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Electronic Hover Craft

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Abstract: *Electronic hovercraft is a device which can easily move on sand, water, hill areas and also muddy places. The main reason behind this project is to rescue the people in the flooded region. Our Indian army forces like Indian army, Indian navy will have greater use of this project. For example coming to our local areas just recently happened these situation is in Hyderabad we got floods so many people lose their houses, property. so many people were injured. There is no such reliable system to rescue there. In that one senior citizen was died due to the helpless situation these type of situation makes so hurting to us. In that cases these type of devices may save their lives. In this system we have Bluetooth, Arduino UNO, propellers, two navigation motors which can give right and forward moving directions. Considering the price, simple implementations this project poses a less cost compare to fire brigade. With the help of Bluetooth in distance we can operate the system. With driving manually we can operate. Due to this one person can be saved. Instead of a driver one extra person can save. By using Bluetooth Arduino control app we can send command to the Arduino. When we give command we can operate, navigate the device with the help of down propeller air fills in cushion with the help of back propeller it will move towards forward direction with this we can control the device navigation for this we have 12volt 3.5Amps Battery power supply. Amplified current version battery to drive the motors.*

Keywords: *Arduino, Embedded C, Bluetooth, Android.*

I. INTRODUCTION

Generally most of the disasters occurs in borders and area filled with water. For example in rainy season Hyderabad was fully filled with water due to the leakage of drainage water. In these disaster destructive elements which not only caused the infrastructure but also took lives of many people which is very sad to see and hear. These type of disasters make so many relation breaking and also taking the lives of human beings and animals trees etc. so in order to protect the trees, animals, humans, infrastructures, efforts of engineers, workers, government we need such system which can save lives, effort and human attachments.

In this project we made use of the Arduino uno which is having atmega 328 microcontroller chip and we made use of many components as DC motors, BLDC motors (propellers), HC-05 Bluetooth control, Li-po battery which gives the appropriate power supply to the system to control the motor speed.

II. LITERATURE SURVEY

We referred various different type of existing models and located them for helpful to our device work.

The first practically designed hovercraft was designed from British invention in 1950's. They are now used throughout the world as transport in disasters relief, coast guard, military and survey applications.

A hovercraft is in simplest form hovercraft compose a hull that can float on water and carries out a cushion of air retained by a flexible skirt.

Hovercraft is a boat like vehicle but that are much more better work than the boat why because they not only travel on water they also travel on grass, mud, sand, hill areas as well as on ice.

During the 1950's English by name of Christopher Cockerell developed and patented the first hovercraft for this invention people and the queen of British named Sir Christopher Cockerell. He made the hovercraft which that can carry the passengers upto 400 people and have carried more than 30 million passengers.

Cockerell theory was instead of using plenum chamber as the theory of Thornycroft device. Air was pumped into narrow tunnel. Cockerell successfully tested his theory and filled his first patent in 1955. The birth of first hovercraft was 1959. First hovercraft was having the feature of Weight=4 tons

It can carry=3 men Speed=1.85kmph on water.

III. WORKING

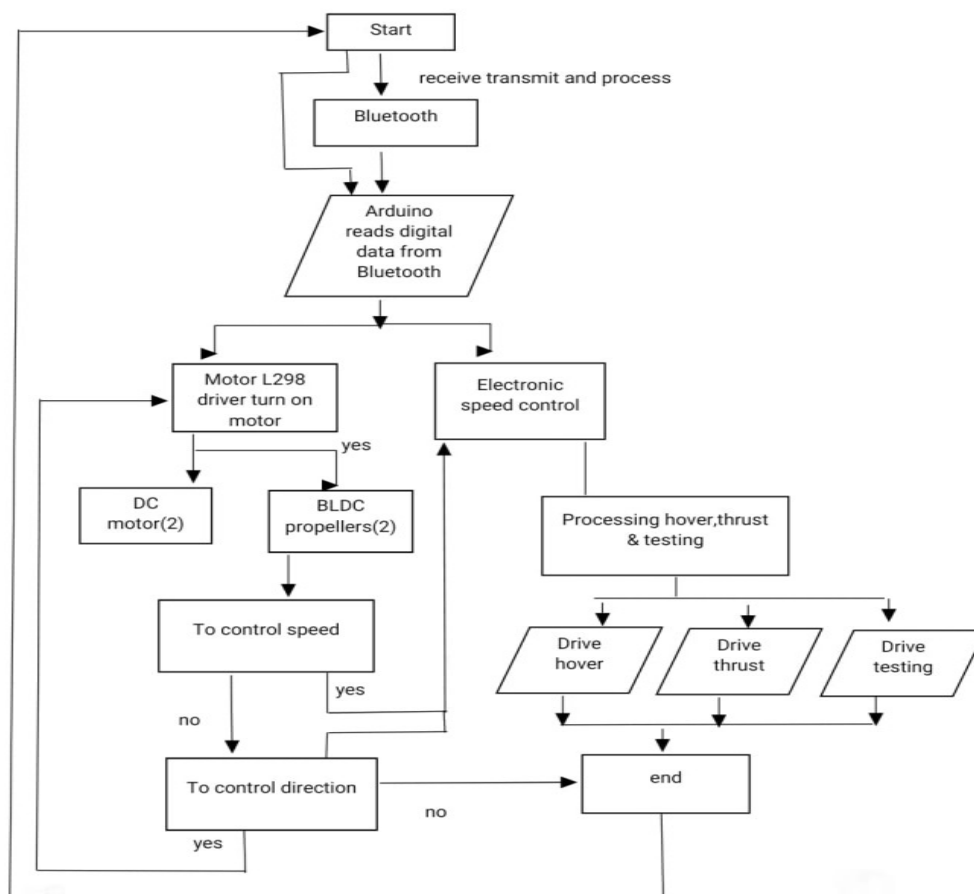


Fig 1. Flow Chart of Working Model

Two DC motor which one having the 1500- 2500rpm speed and the propellers for this we used drone motors BLDC(brush less dc motors) which one having the 19500-35500 rpm.with the help of “Arduino Bluetooth control” application which is available in playstore with that we cannot to through HC-05 to Arduino uno.by giving the “terminal mode” operation we can control the navigation of device.

When the down propeller start then the air will filled in cushion. When the speed of the motor is inverts that much amount of air will filled in the cushion.

When the back propeller turns on then device will move forward direction. If we need left to move left motor will turns on.when right side to move right motor will turns on.where ever the disaster happen it can easily go.

In this here we starts the setup of device by switching on or giving power supply by the Li-po battery. Which is having 2amp-12volts.then the Arduino uno seeks digital input from the mobile phone with the Arduino Bluetooth control application. With the HC-05

Bluetooth control from the mobile we give analoge input and that input data is converted into digital and it transmitted to Arduino Uno. With that Bluetooth is connected to Arduino Uno. Now we need control the motors. Arduino gives the digital data to L298 motor drive with that we can turn on required motors and to navigate the device left and right we can use L298 motor drive.

To control the speed of the motors we use ESC(electronic speed controllers) which can having the specifications of 18A,11.1-14.8v with that we can increase and decrease the speed of motor. An ESC (electronic speed controller) controls the brushless dc motor speed here BLDC motor of propellers. Basicallly BLDC motor are use for drone,for prototype we used drone .BLDC motor which is having 19500-35500rpm speed.

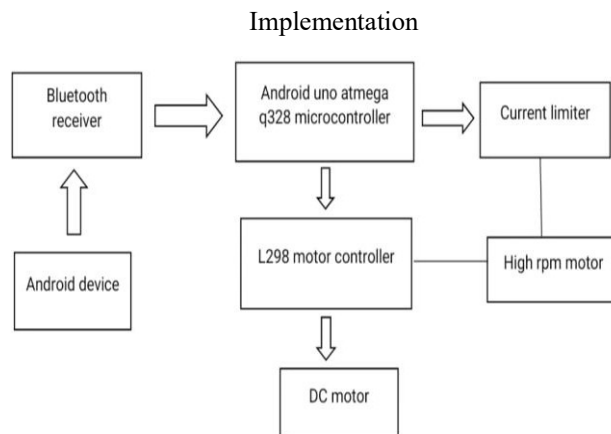


Fig 2. implementation

IV.WORKING PRINCIPLE

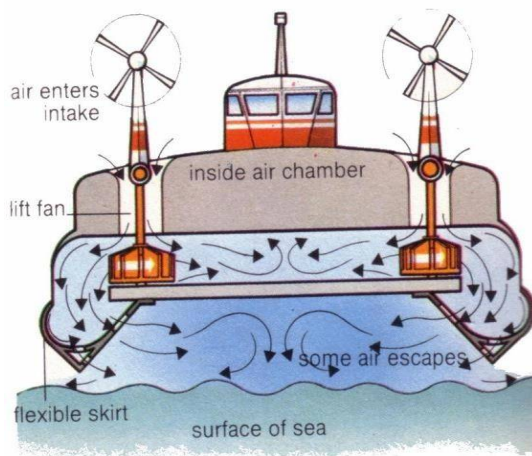


Fig 3. prototype

The hovercraft is a self-driving car, strongly supported by a self-made slow pillow a moving, high- altitude air emanated from the lower surface and contained inside a flexible skirt such is perfectly lung and has some ability to travel under the most beautiful places. Basically, the hovercraft floats over the surface of the earth over the air cushion provided by the lifting fan . The underground pressure eliminates all forms of collision and ease of hovercraft movement and pressure stability maintains sufficient height. A horizontal divider separates the air generated from the propeller into compressed air used for air compress while pressure is used for compression. Due to the air flow, the skirt fills up and the body is pushed and lifted when the lifting force is greater than the body weight. The stretched skirt provides content, enhances balance and makes the work of art versatile place. After the art lift, the blower mounted on the input engine enters the air facing backwards.

To control the direction of art to move forward, backward, right and left, using a microcontroller. This type of the vehicle can ride equally on ice, water, mud, or limited land . Because nothing is straightforward The collision between the hovercraft and the surface of the earth, the collision will be lowered so the hovercraft can move at high speed.

There are four main concerns when designing a hovercraft: boat, gravity, lifting system, and skirt . The design of the boat depends on the load that the hovercraft will carry determines the size of the boat. After knowing the hovercraft load, it is necessary to plan the location for each cargo to determine gravity and calculate the dead weight on the boat. If the dead weight is fixed, the lifting system needs to be set up in order to create the right pressure to lift the hovercraft. After that, the skirt should be able to support the required pressure and press the art on top. Like an empty car, The hovercraft can usually be controlled by remote control or self-driving, using neural network navigation process. In addition, many methods can be used in relation to improving speed control such as Equivalent Integration (PI), Equivalent Release (PID), Logic Fuzzy Control or combination among them.

V. HARDWARE DESCRIPTION

A. Arduino UNO

Arduino UNO is an open source microcontroller board based on Microchip ATmega328P microcontroller and developed by Arduino.cc. It is equipped with sets of digital anchors and analog input / output (I / O) that can be interrupted on various expansion boards (shields) and other circuits. IDE (Integrated Development Environment) with cable B of type B. It can be powered by a USB cable or a 9-volt external battery, even if it accepts values between 7 and 20 volts.

The same goes for Arduino Nano and Leonardo. Hardware reference design is still distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website.

Editing and production files for other hardware types are available.



Fig 4.Arduino uno

Technical Specifications

- 1) Microcontroller: Microchip ATmega328P
- 2) Active Voltage: 5 Volts
- 3) Input Voltage: 7 to 20 Volts
- 4) Digital I / O anchors: 14 (of which 6 provide PWM output)
- 5) Analog Input Anchors: 6
- 6) Current DC per I / O Pin: 20 mA
- 7) DC current of 3.3V pin: 50 mA
- 8) Flash Memory: 32 KB of its 0.5 KB used by bootloader
- 9) SRAM: 2 KB
- 10) EEPROM: 1 KB
- 11) Clock speed: 16 MHz
- 12) Length: 68.6 mm
- 13) Diameter: 53.4 mm
- 14) Weight: 25g

B. L298N DC Car Module Module



Fig-5 L298N Module.

C. DC Motor Control

In order to fully control a DC car, we must control its speed and rotation direction. This can be achieved by combining these two methods.

- 1) *PWM* - Speed control.
- 2) *H-Bridge-Control* steering rotation.

a) *PWM - For Speed Control*: The speed of a DC motor can be controlled by varying its input power. The most common way to do this is to use PWM (Pulse Width Modulation). PWM is a process in which a standard amount of input power is adjusted by sending a series of ON- OFF pulses. The medium power is equal to the width of the pulse known as the Duty Cycle. The higher the work cycle, the greater the voltage applied to the dc car (High Speed) and the work cycle decreases, the lower the power consumption in the dc car (Low Speed).

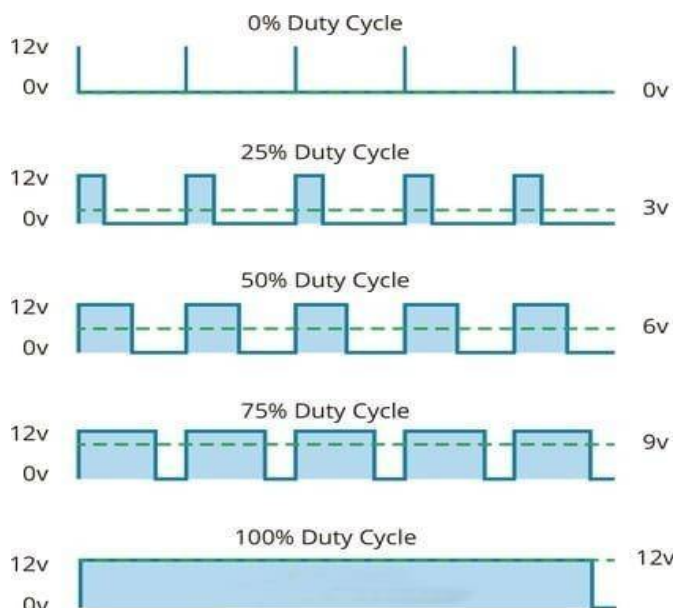


Fig 7.Duty cycle graph

D. Pair HC-05 with Smart Phone

- 1) Search for a new Bluetooth device in your phone. You will find a Bluetooth device with the name "HC-05".
- 2) Click on the connection / pairing device option; The default HC-05 pin is 1234 or 0000.

After pairing two Bluetooth devices, open the software (eg Teraterm, Realterm etc.) on the PC, and select the port where we have connected the USB to the serial module. Also select the default baud rate of 9600 bps.

On a smart phone, open the Bluetooth terminal app and connect to a paired device HC-05.

Easy to communicate; you just need to type the last Bluetooth app for Smartphone. Letters will be sent wirelessly to the Bluetooth HC module- 05. HC-05 will automatically transfer it to a PC, which will appear in the terminal. In the same way we can send data from PC to smart phone.

a) Command Mode

- If we want to change the settings of the HC-05 Bluetooth module such as password change switch, baud rate, Bluetooth device name etc.
- To do this, HC-05 has AT instructions.
- To use the HC-05 Bluetooth module in AT command mode, connect the "Key" PIN to the High (VCC).
- Baud's default rate for HC-05 in command mode is 38400bps.
- The following are some of the AT commands most commonly used to change the Bluetooth module settings
- To send these commands, we must connect the HC-05 Bluetooth module to the PC via serial to a USB converter and transfer these commands via the PC serial terminal.

E. ESC

The term ESC stands for "electronic speed control" is an electronic circuit used to change the speed of an electric vehicle, its route and to act as a powerful brake. ESC can be a separate unit that enters the waterfall control station or assembles the receiver itself, as is the case with most R / C toycars.

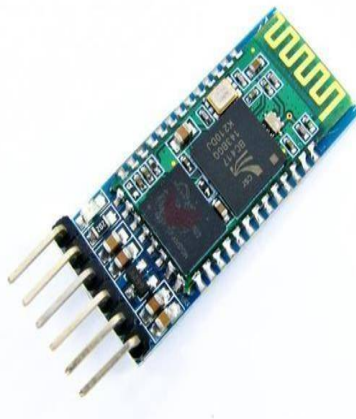


Fig 8- ESC

F. HC 05 Bluetooth Module

- 1) Used for many applications such as wireless headset, game controllers, wireless mouse, wireless keyboard and many other consumer applications.
- 2) It has a range of up to <100m depending on transmission and reception, atmospheric, national and urban conditions.
- 3) It is the IEEE 802.15.1 protocol, which can be used to build a Wireless Personal Area Network.
- 4) Uses basic communication to communicate with devices. It communicates with the microcontroller using a serial port (USART).

G. HC-05 Bluetooth Module

HC-05 is a Bluetooth module designed for wireless communication. This module can be used in master or slave configuration.

H. Brush Less DC Motor



Fig 9. BLDC

In brushless DC motors, the electronic servo system replaces the commutator contacts. The electronic sensor detects the rotor angle and controls the semiconductor switch as transistors change current through the windings, which change the direction of current or, in some motors to turn it off, at the right angle for the electromagnet to form a -torque in one direction. Slide contact removal allows non-brushless engines to have minimal impact and long life; their working life is limited only by the lifespan of their bears.

A standard brushless car has permanent magnets around the arm that do not change, eliminating the problems associated with the current connection to a moving armature. The electronic controller replaces the DC passenger car assembly assembly, which continues to change the section to the windings to keep the car turning. The controller enables a simultaneous power distribution using a solid state circuit rather than a flow system Brush-free motors offer several advantages over DC brushed, including high to heavy torque, increased efficiency producing more torque per watt, increased reliability, reduced noise, longer life by eliminating road erosion and road travel. , the elimination of ionizing sparks from the commutator, and the complete reduction of electromagnetic interference (EMI). Since there are no pulses on the rotor, they are considered centrifugal force, and because the windings are supported by the housing, they can be cooled by operation, which does not require air penetration inside the car to cool. This means that the occupants of the vehicles can be completely sealed and protected from contamination or other external matter.

Brush-free car switching can be done on software using a microcontroller, or it can be done alternatively using analog or digital circuits. Exchanging electronic items instead of brushes allows for greater flexibility and capabilities that are not available with brushed DC cars, including speed limits, microstepping performance to control slower and smoother movements, and torque grip when stationary. Control software can be made with a specific vehicle used in the system, which results in better mobility performance. The maximum power that can be used in an unmanned vehicle is limited to almost the extreme heat which weakens the exhaust and will damage air congestion.

When converting electricity into electric power, brushless motors work better than brushed motors mainly due to the lack of brushes, reducing energy losses due to collisions. Improved performance is greater in regions that do not load and have a low load of vehicle operation curve. Areas and requirements where manufacturers use non-brush DC motors include unsafe performance, high speed, and performance where the gloss is dangerous (e.g. explosive areas) or may affect sensitive electrical equipment.

VI. CIRCUIT DIAGRAM

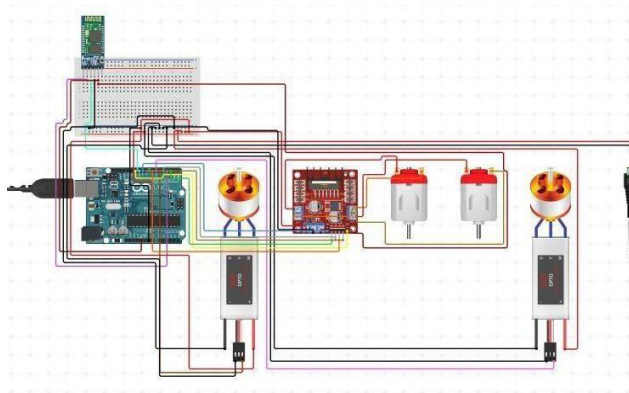


Fig 10.Circuit diagram

VII. APPLICATION

- A. Is It a remote mining vehicle
- B. Engineering Engineering and bridge construction
- C. Farming Fish farming
- D. Bird Airport for birds in the airport and for rescue operations.
- E. Pat Electrical power rotation and safety.

VIII. FUTURE SCOPE

- 1) In addition to a robotic machine that can capture various types of platforms such as small spy cameras, land mines, etc., it can be used for activities related to security issues. When attaching a small light that works remotely before hovercraft, it can work at night and in areas where very low light is available.
- 2) Range Its range can be enhanced using IR LED's high direction. Also, it can be upgraded using the Camera and installed with the MATLAB software, thus allowing us to see the objects and its detection.

IX. CONCLUSION

In this paper we have discussed our approach to create a new type of rescue system to save people lives. The system designed is used for real time application and is secure. There is still lot of scope for development in the project.

X. ACKNOWLEDGMENT

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