tied on back side of the delivery pipe for collecting the waste which is observed through suction end. All these parts are assembled together to build a Solar vacuum floor cleaning machine.

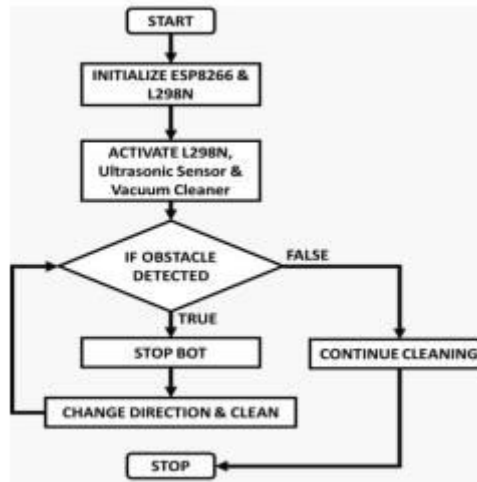


Fig.2 Flowchart

VI. LIST OF COMPONENTS / MATERIAL REQUIRED

Hardware Specifications

- LED's
- Ultrasonic Sensor
- Solar Panel
- Floor Cleaner Brush
- Wheels
- Resistors
- Cables and Connectors
- PCB
- IC , IC Sockets
- Atmega Microcontroller
- LCD Display,DC Motor
- Vacuum Suction Motor
- Robotic Chassis
- Motor Driver IC
- Capacitors
- Diodes
- Push Buttons ,Switch

Software Specifications

- Arduino Compiler
- MC Programming Language: Embedded



VII. COMPONENTS DESCRIPTION

Power supply unit: In this section needs two voltages viz., +12 V & +5 V, as working voltages. Hence specially designed power supply is constructed to get regulated power supplies.

Drivers: This section is used to drive the relay where the output is complemented of input which is applied to the drive but current will be amplified.

Ultrasonic sensor: The HC-SR04 ultrasonic sensor uses sonar to determine distance to an object like bats or dolphins do. It offers excellent range accuracy and stable readings in an easy-to-use package. Its operation is not affected by sunlight or black material like Sharp rangefinders are (although acoustically soft materials like cloth can be difficult to detect). Similar in performance to the SRF005 but with the low-price of a Sharp infrared sensor.

Solar panel: Solar energy begins with the sun. Solar panels (also known as "PV panels") are used to convert light from the sun, which is composed of particles of energy called "photons", into electricity that can be used to power electrical loads. Solar panels can be used for a wide variety of applications including remote power systems for cabins, telecommunications equipment, remote sensing, and of course for the production of electricity by residential and commercial solar electric systems.

Relays: It is an electromagnetic device which is used to drive the load connected across the relay and the o/p of relay can be connected to controller or load for further processing.

DC Motor: A DC motor relies on the fact that like magnet poles repels and unlike magnetic poles attracts each other. A coil of wire with a current running through it generates an electromagnetic field aligned with the centre of the coil. By switching the current on or off in a coil its magnetic field can be switched on or off or by switching the direction of the current in the coil the direction of the generated magnetic field can be switched 180°.

Embedded C: Use of embedded processors in passenger cars, mobile phones, medical equipment, aerospace systems and defense systems are widespread, and even everyday domestic appliances such as dish washers, televisions, washing machines and video recorders now include at least one such device. Because most embedded projects have severe cost constraints, they tend to use low-cost processors like the 8051 family of devices considered in this book. These popular chips have very limited resources available most such devices have around 256 bytes (not megabytes!) of RAM, and the available processor power is around 1000 times less than that of a desktop processor. As a result, developing embedded software presents significant new challenges, even for experienced desktop programmers. If you have some programming experience - in C, C++ or Java - then this book and its accompanying CD will help make your move to the embedded world as quick and painless as possible.

Advantages

1. Used to control & clean household appliances
2. In industries and factories for remote sensing & cleaning
3. Using 3g technology we can spy a place
4. Long distance remote sensing
5. Can be implemented in avionics to switch auto pilot from ground station by sending a particular frequency

Disadvantages

1. Operators must be trained
2. Inclination levels may be an issue

VIII. FUTURE SCOPE

At this time, the current system is primarily intended for supervisory applications. The robot can be sent to a suspected area, and if it detects any smoke or gas, it will sound an alarm and notify the operator. The region where the robot moves can also get remarks from the operator. To increase the number of comments made to the robot, the keyboard can also be connected to a TV that is attached to the receiving side. To transmit remarks directly from the remote mobile through the mobile interface with the robot, an amplifier must be connected to the speaker of the mobile. The aforementioned system is also suitable for use in the military for bomb detection and as a spy robot.

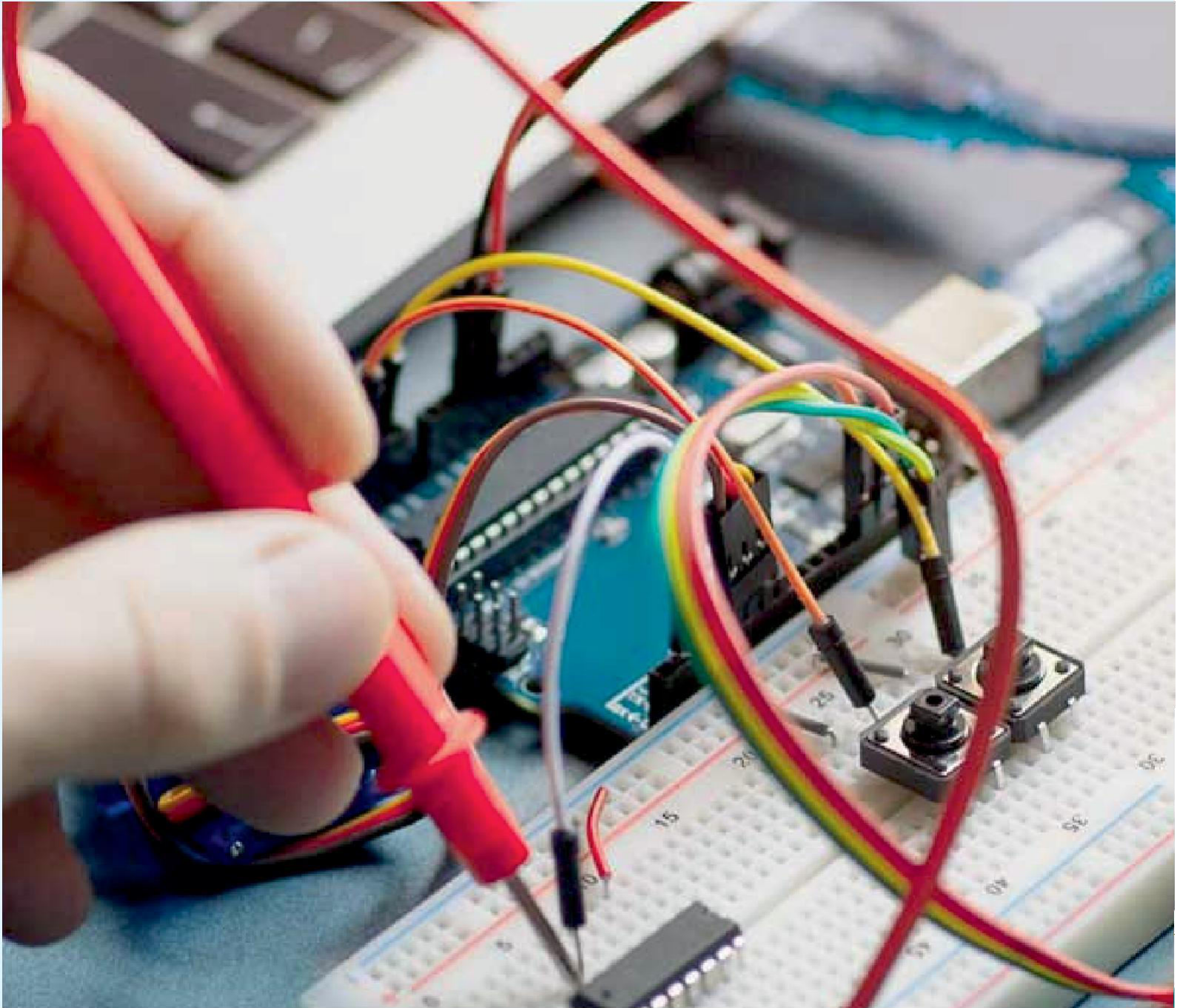


IX. CONCLUSION

There are so many cleaning and wiping robots present in the market however just some of them are moderate and monetary. There are exceptionally less robots that incorporate both cleaning and wiping. With this work, we attempted to diminish the expense of the robot and make it more viable with the Indian Users and the Industries. The primary purpose of the Cleaner Robot is to clean the floors efficiently. As earmarked, it can clean the dirt with efficacy. The robot can detect obstacles and can avoid those to clean the area. The use of innovative technology not only reduces cost significantly but also reduces the human effort while increasing the effectiveness of floor cleaning. Reduced human effort means more frequent floor cleaning which results in increase in overall cleanliness and supports healthy well-being. Small steps in technological advancement like this will have higher impact in long run in future, making India a better country.

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