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Terminator - Of Dust

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***Abstract*:** *Nowadays, robots are used to lighten man's job and to reduce workload or burden of a human being. The stair climbing robots are used to climb the stairs with added feature to automatically clean the surface both plain and stairs. Traditional robots usually climb the stairs or walls .But this model along with this facility will automatically clean the floor with the aid of vacuum cleaner .Thus reducing human effort. In this paper we are focusing on how our model is efficient for the purpose of cleaning.*

1. INTRODUCTION

The interest in development of climbing robots has grown rapidly in recent years. Climbing robots are very significant because it can be adopted in a variety of applications such as maintenance, building, inspection and safety, mainly in the process and construction industries [1].Watching today's scenario , as the people (teenagers, childrens, elders) throw the garbage here and there without thinking about the surrounding ,i.e, encouraging pollution. Whether it's a metro station, college, school, roads, house, railway, etc. People don't care at all , they just throw the garbage anywhere and just go on.In order to tackle with this problem , we are proposing a model which is absolutely fulfilling all the demands. This model will run on the flat surface and also can climb on the stairs. With added feature,i.e.,a vacuum cleaner is implemented below the surface of the robot that will suck all the garbage in it and will keep the surrounding hygienic.The paper is divided in 5 sections. First section provides introduction about the idea of the paper. Second section is dedicated to the literature review which provides the related work done about the proposed idea. Third section gives the comparison between the existed models based on the literature review. Fourth section is about the advantages. Fifth section is the results and discussion. Sixth section is conclusion.

FIGURE.1

2. LITERATURE REVIEW

Yanan Zhang,Yongjie Zhang,Xuan Wu,Tao Mei in their paper presents the design, analyses, and fabrication of a tank-like wall-climbing robot using gecko-inspired dry adhesives[2]. The robot uses customized timing adhesive belts, which is flexible as well as patterned using MEMS techniques. The Kendall strip tape model is modified, considering features of the timing belt, to analyze the peeling process of the viscoelastic tread[3]. The relationship between the peeling force and the pretension strain of the treads is predicted. The normal force distribution of the treads is analyzed in the robot's adhesive process. Conditions for robot's stable climbing are derived. A prototype is fabricated and tested.

Chenwei Fan,Yibo Zhang,Weirong Zhu in their paper presents a kind of wall-climbing robot based on wireless communication among multi-processors is introduced[4]. Base on multi-processors controlled system, mechanical structure, electronic hardware construction and software designing are proposed respectively. Positioning

and path planning are illustrated in detail. Furthermore, communicate protocol is proposed for data exchange through wireless transformation[5]. The robot achieves high precise and excellent performance which could be applied in many fields such as shipbuilding and ship recycling[6].

M.I. Nor Faizal, W.A.F.W. Othman, S.S.N.A. Syed Hassan in their paper presents a climbing robot which is designed to climb a tree with diameter of 10 cm. The robot utilizes modular mechanism as locomotion of the robot that consists of 6 steps which enable the climbing module to carry its weight by using two servo motors[8]. The robot utilizes encompassing grip in gripping module which wrapped the tree to increase the surface area of frictional force. In the initial condition, the climbing module extends and both upper and lower gripper in grip[7]. The climbing motion starts when the lower gripper releases, the climbing module contract upward and the lower gripper return to grip again. Then, the upper gripper releases, the climbing module extends again and the upper gripper returns to grip. This sequence will continue until the robot reaches the desired location[9]. The Arduino Uno microcontroller is used to send the PWM signal to the servo motors to control the robot movement. To ensure the efficiency and performance of the robot, various simulations and test have been done. The weight in simulation data is 0.9 kg whereas the actual weight is 0.88 kg. After the tests have been done, the simulation average climbing speed is 0.1568 m/s while the actual average climbing speed is 0.00183 m/s.

W. C. Myeong; K. Y. Jung; S. W. Jung; Y. H. Jung; H. Myung said that urban structures need constant maintenance and inspection of the structural health condition and safety of the users[10], however, to access the structure is getting harder and harder due to their enormous height and size. In order to deal with this problem, though many researchers have developed several robots for wall-climbing there is no guaranteed solution yet. One of the critical reasons why existing wall-climbing robots haven't been available in the field is the risk of accidental fall due to operational failure from the harsh environment like strong wind and surface's unpredictable condition[11]. Therefore, we tried to develop a drone-type wall-climbing aerial robot platform that can approach to any place of the structure by flying and sticking to the target place with pose change and perching mechanism. The robot is equipped with a locomotion mechanism like other wall-climbing robots to move on the vertical surface of the structure[12]. This paper deals with installing the wall-climbing mechanism on the aerial robot, its pose change and wall sticking mechanism, and locomotion on the vertical surface of an urban structure.

Nick Adriaens in his paper basically focuses on to make the robot work automatically. Three micro switches are placed on the robot: two on the conductors at the front and one at the back[13].The sequence starts by pushing down the gear rack. The robot starts to move up until the gear rack is not able to move any further. To make sure the robot stops moving up at this point, a switch is placed at the top of the main body of the robot on the spot where the top wooden plate of the gear rack-system hits the robot. When this switch is pressed in, the robot starts driving forward until another switch located at the front conductors is pressed in by hitting the vertical side of the next step. In the next stage, the gear rack will be pulled up during a certain length of time programmed in the robot. Once the gear rack is pulled up, the robot starts driving forward until another switch at the front conductors hits the border of the next step. To make sure the robot is positioned parallel with the border of the next step, it will drive forward until both of his conductors hits the stairs. Once this process is done, everything can start over again. The program code is written on Arduino and is sent from the computer to the Arduino on the robot by using X-bees.

Hamidah Haneym Binti Abdul Hamid ,Muhd Khairul Fitri Bin Shafei, Mohd Faidhy Bin Mohd Shahudin,Umar Abdul Azis Bin Ahmad in their paper basically focuses on just climbing the robot upon the stairs. He said large vertical distances for humans, stairs represent a serious challenge to vehicles and robots. In order for robots to operate efficiently in urban environment, this challenge needs to be addressed. In many current applications mobile robot is still tele -operated with only limited autonomy. Climbing stairs for example is required in searching and rescuing missions in urban areas and very demanding in human operator. Usually the robot maneuvers outside the field of view of the operators, forcing them to rely only on feedback from the robot's camera[14]. The latter is usually mounted very close to the ground, has a narrow field of view, and the returned images are often blurred due to the robot's highly dynamic motion. This greatly impairs the operator's perception of the vehicle's current spatial orientation. Combined with the latency in data transmission and the robot's high slippage on the stair edges, this can result in inaccurate and slow stair climbing, collisions with the stair walls, and even in toppling of the vehicle. It is therefore desirable to endow a robot with autonomous stair climbing abilities, thus

enable for faster, safer, and more precise operation while at the same time reducing the user load.

3. COMPARISION WITH EXISTING MODELS

Aluminum plate is implemented on the base of the robot, thus providing a strong, light-weight base.

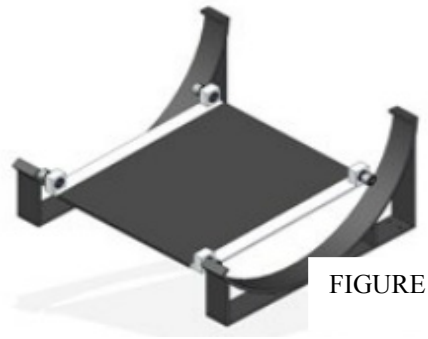

FIGURE 2

Tri-wheels are used instead of those used traditionally applied. Tri-wheels are used to climb stairs very efficiently due to there shape.

FIGURE 3

Design of the model is very much efficient to face different situations.

FIGURE 4

The U.S.P of the model is vacuum cleaner, this vacuum cleaner is implemented below the aluminum plate**.**

FIGURE 5

The model is remote operated. Range of the remote can be further increased.

FIGURE 6

Another unique point in the model is, we can operate it in two ways, i.e. one circuit is running on the principle of simple combination of certain ICs and other is running on the principle of arduino board.

4. ADVANTAGES.

- The concept of this climbing robot has some interesting advantages .firstly it is accompanied with the vacuum cleaner thus giving the model an added feature ,
- Secondly, by adding the necessary accessories it is not too difficult to make the robot to move automatically This excludes the possibility of crashing by

making human control mistakes. But naturally, the use of all these accessories does not take away the fun of using the robot as it is still possible to control it manually.

- Thirdly, all of the electronics are super protected and fit in the inside. This makes it really hard to damage the electronics from the outside even if the robot would crash unexpectedly.

- Fourthly, it is rather easy to drive around and to turn 360 degrees on the spot which makes it more flexible to navigate in small areas. This movability is useful to climb the stairs.

- Last but not least, the parts in the robot are fairly easy to replace. If it is necessary, the top side can be removed which makes that the parts can easily be reached.

5. RESULTS & DISCUSSION

The result which we expect from our project is that the robot will run efficiently on the flat surface and climb upon the stairs without any difficulty . also that the robot will move according to the command given at the receiver end wihout any ambiguity .We also expect that the robot will tolerate the vacuum cleaner load and without any problem the robot will clean the floor efficiently and fast.

6. CONCLUSION

The cleaning feature added increases the efficiency of the robot as it make possible to clean the surface along with the movement of the robot on the stairs ans simply on the floor.The expected result by implementing this model is that it will reduce human effort and it will play a major role in the progress of the society as it is supported with the cleaning facility.Thus by implementing this relatively cheap and easily available system in the colleges,metro stations,etc one can ensure greater cleanliness and reduced human effort .

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