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Stable Surface Water Cleaner Using Quadcopter

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Abstract*—This project is where we are using a quadcopter to fly around and collect the garbage from the oceans, lakes and any water body. Here we are using a container which is attached below the quadcopter, the container is fixed to the floats of the quadcopter. When it collects the garbage from the lake or the ocean we can remove the container and empty the contents. This container uses a pump which will push the water out to create pressure to fill the container back and also pull the garbage in it. Then after a period of time when the quadcopter gets full with garbage there will be sensors which will detect the amount of garbage filled in it and then it will take of automatically and return to the location it took off from. The user can then empty its content's, clean it up and sends it back to do its job again.*

Keywords—Cleaner, KKboard, Surface Water, Quadcopter, Water Cleaner

I. INTRODUCTION

This project is based on the concept where we are using a quad-copter to clean the garbage from the water bodies, the garbage that floats in the oceans, lakes or any type of water body is mostly consisted of plastic. This is the garbage that doesn't degrade so it stays there we need to clean it otherwise our environment will be polluted and it will cause harm to the marine life and the fish in the lakes. To prevent these things we are creating this quad-copter so we can clean the water bodies.

1.1 Objective of Study

This project will help to clean the water bodies. This will reduce the pollution and we can also recycle the plastic waste so that it can be reused for better purposes. Here we can also use a device to work in oceans to separate the water and oil then collect the oil and let clean water flow back so it can be useful for the environment

II. CONCEPT REVIEW

The system consists of KK2.1.5 Multi-rotor board, transmitter, receiver, Lipo battery, electronic speed controllers, motors, and frame shown in the Fig 1.

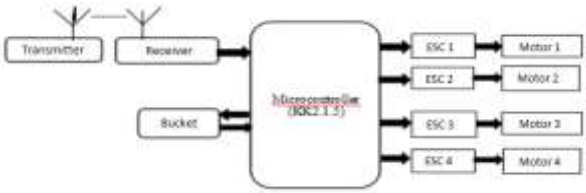

Fig.1 Block Diagram

The Quad-copter used in this project works on a k.k board with a Mega 324PA microcontroller it is used to hold a container to collect garbage from the water bodies. The container is attached to the quad-copter when it flies, it needs to be light weight so that there is no problem when it takes off after collecting the garbage also so that it won't affect it when it's flying.

To achieve this we have the following points below.

- We are using hinges to attach the bucket to the quad-copter.
- There is a pump to create a back flow for pulling water into the bucket and also the garbage.
- There are holes on the container to drain the water so it's easy to take off.

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- There are floats which keep the quad-copter above the water level.

These are the points which if taken care of there will be no issues in the project and it will be implementable.

III. HARDWARE DESCRIPTION

In this system there are various hardware devices used which are given below:

3.1 KK board 2.1.5

KK 2.1.5 is a board with ATMEL mega 664PA,8-bit AVR RISC based microcontroller with 64K of memory.It is easy for the beginner to start with and has firmware pre-defined in it. While activating or deactivating the board there is an audio warning from the piezo buzzer of KK 2.1.5.It is the most stable board because it has inbuilt gyroscope, 6050 MPU, and auto level function. This board has eight motor outputs, five control inputs, an LCD display, polarity protected voltage sensor input, an ISP header, six-axis accelerometer/gyroscope, a fuse protected piezo output. The user-defined signals from K.K.board are processed by ATMEL 644PA IC and these control signals are passed to the ESC's installed on the frame of the drone

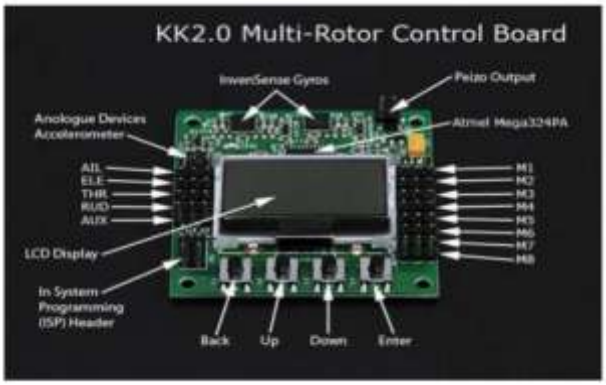

Fig.2.1.5

3.2 Electronic Speed Controller

An electronic speed controller is an electronic device used to control the speed of the motor and the direction also. It follows a speed reference signal and varies the switching rate of field effect transistors. By adjusting the duty cycle or switching the frequencies of the transistor the speed can be changed.

Fig.3Electronic Speed Controller

3.3 Brushless Dc Motor

DC motor is a type of synchronous motor that is powered by DC source via an inverter to produce an AC electric current to drive each phase of the motor. Its construction is simple as permanent magnet synchronous motor. The advantage of this motor is High speed and electronic control.

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Fig.4 Brushless DC Motor

3.4 Propellers

These are simply fans which convert the motion of the motor into upward thrust. They are, made up of flexible fibre to be unbreakable while crash landing.

Fig.5 Propellors

3.5 Battery

Lithium polymer battery or Lipo battery is a simple rechargeable battery with different current ratings and number of cells. Here lithium ion adds to the polymer which is an electrolyte.

Fig.6 Battery

3.6 Transmitter & Receiver

The Transmitter acts as a controller from the user. It is a radio communicating wireless control system. The signal from the transmitter is received by the receiver placed on the frame of Drone through the antenna in a receiver. The signal from a receiver is given to KK board. This board will send the signal to all electronic speed controller from that speed of the motor is controlled by the transmitter. The modulation scheme used in between transmitter and receiver is pulse position modulation (PPM).

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Fig.7 Transmitter and receiver

3.7 Frame

These are many types of frames for Drone. They are made of fibre & has integrated PCB for soldering ESCs and battery wires. Different colour coding made us know the orientation of the Drone.

Fig.8Frame

IV. PRODUCT DESCRIPTION

The Quadcopter used in this project has floats mounted below its frame which will keep it floating above water. Below the floats there will be a container which will act as a garbage collector to collect the waste from the Water bodies.

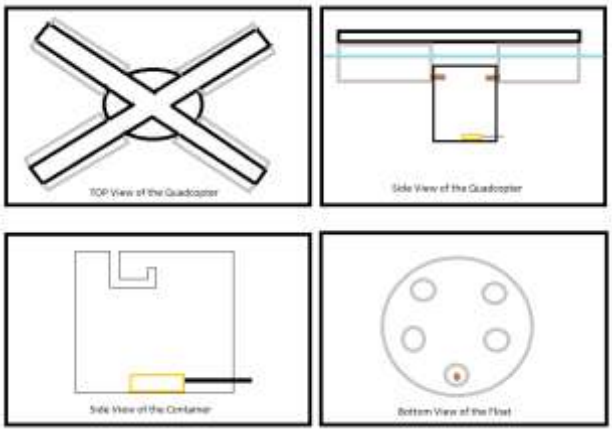

Fig.9 Project design

4.1 The Floats

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There are floats used in this project as we are going to land the quadcopter in water and we need the electric components to stay safe so we use floats made of Styrofoam, you can see in Fig 9 there are grey squares in the top view and side view of the quadcopter. Thesze floats don't just help in keeping the quadcopter float it is also used to hold the container (garbage collector) in place.

4.2 The Container (Garbage collector)

There is a container below the quad-copter which collects the waste and then that waste is used for recycling the way the garbage collecting container is attached to the quadcopter is shown in the figure Fig 9. There are hinges on the side view of the container which is used to connect it to the floats so it stays in place. There is a pump in the container which takes the water from it and pumps it outside creating a flow which sucks more water into the container and also pulls in garbage with it. This settles in the container and later you can detach the container and empty the garbage from it.

The Flow of the project is mentioned in the flow chart below in Fig 10

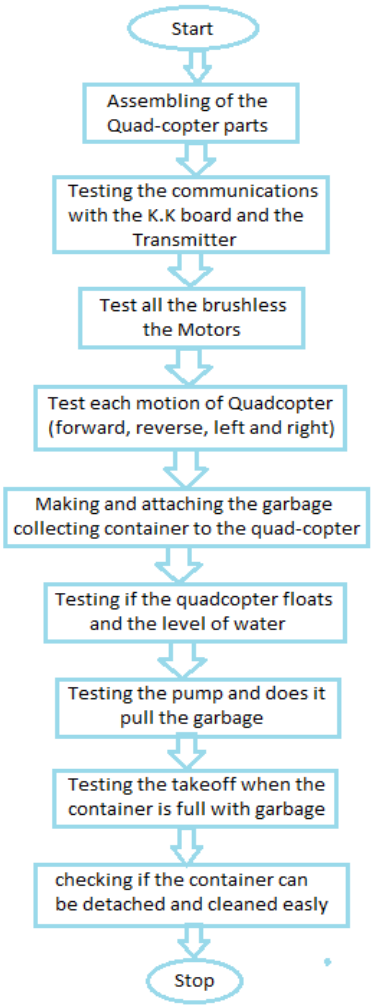

Fig.10 Flow Chart

4.3 Result and Discussion

The Flow Chart of the project shows the main areas which need to be tested. Once these tests are done we will have the container which will pull the waste from the surface of the water. The quad-copter will be able to liftoff with the garbage collected in it.

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- The following results are expected after implementing the ideology:
- Pulling of the garbage from the surface up to 45%.
- Improvements in the Liftoff.

V. CONCLUSION\

After Going through various methodologies and ideas we found the most useful ones like which components to use and what will be the structure of our project. The flow chart was designed according to how we will test every component and how will they function and operate to provide a successful result. In this we faced an issue with the garbage collecting container which we will design as a simple container and if the prototype succeeds we will go ahead with creating a proper bucket. The container will be attached to the floats and it will be removable to make the cleaning process easy.\

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