

AUTONOMOUS FLOATING TRASH COLLECTOR

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Abstract - Commercially available trash collector boats are often designed in large size to cater to the high trash loading for surface water cleaning purpose. On the other hand, for small streams and drainage, the manual cleaning method is often used. This situation is undesirable since it can lead to health problem and diseases to the operator due to the number of impurities present in the water. With the aid of Autodesk Inventor 2009, a 3D representation of the trash collector boat was generated to visualize all the details regarding the trash collector boat. System fabrication will be conducted using appropriate material to ensure the efficiency of trash collector boat. Testing and analysis were conducted to evaluate the system performance, monitoring unit performance and loading capacity of the portable trash collector boat. The results found that the collector boat is capable of handling a maximum trash load of 6 kg in a single operation.

Index terms – Terrain surface, Camera, DC Motor

I. Introduction:

Water surfaces including lakes and river are among the important feature for the world. They do not only serve as water resources for humankind but also provide valuable ecosystems for varieties of flora and fauna. However, with the increasing number in urban population and growth of industries, lakes and rivers are suffering from pollution problem [1]. Floating solids including beverages can, plastic bottles, food packaging, container, straws and Styrofoam cups are among the major solid waste that can be found in the surface water [2]. These waste materials that are being effortlessly dumped into the water bodies and create a harmful environment to human as well as animals and plants . The unwanted presence of these wastes in the surface water will also contribute to the environmental problems such as drain logging and flash flood as well as potential disease.

II. Literature review:

As stated earlier in the introduction of this study, the most common type of pollutions can be categorised into three; Land pollution, Water pollution and Air pollution. These pollutions have become the major factor that caused destructions to the surrounding environment which mainly created by human activities. Apart from this, the pollution may also occurred by natural causes. According to [5], the pollutions always concentrated in the metropolitan cities and suburban areas due to large number of population resided in the area. On the other hand, the rapid growth of industrialization at that time had caused the pollution becoming a universal problem.

Pollution has been always an issue in China [6]. The most common problem is water pollution. A recent study had shown that over half of the river sections in remoted areas in China are

rated as hazardous for human contact. In reference to [7], there are several risk valuations been made. One of the risk valuation is as illustrated through pollution case in Guangxi province of China. The problem was caused after an enormous dump of garbage. This happened in September 2016 where a quarter size of a whole shipment loaded with household garbage was dumped into the river. However, this situation was captured and noticed by nearby villagers. After some reports made, an instant action had been made by the local department of environmental protection by launching an emergency water quality monitoring of the river. The Guangxi Environmental monitoring centre had also conducted thorough investigation through the monitoring data after identification of water damage in the river. where synthetic material such as the disposal of plastic has been seen as a threat to the surrounding and its widespread throughout the environment has caused the destruction of Anthropocene; an act of human activities which has an influence on the environmental impact hence the future of the earth system. A recent study has been conducted according to [8] that in 2010, there was an estimation between 4.8 and 12.7 million tonnes of land-based plastic which was not properly managed and mishandled had been insinuated to the oceans. Due to this case scenario, it has been noted that the plastic pollution had delivered an obvious unfavourable effects on the organisms, ecosystems, human health and socioeconomic factors including aquaculture, tourism and navigation. The latest evaluation made from reference [8], at least 5 trillion plastic debris was recorded drifting on the surface of the ocean. This Marine Plastic Pollution (MPP) had been extended to five subtropical ocean gyres as well as the Arctic Ocean; accumulation at the convergence zones. The accumulation of large scales of marine plastic was the result of aftereffect of the

wind flow, the currents of the ocean as well as the thermohaline circulation. Thermohaline circulation can be defined as a flow of heat fluxes

and freshwater across the sea surface and the interior mixture of heat and salt [9]. Apart from this convergence zones, there is comparable concentration in the subtropical gyres. It has been recorded that this was the result of the heavily populated areas in the Mediterranean Sea, South China Sea, Gulf of Mexico and Bay of Bengal. As indicated by [8], the biological pathway of living marine organism that had ingested the marine plastic cannot be reversed and stopped as it has a noteworthy impact in the worldwide dispersion of plastic particles. Factually demonstrated that this plastic served as an effective substrate for sessile species; Tube Worms, Bivalve Mollusks and Barnacles just as for motile life forms. Apart from that, it additionally affirmed that plastic could host very harmful viruses, microbial communities and bloom species which also known as "Plastisphere". Beside this, the marine plastic could act as a vector to

transport the alien species which is invasive [8]. Regardless of the little size of the plastic, every particle has the ability to convey living organisms and to re-disseminate destructive substances which may alter ecosystem composition and its functionality as well as changing their genetic diversity. The plastic has become rapidly in use since the end of Second World War due to its durability as well as its lower cost of production [10]. Since then, plastic has been on production and currently its production exceeds 280 million tonnes per annum. Based on the same reference, it is believe that estuaries are the main source of transporting the plastic to ocean and of course due to other factors such as industrial outlets and recreational fishing activities. There has been a research made in South Africa that the marine debris is the source of foods by seabirds in the mid of 1980s.

From the reference [11], the plastic pollution has been greatly produced and the source of input to the marine environment have drastically increased. The reference is also once again express that the marine debris such as plastics are being ingested by the marine animals resulting in direct mortality and range of sub-lethal effects such as laceration and gastrointestinal blockage. Estimated over 260 species of animals have been reported to have ingested the plastic debris [11].

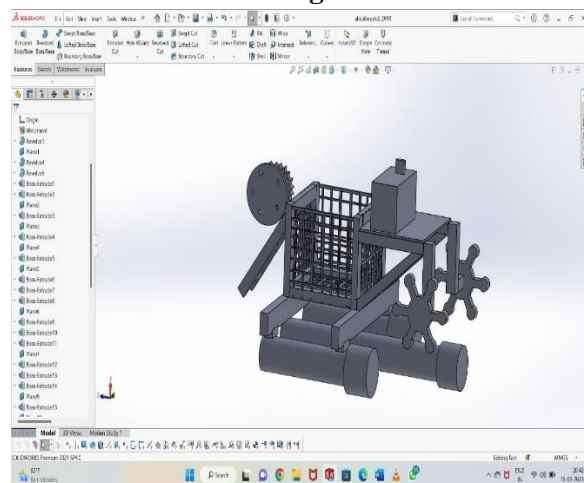
Studies from [12] stated that the Marine Plastic Pollution (MVP) composed of macro and microplastic was considered severe as the authorities have limited resources and services on the island of Caribbean and Atlantic Ocean. Beside tourism, fisheries and shipping are another contributing factors of plastic marine debris. Reference [12] has identified that Henderson Island as the most severely polluted in the world.

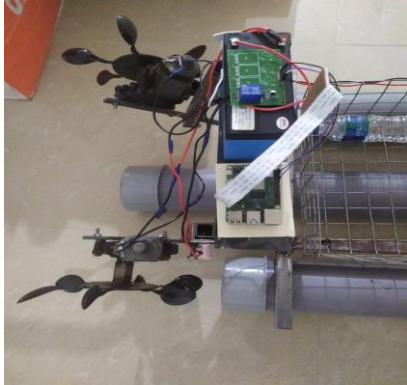
III. Objective f the project:

The main aim of our project is to collect trashes from water bodies together with purification of water. The system is made as a floating apparatus, when powered, it starts to float through water body and collect trashes.

1. To design a boat able to float in the water.
2. To design a conveyor able to pick the waste.
3. To recognize the object and our boat location using camera.

IV. Design:





V. Hardware Requirements:

Hardware components required for this robot:

- Raspberry pi
- Motor Driver
- Gear Motor
- Battery
- Pi Camera
- Mobile App
- Wheels

VI. Applications:

The water trash collector concept is to reduce manpower and time consumption for cleaning the river. The water trash collector is to collect many types of wastes from water bodies and also reduces the human interference. It collects a wide variety of wastes from water bodies and reduces human interference.

VII. Conclusion:

This project is made with pre planning, that it provides flexibility in operation. This innovation has made the more desirable and economical. This project “AUTONOMOUS FLOATING TRASH COLLECTOR” is designed with the hope that it is very much economical

This project helped us to know the periodic steps in completing a project work. Thus, we have completed the project successfully.

VIII. References

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