

AUTOMATIC LAKE CLEANING AND SURVEILLANCE BOAT

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ABSTRACT

Lake Water Cleaning Machine Design and Analysis. The work has been carried out with a view to the current situation of our national lakes, which are dump with many waste litters and loaded with pollutants, toxic materials, debris, etc. The Government of India has been responsible for cleaning up lakes and investing huge capital in many of the Lake Cleaning in major and medium-sized work in cities such as Ahmadabad, Varanasi. This research work has been designed to clean up Lake Water by taking this into acct. The impurities present in the water can cause a threat and disease. As long as the drainage system is considered to be a function of the main drainage system, it is necessary to collect, transport and dispose of the water through the outlet or outlet. Hazardous waste impurities can only be like empty bottles, polythene bags, poppies.

The paper's main goal is to reduce man strength, the energy needed to clean the lake . In this paper, the cleaning of the lake was automated with the help of a motor and chain drive arrangement automatically it will take an auto-turn to clean. We also send boat information to base station using IOT, such as temperature , humidity level pH value of lake water and other required information.

Keywords: Eutrophication , Surveillance , Garbage ,Aquatic animals.

I. INTRODUCTION

As the population of Earth continues to rise, people are placing ever greater pressure on water supplies on the planet. Human actions "squeeze" lakes, and other inland waters, so that

their quality is reduced. When the quality of water is poor means polluting water. Boats in harbors and rivers for the storage and disposal of floating toxic waste materials[7]

More specifically, the invention applies to multi role vessels equipped with means for collecting floating debris, means for storing debris on a vessel, and means for discharging debris from a vessel to a storage area which may be ashore or which may be another vessel, such as a barge. Many work boat and vessels have been proposed for the collection of floating solid waste and other debris. Typically, they may be formed as a catamaran-type hull, i.e. a pair of hydrofoils or sponsors, or as a mixed vessel, a paddle wheel or a Lake gas turbine screw, and an operator station. In one typical trash skimmer design, One or more of the open mesh hydraulic actuators between the two conveyors are located between the twin-hull catamaran vessel hydrofoils. [5].

Due to the recent trends through our environment today , the problem of floods and climate change has become scandalous. It has become a major cause of concern for the world, particularly for developing countries.

Impurities in water can cause both hazardous and illness. The role of the main drainage system is to absorb, transport and dispose of the water through an outflow or outlet as long as the draining mechanism is considered. Impurities in drainage water may only be as empty bottles, bags of polythene, paper, etc. It is an industrial water purification system that can collect floating garbage and solid waste from the surface of the water and store it in its floating bin. The device can be configured, scaled to any size, and can automatically run

Solving the Lake Cleaning problem is organic and successful. This reduces the human effort, works quickly than Man Power[2]. In 153 Nations and locations over 9.5 million volunteers have collected 163 million pounds of litter from over 330,000 miles of coastline and waterways. Actually more than 10 million pounds of garbage is gathered along nearly 20,000 miles of coastline. More than 550,000 people were brought in This issue affects the destruction of the beautiful scenery and attractions in Thailand. In addition, it is causing the sea animal death problem. The whale's death on the beach, for example, Patong, Phuket because it eats plastic waste. While some groups are trying to clean the beach, the amount of garbage on the beach is still rise at all times The invention of technology such as boat to collect the garbage is therefore the one thing that is interested in[19].

II. OBJECTIVE

- Designed to build an automated lake cleaning and surveillance boat capable of cleaning the lake. Sensors, motors and tools are used to clean the lake.
- Surveillance for careful close watching of a place for looking the wastages in lake.
- Conveyor picks up all floating garbage from the surface of the water to the container.
- Automatically to control boat behavior using ultra sonic sensor.
- The boat uses different sensors that gather data and then send it to the base station.
- pH of the lake water is monitored continuously, algaecides is dumped if lake water will found acidic.
- To save aquatic animals using digital image processing.

III. BLOCK DIAGRAM

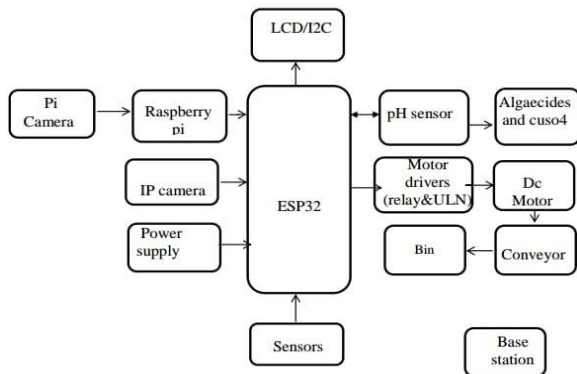


Fig: Block diagram of Automatic Lake Cleaning and Surveillance boat system

Fig: Block diagram

The block diagram of Automatic Lake Cleaning and Surveillance Boat – An automated machine to clean lakes. The block diagram consists of ESP ,rasberry pi and pi camera for image processing , IP camera is for surveillance ,sensors is for auto control of boat ,LCD and I2C is for display purpose , motor drivers ,water pump , conveyor ,bin and power supply unit.

- The boat is developed in such a way that it has a conveyor and bin .Conveyor has 2 motors which rotate continuously and Remove all floating waste from the water surface to the bin. When the bin is full, it gives a beep sound and discharges the waste in one area.
- Conveyor gathers all floating waste collector. And while collecting garbage, it also checks for the presence of aquatic animals in front of boat using image processing, conveyor is idle if any aquatic animal presence is confirmed.
- The boat direction is controlled using the ultrasonic sensor suppose any obstacle is present in front of the boat like rock, pipe etc it indicates the distance then the direction of the boat will be changed.
- The boat is operated by microcontroller in automatic mode. The boat uses various sensors that gather data and send it to the microcontroller that controls the behavior of the boat.
- The microcontroller is connected directly to the relays and can activate or deactivate them. The relays are linked to the control system.
- The pH of the lake water is monitored continuously if the water is acidic then the algaecides is dumped into the water .This might leads save aquatic animals.
- Eutrophication or hypertrophication occurs when water is excessively enriched with minerals and nutrients causing excessive algae production. This process can cause the body of water to deplete oxygen. One of the negative impacts of eutrophication and increased algal growth is a loss of available oxygen, known as anoxia. These anoxic Fish and other aquatic organisms such as amphibians may be killed under conditions.Nitrogen and phosphorus are the most common nutrients which cause eutrophication.Run-off from agricultural land is the main source of nitrogen contaminants, although most phosphorus contamination comes from households and industry including phosphorus-based

detergents. Usage of algaecides such as copper sulphate to control eutrophication.

The boat information is send to base station like temperature, humidity and pH value using IoT platform ThingSpeak.

- Development of a Boat to conduct surveillance activities in water areas. The IOT-based system nowadays plays a vital role in our day-to-day life activities, thus reducing human labor and error.

FLOW CHARTS

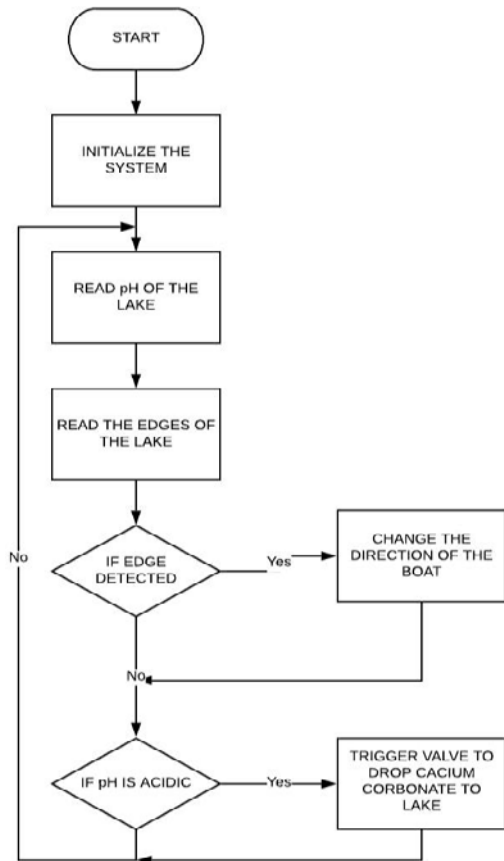


Figure.2. Flowchart for Flowchart for direction control

- As shown in flow diagram , Initially the power is supplied to components and the system starts.
- Ph value of the lake water is continuously monitoring, using pH sensor.
- The lake edges are detected by using the ultra sonic sensor. If the edge detection is confirmed, then the direction of the boat is changed. Otherwise the boat will move forward.
- While monitoring the pH value of the lake water ,if it found acidic the algaecides is dumped into the lake. This might leads to save the aquatic animals.

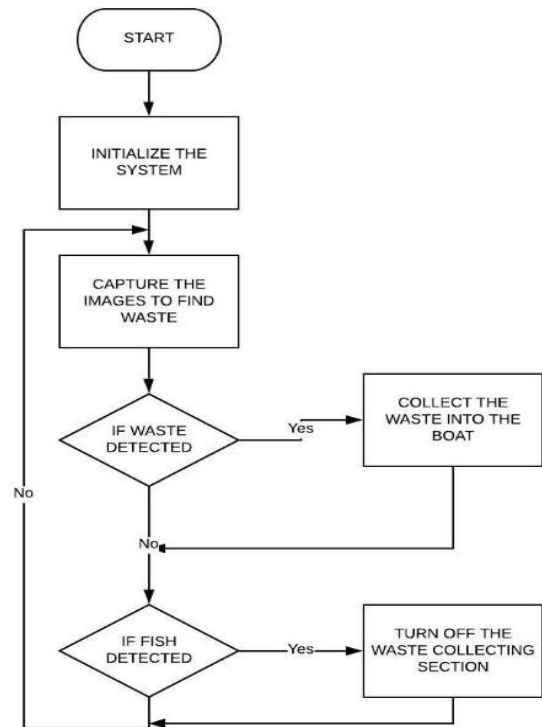


Figure.3. Flowchart for waste collection

- As shown in flow diagram, the system is initialized and, the waste is detected using the image processing.
- Pi camera captures the images to find the waste, and monitor using image processing. If it is confirmed as waste then waste is collected into the bin.
- The conveyor of the boat is rotating continuously it collects the floating garbage into the bin.
- While monitoring the image processing if there is any aquatic animal is present in front of boat, ex fish the waste collection section is idle for awhile.

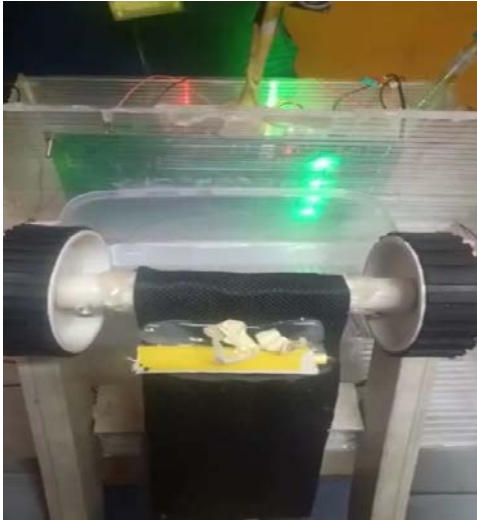
IV. RESULTS AND DISCUSSION

1. Initial setup



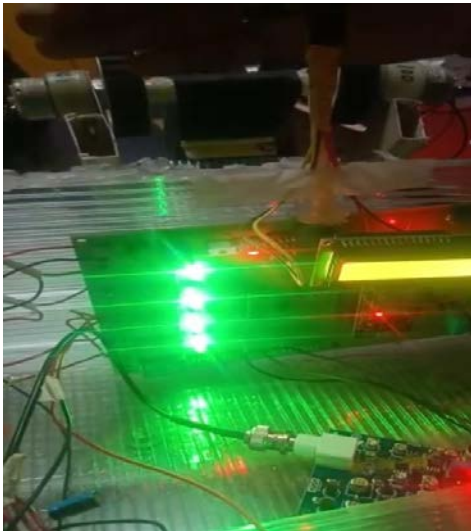
- After the initialization of the system the temperature, humidity , pH value and shows the distance between the objects and boat.

2. Garbage collection



- In this section collects the floating garbage such plastic, covers .etc in to the bin.
- The conveyor of the system is rotating continuously ,the garbage which is floating on the lake water is picked up by using conveyor.

3. Automatic direction control



- The automatic direction control of the boat is done using ultra sonic sensor.
- Boat will stop its motion when any obstacle is present in front of boat.
- If the lake edge is detected the direction is changed. First it will take right direction and next it will take left direction in such that it will covers all parts of the lake.

4. pH monitoring



Fig(a)

Fig(b)

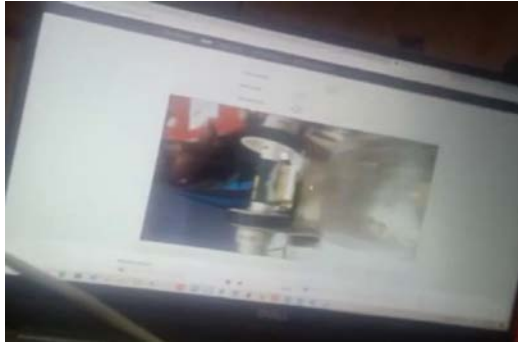
- The pH of the lake water is monitored by using the pH sensor.
- If the lake water is acidic the algacides dumped automatically into the lake. In figure (a) if the water is acidic the algacides dumping into the lake. In figure (b) It has stopped dumping because the pH sensor is kept in pure water .

5. Aquatic animals detection using Digital image processing



- Digital image processing is used to detect aquatic animals. In raspberry pi the GPIO pin 2 connects to GPIO pin 5 of ESP , it will intimate to the ESP module then the relays linked are switched off.
- Here the golden fish is taken as example . If it is detected, shows message “FISH DETECTED “ then the conveyor will stop collecting.

6. Surveillance



- Surveillance is done using IP camera.
- User can watch the lake from base station using Wi-Fi.
- Thingspeak – IoT platform Data is updated to cloud.

V. APPLICATIONS

- Minimize water pollution in lakes and ponds:-In this case, pollution is described as "making something unclean," fresh water bodies. Water pollution limits its use in the ecosystem for some human need or a natural function.
- Removes the sediments:-Inside the uppermost sediments of the lake, large amounts of interstitial plastic materials and organic matter, chemical, precipitate or mixture of those.
- Keeping water clean:-Recycling items and proper disposal of items that cannot be recycled would keep them from getting lost to rivers and oceans.
- Clean rivers:-The River's garbage is more than just an eyesore because it can actually contaminate our drinking water and damage wildlife, human lives.

VI. ADVANTAGES

- Saves aquatic animals: Aquatic animals like fish, tortoise, crocodile etc are saved by using digital image processing.
- Less human interference: As the automated machine cleans the lake, no human interference is required to clean the lake.
- Easy disposal of waste: By using the boat the process of cleaning can be done easily.
- Efficient and reliable: The system is more efficient and reliable.
- Environment friendly system: Cleaning the lakes means protecting the environment.
- Skill workers not required: The machine is automatically controlled hence skill workers are not required to drive the system.

VII. CONCLUSION

Owing to plastic, paper and metal the issue of water logging contributes to pest growth and it favors diseases such as malaria, typhoid etc. For human life, this is unsafe. The proposed paper system cleans the garbage present in the lake and minimizes the usage of garbage collector powered with diesel. It also saves aquatic animal life and reduces the human effort needed to cleanse the lake.

VIII. FUTURE SCOPE

This paper could be strengthened in future to sort further waste categories. In this method, we will use an advanced conveyor system and conveyor material to make garbage collection more effective. Instead of battery operation we can use the solar panel to provide power to the boat. Changing the size of the boat according to its capacity to collect waste is increasing. This paper makes it possible to use it in large lakes or for small lakes by making some improvements in its size and ability.

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