

Beach & Sewage Cleaning Robot

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Abstract: This article presents the development of a multipurpose modular robot and its adaptation to be used in beach cleaning tasks. The robot presents a robust design, oriented to withstand the inclemency of various types of environments. With the presented configuration, the robot is able to independently collect scattered garbage through the environment, using a claw similar to that of an excavator. Also the robot uses a sliding mechanism to remove the garbage from sewages. In addition to detailing the project and the development of the system, a description of the developed electronic modules are also presented, which through the use of artificial vision allows following a predefined path and tracking garbage that are going to be collected.

Index Terms – Multipurpose modular robot, robust design, collect scattered garbage

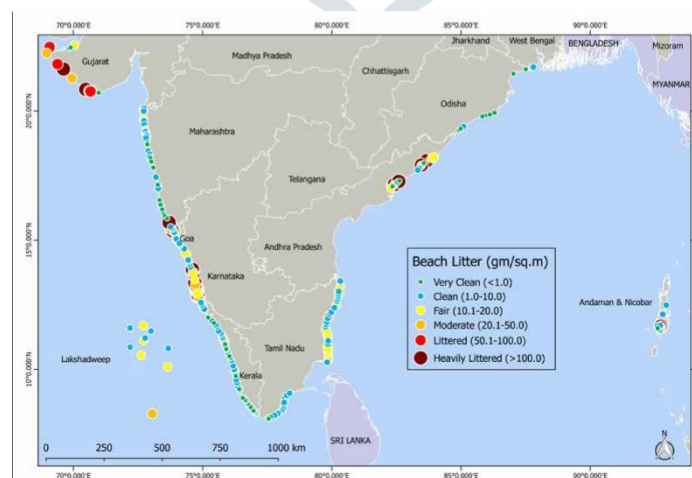
I. INTRODUCTION

Garbage is a major problem worldwide attention. It can be seen from organizations that support and fix this problem, such as Ocean Conservancy that is a non-profit environmental advocacy group based in Washington, D.C., United States. The organization reports on 23 August 2013 that over the past 27 years, over 9.5 million volunteers have removed 163 million pounds of trash from more than 330,000 miles of coastline and waterways in 153 countries and locations. At the present, more than 10 million pounds of trash along nearly 20,000 miles of coastlines were picked up by more than 550,000 people. In Thailand, this problem affects to the destruction of the beautiful scenery and attractions. Moreover, it causes the problem about the sea animal death. For example, the death of the whale on the beach, Patong, Phuket because it eats the plastic waste. Although, some organizations try to clean the beach but the amount of the trash on the beach is still increasing at all time. Therefore, the development of the technology such as robot for collecting the garbage is the one aspect that is interested.

The progress in various fields of robotics improves people quality life and their environment. In the current context of environment protection and care, waste collector robots loom large, because they locate, collect and dispose garbage in a controlled, autonomous and fast way. In this specific case it was implemented an autonomous robot capable to navigate in sand, collecting cans and transporting them to a particular deposit. Developing waste collector robots is currently a research and investment matter. Therefore, this project presents the development of a robot which will collect garbage on the beach. This robot uses the Bluetooth for communication between the user and the robot. It is motor controlled vehicle equipped with a cleaning mechanism and a dirt bag for Garbage collection. Motors are used to drives the robot and the cleaning mechanism. Complete system is embedded in a Microcontroller.

II. PREVIOUS CONDITIONS

Due to our carefree lifestyle, nearly 8.8 million tonnes of plastic waste is being dumped into oceans every year. As a result over 700 species of marine organisms were in danger of extinction. Information on beach debris from India are available from various parts such as Nicobar Islands, Karnataka coast, northern Gulf of Mannar, selected beaches of Kerala, Karnataka and Tamil Nadu & some urban beaches in Mumbai and Mangalore coast. However a comprehensive study of the beach debris in the country has not



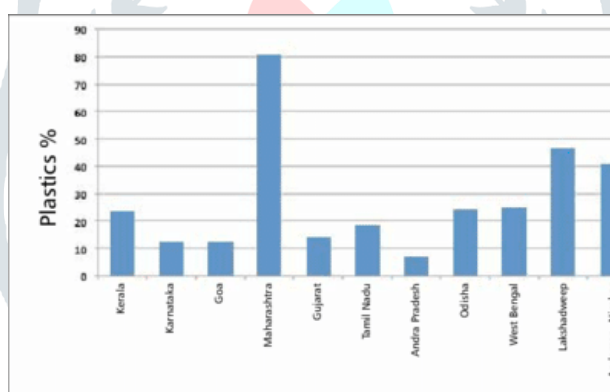
been undertaken so far. For over 30 years, the coastal Cleanup has seen communities rallying together the document and collecting the trash from beaches and waterways.

The condition of the beaches was getting worse. There were many plastic bags, bottles, wasted food, food wrappers, tops and lids of bottle and containers.



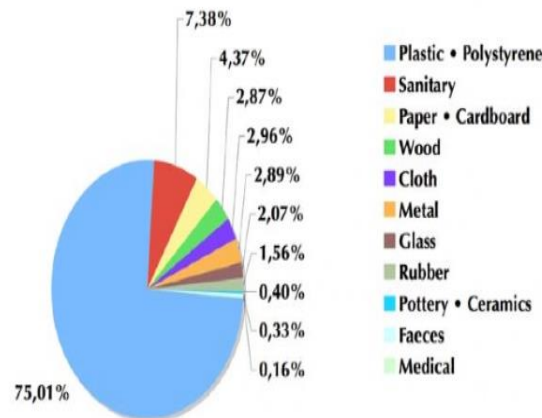
III. PRESENT CONDITIONS

After looking at the past conditions of the beaches government and people individually took the initiative to come forward and provide help in cleaning the beaches.



In 2015 citizens of Chennai came forward to clean their beaches. Over 5000 people volunteers from 120 corporates, NGO’s, schools, colleges, running groups, and social organization participated in massive cleanup drive. Government started the Swachh bhara abhiyan which also came in handy for the cleanliness beaches. Many of the schools and colleges are coming forward and participating in the cleanup drives and also helping in making the individual aware of the filthy beaches. Many social organization and camps are held in cleaning and segregating the waste on the beaches. By providing these social organizations and NGO’s with our robot the process of cleaning the beaches and sewages would be done in a speedy manner. The most recent research saw that major waste was plastic and cigarette butts. These rubbishes can be easily cleared out with the help of our claws mounted on the robot and efficient pick-up and disposal of the waste from the beaches can be done. The proportions of different types rubbish that accommodate the total garbage on the beaches is shown in the following chart:

Proportion of marine litter categories on reference beaches



The waste is segregated in 3 parts glass, plastic and recyclable waste. Many beaches like Versova beach, Juhu and Chowpatty beach in Mumbai and many beaches in Goa were taken under cleanup drives. After the efforts paying off by selecting 13 beaches across India for certification of blue flag beaches. Our project will help us in cleaning the beaches by picking up the garbage with the help of the claws and dispose it in its bin even with less number of volunteers, due to its automation and remote control it will make easy for the volunteers to clean the beaches with less manpower and also be less exhausting.

IV. OBJECTIVES

We do understand the importance of clean environment so with the help of our project we will provide a bit of our contribution towards cleanliness. Even though there are many volunteers and people from other organization help in cleaning the beaches still it consumes a lot of time to clean and segregate the waste. We the help of our project we can make the cleaning process more rapid and efficient. Our Bleach and Sewage Cleaner Robot will consist of a conveyer with chain and sprockets and the jaws or claw like structure attached to the chain. It will have an aluminum base on which our conveyer will be placed and have a bin attached at rear end to collect the garbage lifted by the conveyer. Our Robot will be controlled by remote which will help control the direction of robot, sliding mechanism (which will be mounted beside the conveyer) and conveyer. It will also have a Bluetooth module so that it can be controlled with the help of mobile phones and laptops. With the help of our beach cleaning robot the man power required would be less and more area would be cleaned in short time as with the help of arduino we can predefine its path in program make the robot completely automatic.

V. OUR CONTRIBUTION

Our project would not only help in cleaning the beaches but also would help in cleaning the coast area of waterways and also the sewages. With the sliding mechanism the conveyer would move downwards and lift the waste and unwanted materials from the sewages. With this project we would like to provide our contribution to the organizations, social workers and everyone who help us in making our beaches clean.

VI. FUTURE SCOPE

1. Waste can be detected and separated using various available sensors.
2. Wireless communication can be implemented using various technologies.
3. In future speed and accuracy can be increased using high speed motors.
4. Various robots can be used simultaneously to cover and clean up the dirty beaches efficiently.
5. To provide some mechanism for cleaning the beach sand of oil and tar balls occurring due to oil spill disasters.
6. To make the robot more eco-friendly by using natural sources of energy.

VII. CONCLUSION

The Garbage and recycling pickup work is challenging due to its demand of physical labour and the many occupational hazards it exposes on the workers. This robot is designed to fulfil the task of collecting garbage from certain places and then collect it in its bin from where the garbage will then be taken for disposal or process of recycling. Hence cleaning of the beaches and sewages can be done with the beach and sewage cleaning robot using Arduino microcontroller which follows a predetermined path in an area and collects the different types of garbage automatically and collect it. So, this reduces the requirement of manual labour for cleaning the beaches and sewages.

VIII. ACKNOWLEDGMENT

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REFERENCES

- [1] Osiany Nurlansa, Dewi Anisa Istiqomah, and Mahendra Astu Sanggha Pawitra, "AGATOR (Automatic Garbage Collector) as Automatic Garbage Collector Robot Model ". International Journal of Future Computer and Communication, Vol. 3, No. 5, October 2014
- [2] 2016/03/the-robot-garbage-collectors-are-coming/471429.pdf
- [3] Y. Fu-cai et al. , "Design of Cleaning Robot for Swimming Pools". International Conference on Management Science and Industrial Engineering (MSIE), pp. 1175-1178, 2011.
- [4] X. Gao and K. Kikuchi, " Study on a Kind of Wall Cleaning Robot". IEEE International Conference on Robotics and Biomimetics, , pp. 391-394, 2004. [7] C.-C. Liu, Y.-P. Kang and S.-N. Yu. Hardware and Software Integration for Domestic Stairs Cleaning Robot. Proc. of SICE Annual Conference (SICE) , pp. 663-670, 2011.
- [5] Takeshita, T. Tomizawa and A. Ohya, " A House Cleaning Robot System-Path indication and Position estimation using ceiling camera". International Joint Conference SICE-ICASE, pp. 2653-2656, 2006.
- [6] 08681_beachtech_today_01_2016_en_v03_b.pdf
- [7] Prevalence_of_marine_litter_along_the_Indian_beaches_A_preliminary_account_on_its_status_and_composition.pdf
- [8] 2016/12/Ecocoast-Technical-Note-Beach-Cleaning.pdf

