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Smart Water Body Cleaning Robot

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ABSTRACT

Water is the most required component among the natural resources, and is basic for the survival of every creature including humans. Water gets polluted due to many reasons such as waste from industry, garbage disposal, sewage waste. Which results in global warming. In India, water pollution has been a major topic of concern for many years because of the disposal of plastic and garbage and other waste being dumped in large quantities in the water by industries and its one of the ways garbage is dumped with no proper waste management in the country. As for the application of the water drone, we focused on object recognition for the detection of different types of garbage polluting the lake to help protect the aquatic environment. Object recognition is based on the concept of deep learning, which is the biggest topic in the artificial intelligence research field today. This model is highly scale-able and with the implementation of "HIVE Intelligence" and integration of a Global Positioning System (GPS) Module will allow multiple robots to simultaneously work together as a whole and clean the water body surface with utmost efficiency. Index Terms - Smart Water Body Cleaning Robot, HIVE Intelligence, Global Positioning System (GPS), IOT on the platform of things speak.

Keywords:Controller,Propeller,GarbageCollection.

INTRODUCTION

In the modern society we generate about 2.01 billion tonnes of solid waste per day, out of which 30% which is almost about 600 million tonnes end up in our oceans and other water bodies. These are very detrimental to the aquatic ecosystem and the flora and fauna that thrive there. Especially in India water pollution is mainly due to materials like plastic bottles, covers, discarded from industries and waste from plants such as leaves and flowers that float on the surface of water. At this stage we will only be implementing surface water cleaning of solid floating waste. To combat this we have come up with an innovative solution. Where we use a robot that works to eliminate solid waste from water bodies such as lakes and ponds. The robot will serve the main objective of surface water cleaning and removing as much of solid plastic waste and other floating objects from the water. All the garbage will be collected in the collection bin. For the last two decades, there has been an explosive increase in the urban

population without corresponding expansion of civic facilities such as adequate infrastructure for the disposal of waste. Hence, as more and more people are migrating to cities the urban civic services are becoming less adequate. As a result, almost all urban water bodies in India are suffering because of pollution and are used for disposing of untreated local sewage and solid waste, and in many cases the water bodies have been ultimately turned into landfills. This "Smart Water Body Cleaning Robot " is used in places where there is waste in the water body which is to be removed. This model uses "HIVE Intelligence" along with Global Positioning System (GPS) Module will allow multiple robots to simultaneously work together as a whole and clean the water body surface with utmost efficiency.

2. LITERATURE SURVEY

Munjik Lee, Jeong Woo Park, Sang-Heon Park, Jungwoo Lee, Sungkook Park, Jong-Geol Kim, Youngjin Hong, Jinho Suh, Yun-Jung Lee "An Underwater Cleaning Robot for Industrial Reservoirs",2012. [1]. They have used PIRO-U3 that can be controlled remotely by an operator from outside the water using the ROV (remotely operated underwater vehicle) method, which is automatically controlled. With the help of DGPS (differential GPS), the robot follows a predefined path and locates its position and cleans underwater. This technology is used to clean without draining the water in the pool while removing the foreign substance.

H. Albitar, A. Ananiev, I. Kalykov "New concept of inwater surface cleaning robot", Orebro, Sweden.[2]. This paper introduces a new concept of a flexible mechanism to design a robot cleaner, which can work underwater, scanning the desired surface, and cleaning the garbage. This can be used as a robotic application in underwater surface cleaning and maintenance. It is designed to realize the location of the object by using DC-motors and vacuum technology. In this study, we first focused on realizing the adhesion, bearing reactions, and achieving stable locomotion on the surface.

Fatima Jaber, Abrar Abdulsalam, Jawaher Jafar, Batool Moosa, Amna Khalil, Salama Bilal, Dr.Teye Brown "Autonomous Robot Fish for Underwater Pollution Detection"[3]. It was developed to control and monitor water pollution on waterways which is strong enough to withstand Atlantic currents and highwater pressure, offers an accurate water condition, uses artificial intelligence to identify the source and send reports back to port authorities via Wi-Fi and it can communicate with one another through sensors and a form of sonar.

Zhongli Wang, Yunhui Liu, Hoi Wut Yip, Biao Peng, ShuyuanQiao, and Shi He, "Design and Hydrodynamic Modeling of a Lake Surface Cleaning Robot"[4]. This paper presents the design and hydrodynamic model for garbage collection of using an autonomous robot for cleaning the waste material floating on the face of the lake and proved to be useful in understanding the technical mechanism as a lake surface cleaning robot. This paper also included the prototype where the robot is using the Maneuvering Model Group model approach using simplified models of three degrees of freedom. The hydrodynamic forces and moments of the robot, propulsion and

steering forces are derived using the hydrodynamic model that helped us to design and a mechanically stable craft, while accounting for the viscous resistance of water, the velocity and pressure field around the robot.

3. METHODOLOGY

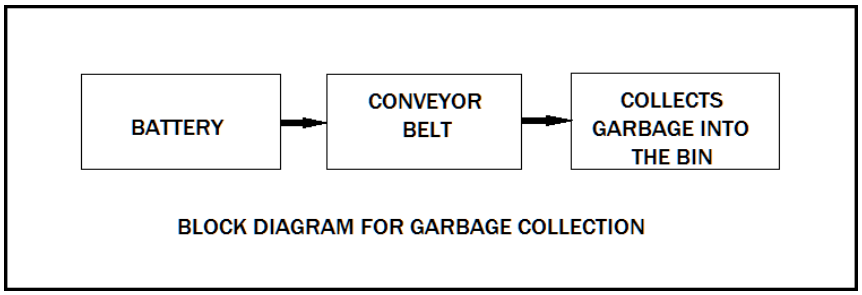

Fig. 1. Block diagramforgarbagecollection

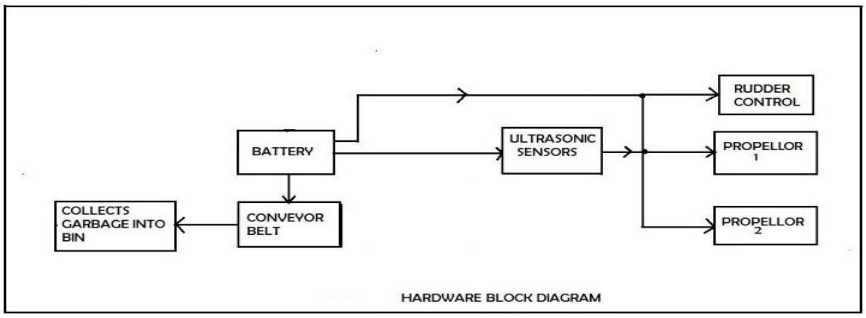

Fig. 2. Hardwareblock diagram

The robot is connected to the Blynk application installed on a smartphone, over Bluetooth and controlled through it. The robot once deployed can be controlled by the operator to navigate the waterbody and collect garbage. The ultrasonic sensors are used to detect objects and avoid collision in case of unavailability of line of sight.The robot and all its subsystems are powered by a Li-ion Battery which includes all the controllers, sensors and motors. The conveyor belt collects the floating objects and transfers the garbage in the collection bin present on top of the robot. The collection bin acts as an intermediary storage and contents of the bin are later transferred back to the shore for further processing.

4. IMPLEMENTATION

At boot the Drone connects to the Users peripheral (Mobile/Laptop) Over local Network or the Internet through a web browser-based interface. Here the user is given a choice to run the robot in two modes.

1. Manual Mode

2. Autonomous Mode

Manual Mode:

When the manual mode is selected, the individual robot is connected to the User's peripheral over the desired network connection over a Web Browser Based UI. The UI consists of a HTML Based Web Page. The UI elements are constructed using CSS and Javascript. The Advantage of this being the wide range of devices with web browser support. So the user can choose whichever device he/she feels comfortable with.

The web Browser displays all the sensor Readings, The live Feed and also the operating Temperature of the drone. A Custom-built input JoyStick is used to control the movement of the Drone.

Autonomous Mode:

At the selection of autonomous mode, the Drone first begins its trace on a predefined path. As the floating debri and garbage is detected the robot Moves in to collect it. The position vectors are fed into the particle swarm optimization algorithm which is used then to optimize the route of the robot to move towards areas of larger concentration of Debri. This data is relayed to all the other drones deployed. Which similarly compute the shortest global mean collectively to reduce path and optimize efficiency.

This is carried out until the drone is filled to the brim with debri and garbage or until the remaining battery is left to less than 10%. In this case the robot is retired back to the shore for unloading or charging.

The current project, Blynk acts as the brains and is responsible for the control and actuation of all themechanical components. The components are powered by a Li-ION battery pack consisting of 4 18650cellseachof3500mAhcapacityin4Pconfigurationgivingitatotalcapacityof14,000mAh.TheArduinoboard and the laptop are configured as the client's and the server using the Blynk app.The model isdeployedwithultrasonicsensorstocoverallblindspotsanddetectobstaclestoavoidanykindofcollision.The Ultrasonic sensor works at a voltage at 4.75-5.25v and detection range is up to 11 meters. Theultrasonic sensors detect the garbage. Once the garbage is detected the conveyor transfers it to thecollectionbin.

Fig. 3. Proposed Model for the project

5. RESULT

Smart Water Body Cleaning Hive Robot is designed with an intention of cleaning the waste that floats on the lake, by using our robot we can collect many floating wastes like plastic bottles, bags, flowers without any human interference and then dispose of the waste easily to a centralized collection bin. Also, our product helps in reducing the water pollutants to a certain extent. The major advantage is the safety provided by our product that is one need not risk his life while he is cleaning the lake and we just need one person to control the drone. The product is socially helpful for the laborers who clean the lake and economically viable.

6. CONCLUSION

We can conclude that it is an innovative method of minimizing manual stress and thus very much reliably stabilizing the river. The project carried out by us made an impressive task in the environmental purpose and it is very useful for small scale works. Although this system is able to collect the garbage from the lake with human intervention. The objective of the project was successfully achieved.

The advantages of this project are:

- This cleaning system is easy to operate and flexible.
- This system is Eco-friendly.
- This requires less manpower.
- This required more use of renewable energy Sources.

- This system is Cost effective (Initial and Maintenance cost is low). This is an efficient method.

REFERENCES

[1] Munjik Lee, Jeong Woo Park, Sang-Heon Park, Jungwoo Lee, Sungkook Park, Jong-Geol Kim,Youngjin Hong, Jinho Suh, Yun-Jung Lee "An Underwater Cleaning Robot for IndustrialReservoirs",2012.

[2] H. Albitar, A. Ananiev, I. Kalykov "New concept of in-water surface cleaning robot" Orebro,Sweden.

[3] FatimaJaber,AbrarAbdulsalam,JawaherJafar, BatoolMoosa,Amna Khalil,SalamaBilal,Dr.Teye Brown"AutonomousRobotFishforUnderwaterPollutionDetection"

[4] ZhongliWang,Yunhui Liu,HoiWutYip,BiaoPeng,ShuyuanQiao, andShiHe,"Design andHydrodynamicModeling of A LakeSurfaceCleaningRobot".

[5] Daniel Souto, Andres Faiña, Fernando López-Peña, and Richard J. Duro "MorphologicallyIntelligentUnderactuatedRobotforUnderwaterHullCleaning".

[6] ManHyungLee,YuDarkPark,HyungGyuPark,WonChulPark,Sunpyo Hong,KilSooLee,HoHwanChun."Hydrodynamicdesignofanunderwaterhullcleaningrobotand itsevaluation".

[7] LEVERAGING RETENTION SALES BASED INNOVATIVE INCENTIVE STRUCTURE TO TURNAROUND AUTOMOBILE DEALERSHIP, Fateh Bahadur Singh , Brajesh Mishra, Anjali Singh, International Journal Of Advance Research In Science And Engineering http://www.ijarse.com IJARSE, Volume No. 10, Issue No. 02, February 2021 ISSN-2319-8354(E).

[8] S.M.MirajUddin,Md.ReyadHossain, Md.ShahriarRabbi,Md.Akib Hasan,Md.SaniatRahmanZishan"UnmannedAerial VehicleforCleaningtheHigh RiseBuildings".

[9] J.Flynt,J.Flynt,J.Flynt,J.Flynt,J.Flynt,"21TypesofDrones:TheUltimateListofDroneTypes-3D Insider", *3D Insider*,2018.