Smart Floor Cleaning Robot

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ABSTRACT:

Smart floor cleaning robot can be used for cleaning and mopping purpose in home, airport platforms, railway platforms, hospitals, bus stands, malls and in many other commercial places. Conventional method of cleaning involves using the brooms and mops to cleaning and sweep the house which is replaced by robot. The robot implemented by using Arduino controller. The cleaning, mopping, dust collection and sanitizing facilities are added into robot. The robot can be used autonomously to wipe and sweep floors in the house from time to time thus keeping the house clean and maintaining Hygiene. The developed machine is completely autonomous and doesn't require any manual intervention after it is started.

Keywords: Robot, Sensors, ArduinoMega2560, cyclonseparator, Camera, Voice Recorder, Voice Controlled System.

INTRODUCTION

Effective cleaning and sanitizing helps and protect the health of the human beings directly and indirectly. Also, cleaning and sanitizing prevents the pest infestations by reducing residues that can attract and support bees, pests etc. It also improves the self life of the floor, walls etc due to regular cleaning and maintenance. In recent years, most of the people prefer to use trains or buses for commuting and hence these places are littered with biscuits covers, cold drink bottles etc. Hence, it is necessary to clean the bus stands and railways stations at regular interval.

There is no one single cleaning method that is suitable cleaning technique and also the equipment should be user friendly. Cleaning work can be physically demanding and a need has been identified to developed methods for systematic ergonomics evaluation robots are getting more popular for busy and aging populations due to lack of workers. This project deals with the concept of development of autonomous floor cleaning robotic vehicle. The developed machines can autonomously clean the entire floor. Further the machine implements dual mode of cleaning where in the floor is cleaned using brushes as well as vacuum technology. The machine is has an onboard power source so that it can also wipe the floor.
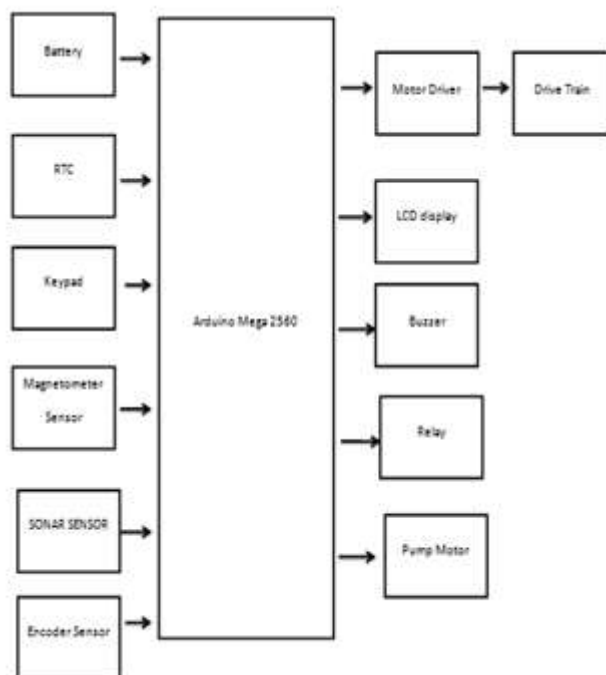
I.   BLOCK DIAGRAM

Figure 1: Block Diagram of the Project

The architecture of proposed project, "Smart Floor Cleaning Robot" is implemented to make it easy of the people who can't afford the autonomous floor cleaners which are present in the market today. Here we have two modes: 1.Using switch, 2.Using RTC. The basic block diagram consists of microcontroller Arduino Mega 2560, Battery, RTC(Real Time Circuit), Keypad, Magnetometer Sensor, Sonar Sensor(Ultrasonic Sensor), Encoder Sensor, Motor Driver, Drive Train, LCD display, Buzzer, Relay and Pump Motor.
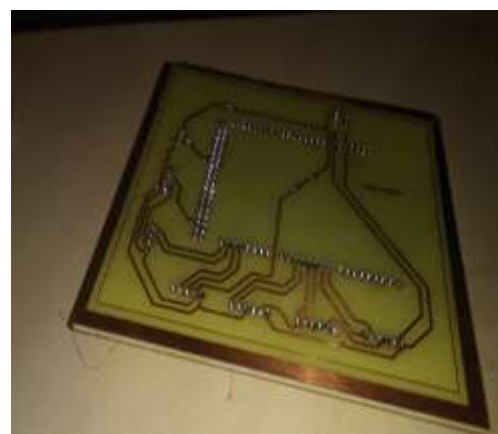
II.   IMPLEMENTATION

Figure 2: PCB design of the Project

The printed circuit board (PCB) acts as a linchpin for almost all of today's modern electronics. If device needs to do some sort of computation- such as is the case even with the simple digital clock. Chances are there is the PCB inside of it. PCBs bring electronics to life by routing electrical signals where they need to go to satisfy all of the device's electronic requirements.

III.   MAJOR COMPONENTS

- **Arduino microcontroller set:**

Figure 3: ArduinoMega2560 microcontroller

A **microcontroller** (sometimes abbreviated **µC**, **uC** or **MCU**) is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. Program memory in the form of Ferroelectric RAM, NOR flash or OTP ROM is also often included on chip, as well as a typically small amount of RAM. Microcontrollers are designed for embedded applications, in contrast

to the microprocessors used in personal computers or other general purpose applications.

Microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, toys and other embedded systems. By reducing the size and cost compared to a design that uses a separate microprocessor, memory, and input/output devices, microcontrollers make it economical to digitally control even more devices and processes.

Ultrasonic Sensor

Figure 4: Ultrasonic Sensor

An ultrasonic sensor transmits ultrasonic waves into the air and detects reflected waves from an object. There are many applications for ultrasonic sensors, such as in intrusion alarm systems, automatic door openers and backup sensors for automobiles. Accompanied by the rapid development of information processing technology, new fields of application, such as factory automation equipment and car electronics, are increasing and should continue to do so. Using its unique piezoelectric ceramics manufacturing technology developed over many years, Murata has developed various types of ultrasonic sensors which are compact and yet have very high performance.

- **Infrared photoelectric sensor**

Figure 5: Infrared photoelectric sensor

A photoelectric sensor emits a light beam (visible or infrared) from its light-emitting element. A reflective-type photoelectric sensor is used to detect the light beam reflected from the target. A thru beam type sensor is used to measure the change in light quantity caused by the target crossing the optical axis. A photoelectric sensor, is an equipment used to discover the distance, absence, or presence of an object by using a light transmitter, often infrared, and a photoelectric receiver.

- **Encoder Sensor**

Figure 6: Encoder Sensor

Shaft encoder, is an electro-mechanical device that converts the angular position or motion of a shaft or axle to an analog or digital code.

- **Magnetometer Sensor**

Figure 7: Magnetometer Sensor

A magnetometer is a device that measures magnetism—the direction, strength, or relative change of a magnetic field at a particular location. Magnetometers are widely used for

measuring the Earth's magnetic field, and in geophysical surveys, to detect magnetic anomalies of various types.

IV. ADVANTAGES

1. Highly efficient and user friendly design.
2. Easy to operate.
3. Low power consumption.
4. Can be used in household cleaning purpose
5. Cost efficient

V. APPLICATIONS

1. The developed system can autonomously navigate through the home there by eliminating the need for any manual control
2. The System can autonomously clean the house thereby maintaining cleanliness
3. The proposed system can Not only clean but also collect the dust using the Vacuum source
4. The system will also mop the floor partially
5. The system can be used in all households
6. The system can be used in all commercial establishments
7. The proposed system is time based, hence triggers automatically at the set time
8. The system is easy to use

CONCLUSION

This project deals with the development of automatic floor cleaning machine. The machine can automatically move on the floor at the set time and clean the floor autonomously. The developed project has the system to set time to trigger which gets stored in the robotic vehicle and at the time the robotic vehicle starts autonomously cleaning the home. The system can automatically clean the floor using cleaning

mechanism and the vacuum suction system and collect it in the dust collection chamber which can be emptied when full. The project has wide scope for further modification. The project can be further implemented with LIDAR sensors for fast response time while navigation and computer vision for dynamic trajectory planning while cleaning the floor.

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