ARTIFICIAL INTELLIGENCE BASED AUTONOMOUS VACUUM CLEANER WITH DISINFECTION SYSTEM

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Introduction:

Nowadays, robot is commonly used to accomplish human requirements in daily life. The massive introduction of robots and the transition of the economic system to robonomics (robot-based economy) that might affect job opportunities especially where robots are replacing human tasks. Despite this concern, industrial robots have been used for several decades now in warehouse, logistics, agriculture, education, financial trade, medicine, transportation, tourism and hospitality, and others. Recently, robots are also developed as home appliances as the individuals' requests expands. Home mechanical machine technology exploration is getting to be dynamic like never before. Cleaning robot applications are imminent today and tend to become a mass market. Smart floor cleaner is a mobile robot with cleaning function. It is an intelligent automated cleaner that has perceptive programming and a limit cleaning framework. It designed to make cleaning process easier and save manpower. Most people are working long hours and do not have enough time to clean. Thus, in some of the hospital or old folk's house, the cleaning robot can be used widely as it can help the people with physical disabilities and inconvenient elderly people to clean the floor and wipe the floor to prevent falling accident. Hence, these situation leads to the demand of autonomous-type cleaning machine in the market. The vacuum cleaner robot should have a mechanism such as the artificial intelligence to solve the problem of cleaning the entire environment areas taking into account some factors such as obstacle avoidance and the number of turns it needs to take. Over time, many researchers have come out with different techniques to ensure optimal coverage of the vacuum robot. Artificial intelligence is adopted to enable intelligent scheduling and motion control for optimized operation of the vacuum robot.

Many initiatives were taken towards the building of smart floor cleaners. However, most of these robots were either used for dry or wet cleaning. This smart floor cleaning robot best suited for household purposes. It has both automatic and manual control modes. Also, the robot performs both dry and wet cleaning parallel saving time and power consumed. The application developed to control the robot provides flexibility to a user. Also, this as compared to other robots is cost effective. In the modern day's maids play a very important

role in one's life, because of people's busy schedule they're totally dependent on maids. Today, it has become a norm for a family to depend on a maid. Hence, this can be totally dependent on. Many a times a maid doesn't show up because of her personal problems, health issues and other commitments, but it is always reliable and can be used anywhere, anytime by anyone. In this era of water scarcity, it consumes minimal amount of water when compared to a domestic worker. This is not only confined to a house, but can also be used in schools, offices, hospitals, restaurants, universities etc with smooth flooring. In an intensive care unit, a domestic worker can easily be prone to infection whereas it is infection resistant.

Objectives:
1. To reduce the work load of working men/women.
2. To provide more effective outcomes when compared to a domestic worker.
3. To avoid more usage of water due to water scarcity.
4. To reduce work pressure of homemakers.
5. To help the old and physically challenged people in the floor cleaning process.
6. For time saving purpose the House Cleaning Robot is important, which is an
7. Autonomous robot for floor cleaning application reduces much time in existence. It does sweeping and mopping tasks at a time, it also detects obstacles, and has automatic water sprayer.
8. Automated Floor Cleaner are designed for cleaning offices, homes also in collages. In one amongst the mode this robot is making decisions on the premise of humans or various sensors which are employed in this robot.
9. Manual works will be replaced by the robot technology and lots of the related robot system applications are used.

Methodology:

The robot is designed to move autonomously throughout the room. Infrared obstacle sensors that are interfaced to the Raspberry Pi 3 serves the role for obstacle detection. Moreover, a manual control of the robot is established by using the keypad to control the robotic movements. In one sweep simultaneous sweeping and mopping is facilitated. The water pump allows the flow of water to mop an area. A vacuum cleaner is used to suck out the dust and dirt encountered by the robot. The app allows the user to control the accessories on the robot thus enabling a judicious use of power and water.

The autonomous motion of the robot involves the application of Artificial Intelligence which records the previously paved path as a reference for the next day's task. A person can wirelessly control the robot using the keypad, Also the person can control the robot with his instructions with the help of the voice recognition feature which is inbuilt in the robot. The robot can be switched between automatic, manual and voice control operation at the push of a button on the application. One part of the robot sucks dust and other particles using the vacuum pump. The other part of the robot performs the mopping enabled via wiper.

In the beginning it is checked if the user has opted for the manual, the automatic or the voice control mode of operation. In case of manual mode, the user can control the motion of the robot using the keypad. In the autonomous mode the robot navigates the room taking turns with the aid of the Raspberry Pi 3 application. In the case of the voice control operation

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the user can control the motion of the robot using the voice commands which includes the keywords which is programmed onto the robot.
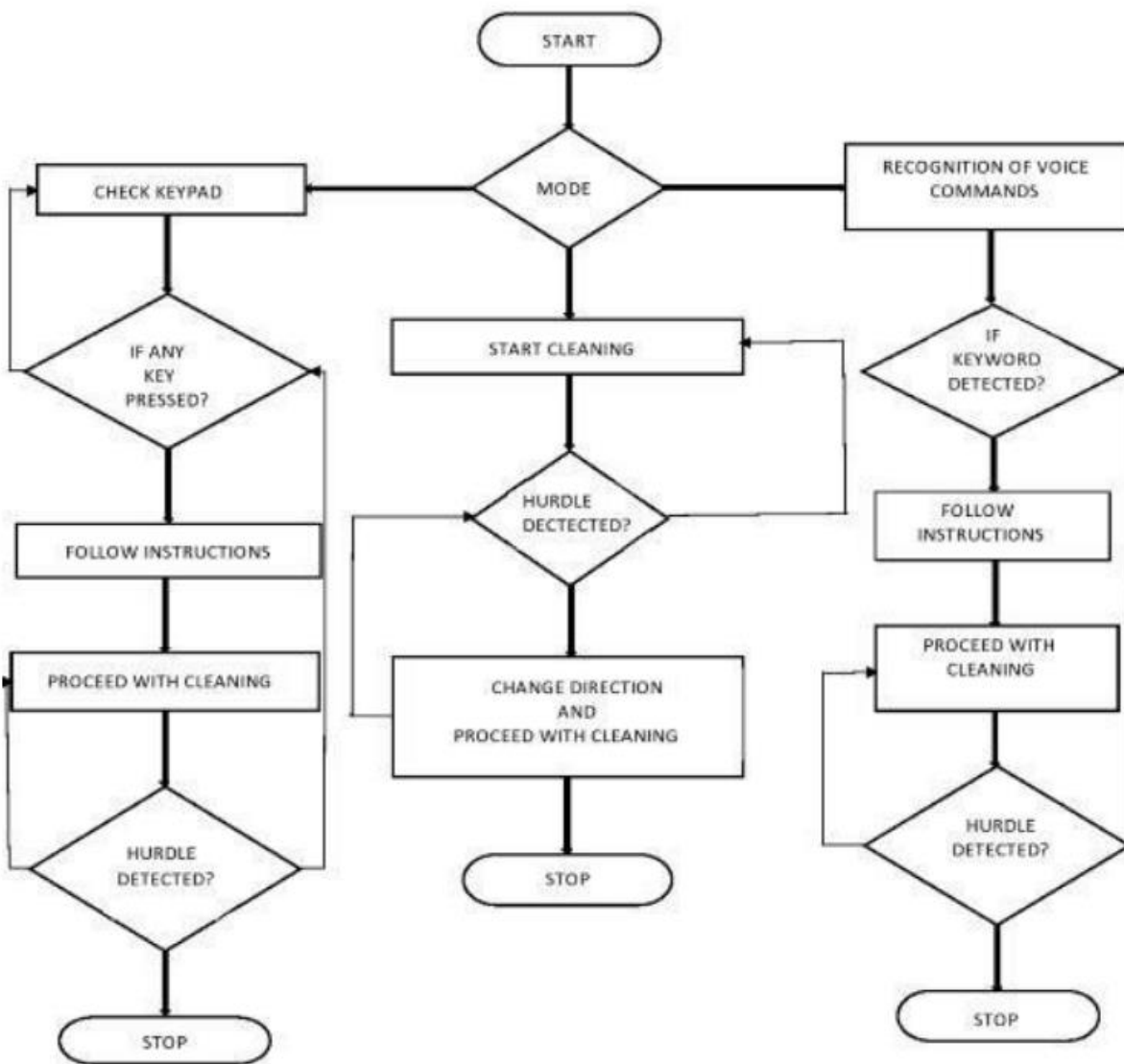

Fig: Flow Chart displaying the working of the mode

Result and conclusion:

The possible outcome of our project is:

1. **Automatically moves and cleans the floor, making your room tidy and germ-free**
   The automatic mode of this robot enables cleaning more efficiently without the involvement of human beings. If any hurdles are detected, using the obstacle sensors the robot automatically changes the direction and continues cleaning the floor.
2. **Collects dust & dirt in the container which can be emptied after cleaning**
   This robot has a storage bin inbuilt which collects all the dust and waste particles by the sweeping action of the device. The storage bin is later emptied manually by the user.
3. **Limited usage of water**
   As there is an increase in water scarcity all over the world, this robot uses limited amount of water as a measure to save water.

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4. **User friendly robot**

   This robot offers three modes of operation which are Manual, Automatic and Voice control mode. In manual mode, the user can control the robot using keypad with four simple keys front, back, left and right. Invoice control mode, the user can control the robot with simple voice commands.

Future scope:

There are so many cleaning and mopping robots present in the market but only some of them are affordable and economic. There are very fewer robots that include both cleaning and mopping. With this work, we tried to reduce the cost of the robot and make it more compatible with the Indian users and the industries.

To further enhance the navigation performance of the robot, feedback sensors such as optical encoders can be integrated. Cleaner brushes can be added to vacuum cleaning mechanism to increase the efficiency of dust collecting. Lithium polymer batteries can be used to reduce the weight of the robot which can further lead to the reduction of power consumption.