Automatic Sanitary Robot with Optimized Performance of Arbitrary Track Selection using PIC Microcontroller

Jayasudha. A[1], Kalaiselvi. A[2], S. Dineshkumar[3], S. Sathiyavathi[4], A. Subha[5], M.Sabariprasath[6]
[1, 3, 4, 5, 6] K.S.Rangasamy College of Technology, Tiruchengode
[2] Sri Ramakrishna Engineering College, Coimbatore

Abstract- *The advent and progress of Robotics has comprised in itself the Robot giants to micro bots that rule the roost and have revolutionized the way of live, work and entertain people. The Tech-savvy world of today has umpteen varieties of Robot that do work ranging from trifles to more complicated tasks. The prototype floor cleaning models to Roomba version and later to the latest smart versions like the Robovac boast of cleaning flawlessly but their size and work mechanism are centred around simple, repetitive motions and sophisticated machine logic hidden beneath its coarse exteriors. The prototype models required regular charging on wall plugs while the latest versions have self charging features and the latest iRobots offers a fast recharging pack. Whatever modifications have been done in the battery potential or work efficiency, the floor cleaning Robots can do only limited tasks like either cleaning or mopping in isolation. A working model that combines in itself both the cleaning and mopping options simultaneously in a single version is still a dream afar. The proposed project specimen addresses that specific lacuna thereby merging a dual action in a simple, user-friendly, affordable, multi-purpose and smart device. The proffered automated sanitary robot is used for multi-purpose floor cleaning and provides a germ-free environment. The overall process is controlled by embedded C program. Once started, the modules will continuously run and when the work is completed, whisper-quiet operation will take place.*

Keywords:- Micro bots, Tech-savvy, Sophisticated, Germ-free environment

I. INTRODUCTION

Automation in floor cleaning provides convenience and saves time for the users. Several robotic vacuum cleaners are available in the markets for dust cleaning and mopping the floor. Identify and design an autonomous robot that will assist people at home who are too busy for daily or weekly floor cleaning, especially for families with children. Robotic vacuum cleaners in the market are expensive and inefficient in terms of cleaning time and cleanness. The goal is to design an omni directional platform with infrared sensors, wireless sensors, bumpers, ultrasound, reshape, and four bristle brushes on every side to improve the cited cleaning performance problems.

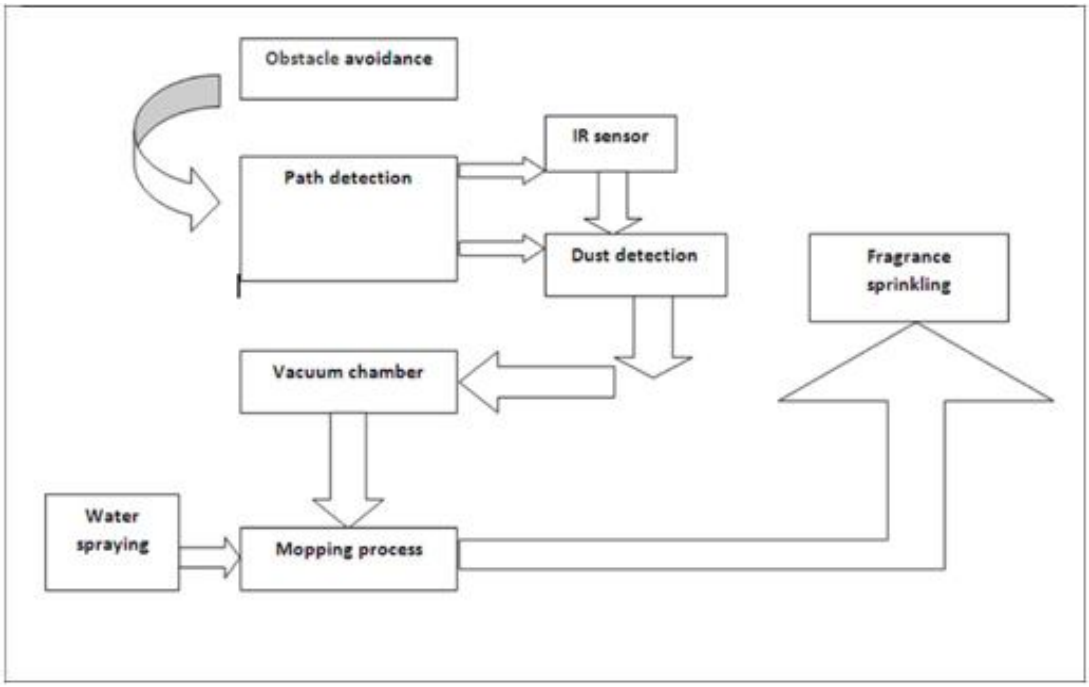
The aim of keeping Sanitary robot as simple as possible, while able to perform the initial goals, i.e. an autonomous vacuum cleaner robot able to randomly navigate through a room or a house with the minimum human assistance with the following specifications:

- Obstacle avoidance.
- Floor detection.
- Collision detection.
- Fragrance sprinkling.
- Autonomous dust bag dump.

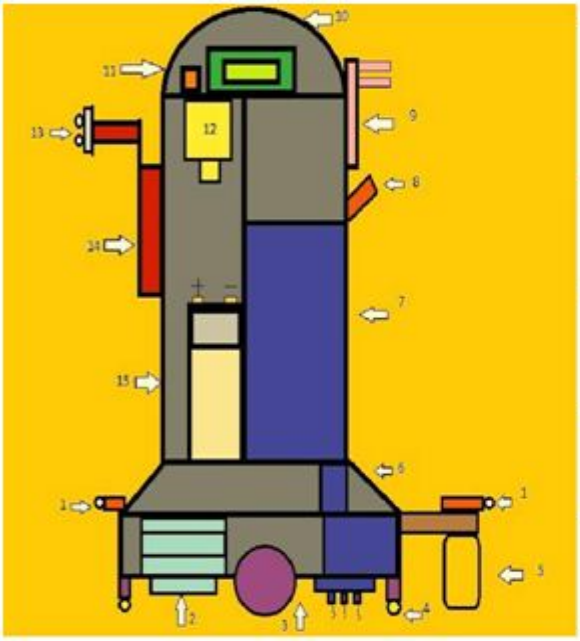
These specifications correspond to some of the expected behaviors that will be programmed into the robot.

II. METHODOLOGY

A. Block diagram



B. System overview



1.IR proximity sensor	2.Vacuum chamber	3.Relocate caster to the rear to hold the weight
4.Rotary wheel	5.Scrubber	6.DC blower for drying the floor
7.Water storage tank	8. Water fill cap	9.Air fragrance sprayer
10.LCD display	11.ON/OFF switch	12.Cooling fan
13.Ultrasonic sensor	14.Radar servo 180°	15.6volt SLA 4.5ah

C. Construction

The typical shape of a robotic vacuum cleaner is a disk. When they bump into a wall or piece of furniture, since it is a circle, it can easily turn around and adjust its position and continue cleaning. The major problem with the vacuum being a circle is that it cannot clean the corners of rooms very well. If it will be a square, then the vacuum can get into the corners and clean better, but there are no square robot vacuums. And the cleaners used for sweeping cannot used for mopping and vice versa.

The proposed method is to provide a combined solution for the problem with four modules by use of sanitary robot. The first module is to detect obstacle avoidance with use of Sonar Sensor. The second module is dust sensing which is sensed by IR proximity sensor and cleans the dust on the floor by dust suction system. The third module is floor mopping using water by scrubber and the fourth module is fragrance spraying which is by sprayer and automatic disposal of collected dust particles.

III. PROJECT DESCRIPTION

A. First module-Obstacle avoidance ROBOT has sufficient intelligence

To cover the maximum area of provided space. It has an infrared sensor and an ultrasonic sensor which are used to sense the obstacles coming in the path of ROBOT [2]. It will move in a particular direction and avoid the obstacle which is coming in its path. This sanitary robot that can perform desired tasks in unstructured environments without continuous human guidance.

B. Second module-Dust sensing and Cleaning

Dust sensing: An optical dust sensor for detecting a quantity of dust which sensor is provided at a predetermined position of a suction path for sucking air by a suction force of the robot. Once the dust is detected on the floor the robot cleans the dust on the floor by dust suction system.Compact optical dust sensor is used for detecting the dust.

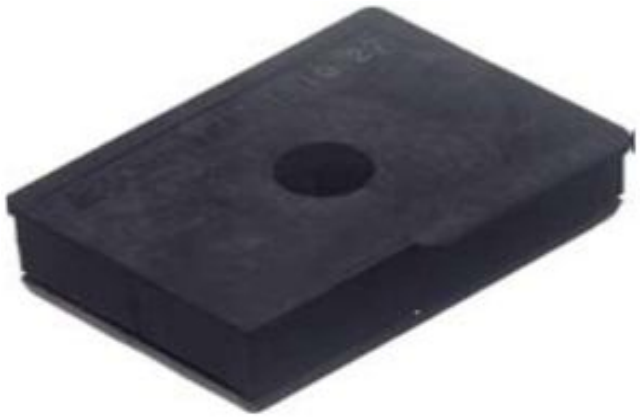


Figure.1 Compact optical dust sensor

Dust cleaning: After the dust is sensed,the sanitary robot cleans the dust on the floor by suction pump [8]. Suction is the flow of dust into a partial vacuum, or a region of low pressure.The pressure gradient between this region and the ambient pressure will propel matter towards the low pressure area.

C. Third module-Mopping

A mop is a mass or bundle of coarse strings or yarn, etc or a piece of cloth, sponge or other absorbent materials, attached to a pole or stick. It is used to soak up liquid, for cleaning floors and other surfaces, to mop up dust, or for other cleaning purposes [4].

Types of mop

1. Dry or dust mop
2. Wet or moist mop

D. Fourth module-Fragrance spraying After the mopping process,

Fragrance spraying process takes place and it is done by the sprayer and after this process automatic disposal of collected dust particles takes place.

IV. SOFTWARE

A. Embedded C

All the above mentioned modules are controlled by embedded C program. Once started, the modules will continuously run and when the work is completed, whisper-quiet operation will take place. Embedded C is a set of language extensions for the C Programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Traditionally, embedded C programming requires non standard extensions to the C language in order to support exotic features such as fixed point Arithmetic and basic I/O operations. Embedded C uses most of the syntax and semantics of standard C. It is small and reasonably simpler to learn, understand, program and debug. In comparison with assembly, C code written is more reliable and easy, more portable between different systems. C compilers are available for almost all embedded devices in use today. C has the advantage of processor independence i.e. it is independent of the kind of controller or processors used, and is not specific to any particular microprocessor/ microcontroller or any system.

B. PIC Microcontroller

A microcontroller is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. 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. PIC defined as (Programmable Interface Microcontroller) is used here to perform the various modules. Based on the embedded C program it takes control over the modules.

V. CONCLUSION

Thus the integrated use of different fields oriented towards the design of a complete floor cleaning mobile robot. The implementation of Sanitary Cleaning Robot will provide quick clean-up of spills and concentrated messes and it will be easy to use. Following are the advantages of the above system:

a) Reach Remote Areas – It can clean in areas with hazardous environments; areas beyond the reach of humans as could be fatal.

b) Availability – A machine can be used anytime and anywhere, it does not get tired and is never busy.

c) Cost Reduction – Saves on labour costs and time, as a single machine can do the work of multiple labourers in lesser time.

Obviously, the advantages of sanitary robot are multiple. Through with all these modules this sanitary robot provides a germ-free environment.

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