Project Report

On

“HOVERCRAFT- AVC”

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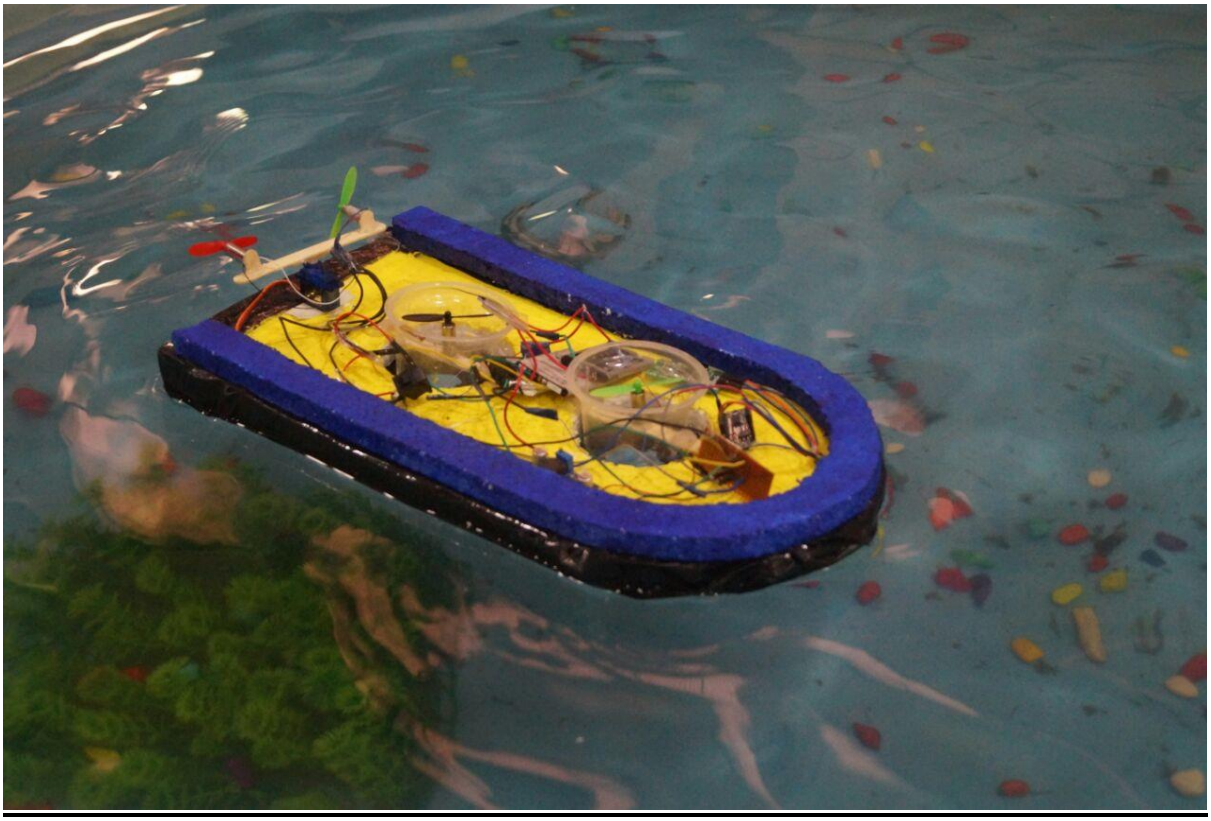
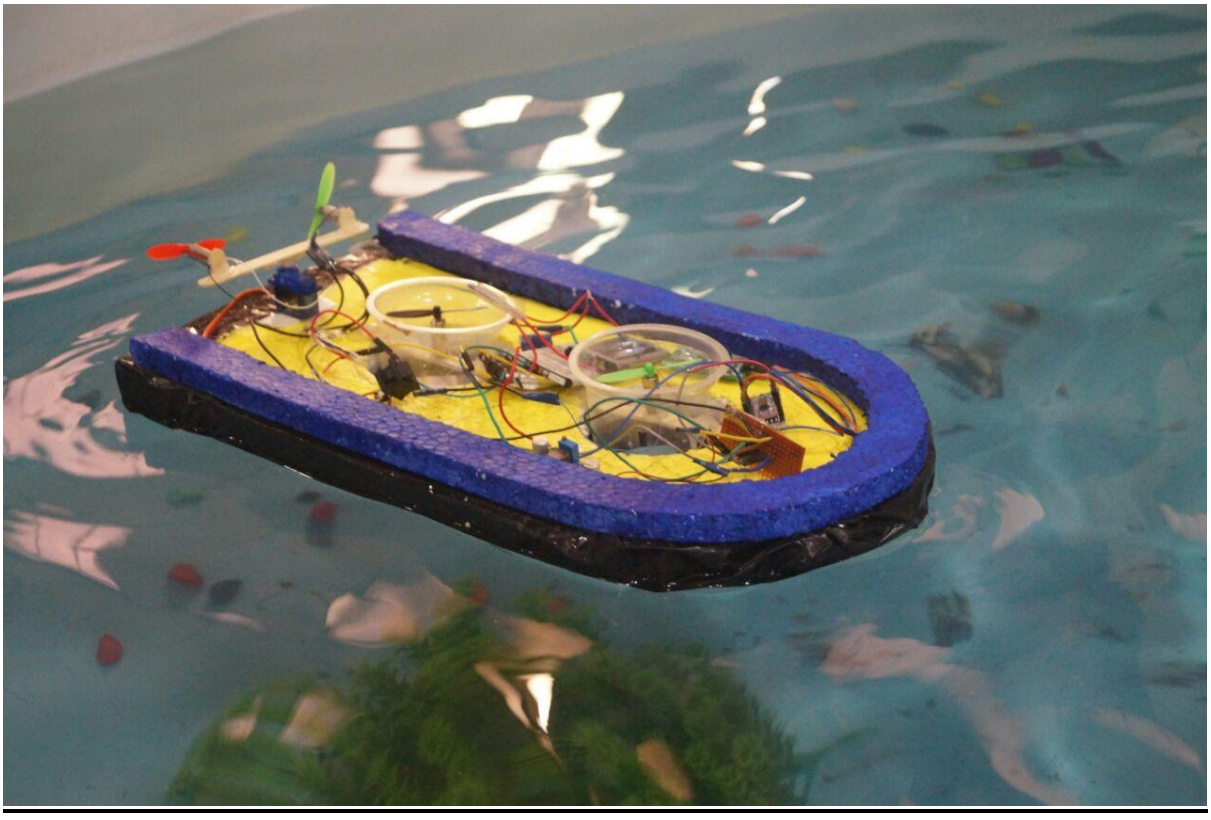
Abstract





A **hovercraft also known as air cushion vehicle** is a craft capable of travelling over land, mud, ice, water and other surfaces .It traps a cushion of air underneath itself and then floats along on top of it which makes it easily overcome any slight unevenness and obstacles .The air cushion holds it high above waves and land obstructions making the craft superbly amphibious. Hovercrafts can travel over any surfaces and have no collision with debris, logs and are independent from harbour and jetties.

The structure is designed so as to maintain the stability of the robot inside the water. The basic parts for constructing a hovercraft are :

1) HULL-which is attached to the skirt system.

2) A PROPULSION SYSTEM- to move the craft.

3) THE LIFT SYSTEM-to feed air into the chamber below the craft in order to create the air cushion.

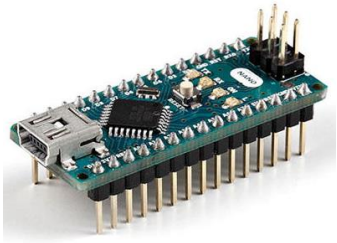
To power the central fan we have used 2 brushless motors of 22000rpm which are mounted with their respective propellers. These fans blow air underneath the hovercraft and creates an air cushion which causes it to lift off the ground. To prevent the pressurized air from escaping a rubber skirt is used which is surrounded along the base. Two motors each of 22000 rpm with their propellers are mounted on a servo motor which serves as a system of rudders to propel the craft forward. A stepper motor is also attached to the system along with the two switches to make the circuit work more efficiently. The main application of the robot is to travel on any surface in spite of any unevenness and obstacle.

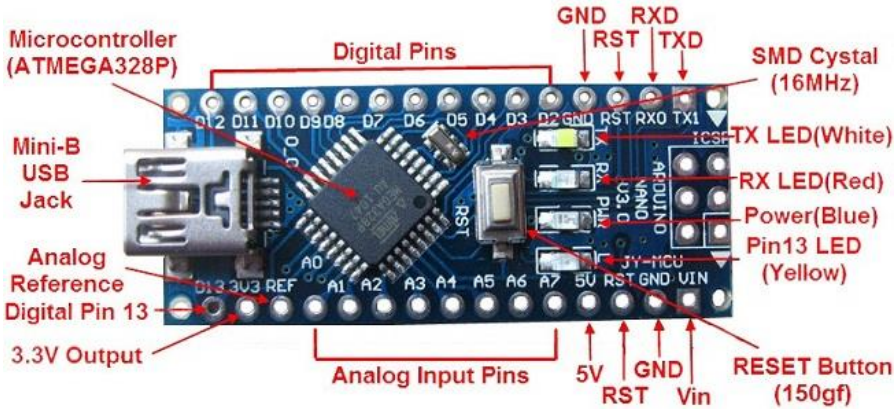
Components Used

S.No.	Components
1.	ATMEGA 16
2.	Control
3.	Switch
4.	PCB
5.	Jumper wires
6.	Lead (soldering)
7.	2 SPST Switches
8.	Coreless motors (22,000 rpm)
9.	Thermocol
10.	Lead acid battery (4V)
10.	Depron
11.	Servo SG92
12.	Bluetooth Module HC05
13.	3 Batteries (4V)
14.	Arduino Nano
15.	Stepper Circuit

Description Of the Components

1.) Arduino Nano:

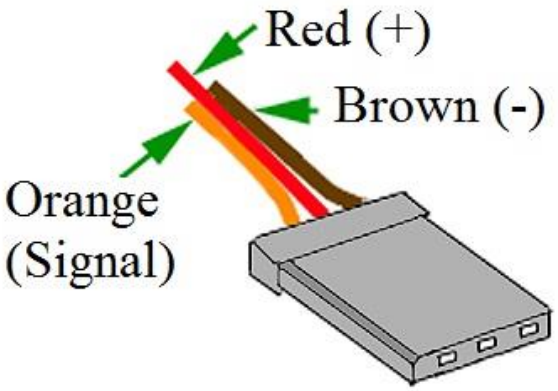




The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328; offers the same connectivity and specs of the UNO board in a smaller form factor.

The Arduino Nano is programmed using the Arduino Software (IDE), an Integrated Development Environment common to all our boards and running both online and offline.

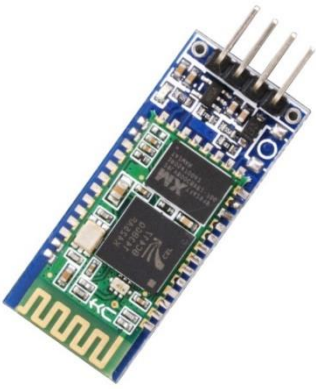
2) RC Servo Motors:

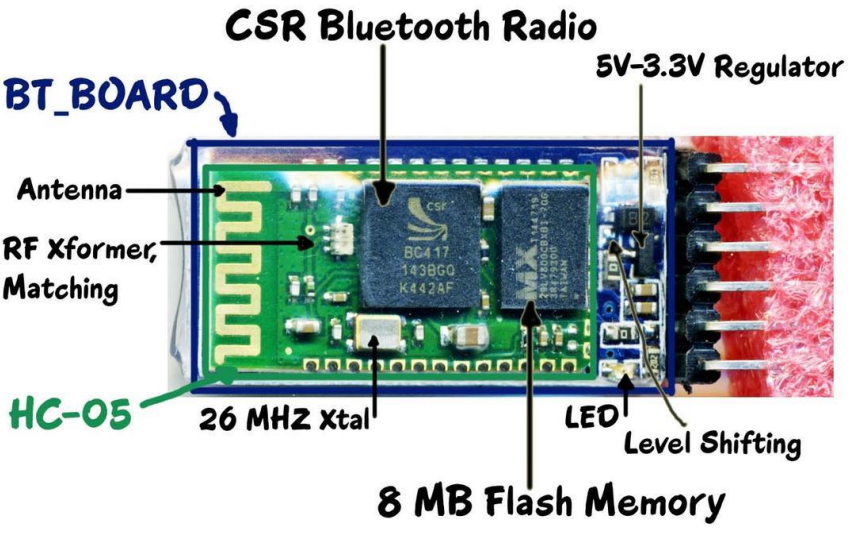


Servos are devices that are commonly used in robotics and have many applications Servos are used to move object parts from one angle to another and most servos can only move within a limited range. In order to assess how far a servo can move, the gears inside the servo must be examined. In addition, the servo may have a tab to help the servo define the limits of rotation.

A servo is a small device that consists of gears, driveshaft, DC motor, a plastic case, potentiometer, and an amplifier. The three wires within the servo are the inputs connecting the servo. Also, the colors of these wire determined the brand of servo. This is important because the colors of the wire will determine the input signal, the ground and the input voltage of the servo.

3.) Bluetooth Module- HC05:



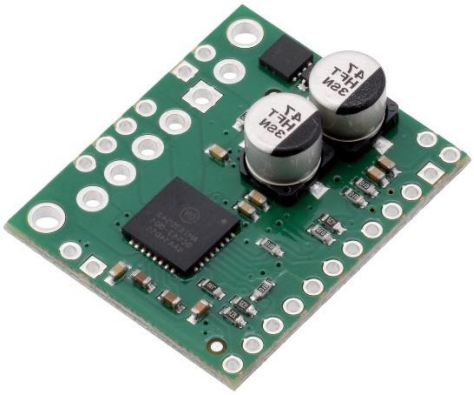


HC-05 is a class-2 **bluetooth module** with Serial Port Profile, which can configure as either Master or slave. a Drop-in replacement for wired serial connections, transparent usage. You can use it simply for a serial port replacement to establish connection between MCU, PC to your embedded project and etc.

HC-05 Specification:

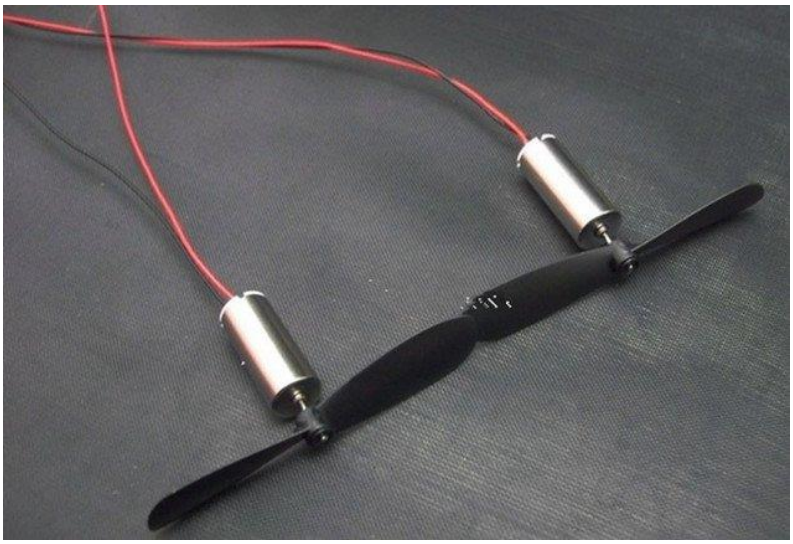
- Bluetooth protocal: Bluetooth Specification v2.0 EDR
- Frequency: 2.4GHz ISM band
- Modulation: GFSK(Gaussian Frequency Shift Keying)
- Emission power: ≤4dBm, Class 2
- Sensitivity: ≤-84dBm at 0.1% BER
- Speed: Asynchronous: 2.1Mbps(Max) / 160 kbps, Synchronous: 1Mbps/1Mbps
- Security: Authentication and encryption
- Profiles: Bluetooth serial port
- Power supply: 3.3VDC 50mA
- Working temperature: -20 ~ 75Centigrade
- Dimension: 26.9mm x 13mm x 2.2 mm

4.) Stepper Circuit:



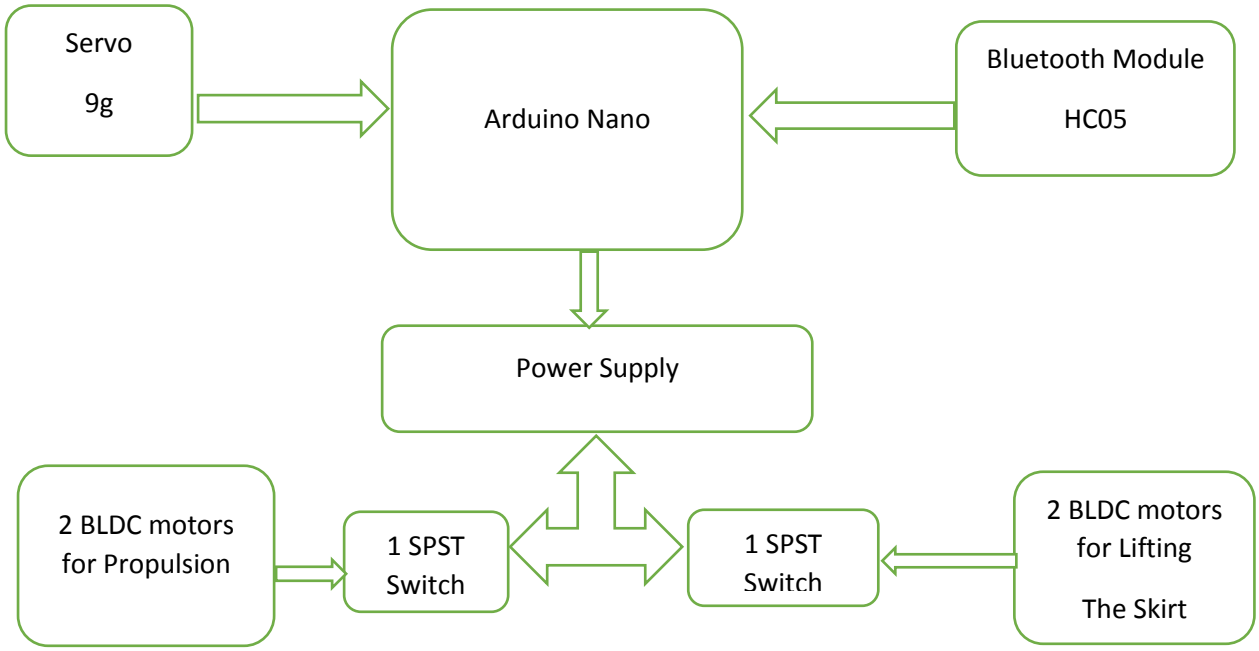
This is a type of circuit which increases the amount of voltage. In our project we used it because it takes 3V as input and gives 5V as output. This is used to drive 5V to give it as power supply to Arduino Nano and stepper.

5.) Brushless Coreless DC Motors:

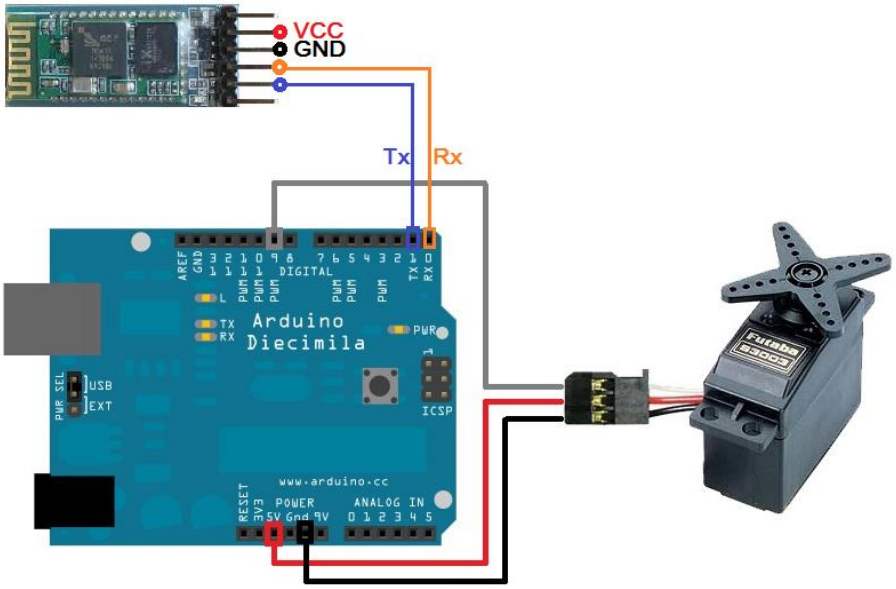


These are the type of motors having high rmp(rotations per minute)i.e., approximately 22,000 rpm. They consume about 3.5V-4V and 2A of current for its efficient performance. In our project we are using 4 motors, 2 for propulsion and 2 for pressure.

DESCRIPTION OF PROJECT WITH BLOCK/CIRCUIT DIAGRAM:



WORKING:



Hovercraft run on two important functions lifting and propelling. The main source power to the robot is two phone batteries of 5v each and the control is by a Bluetooth module, two BLDC motors are used for creating the lift and the other two motors to propel the craft forward. When the two switches are pressed in on position simultaneously the robot moves in forward direction. The direction of the bot is controlled with Bluetooth module so that the robot can move in backward, forward as well as side positions.

PROJECT OUTCOMES:

Benefit to the society:

- Can be used in foreign countries while heavy snow fall for transportation
- Uses less power
- More Efficient
- Can be used in large Walking areas for quick transport. Example: Airport
- Multi task Vehicle.

Relevance of Project with Program outcomes

Program Outcome	Relevance of project (Refer Program Outcomes)
PO1	3
PO2	2
PO3	2
PO4	0
PO5	2
PO6	Relevance to Society: 1 (Rescue trapped victims)
	Relevance to Health: 1
	Relevance to Safety: 2
PO7	0
PO8	0
PO9	3
PO10	3
PO11	3
PO12	2

Mapping with Program Specific Outcomes of ECE department

Program Specific Outcome	Mapping (Refer Program Specific Outcomes)
PSO1	3
PSO2	3
PSO3	2
PSO4	3

0: NIL 1: WEAK 2: MODERATE 3: STRONG

CONCLUSION:

The robot depicts a small model of a Hovercraft showing that it can be used in different terrains i.e, on land, water, air and snow. Hovercraft use blowers to produce a large volume of air below the hull that is slightly above atmospheric pressure. The pressure difference between the higher pressure air below the hull and lower pressure ambient air above it produces lift, which causes the hull to float above the running surface. For stability reasons, the air is typically blown through slots or holes around the outside of a disk- or oval-shaped platform, giving most hovercraft a characteristic rounded-rectangle shape. Typically this cushion is contained within a flexible "skirt", which allows the vehicle to travel over small obstructions without damage.

Social Benefit:

- Low Cost and Maintenance
- Multi-purpose
- More efficient

PROGRAM CODE:

```
#include <Servo.h>

int pos=90;

Servo myservo;

char command;

const int FrontLed = 6;

void setup()

{

  Serial.begin(9600);  //Set the baud rate to your Bluetooth module.

  // Front LEDs

  pinMode(FrontLed, OUTPUT);  // declare FrontRightLed as output

  myservo.attach(9);

  myservo.write(90);
```

```
}
void loop(){
if(Serial.available() > 0){
    command = Serial.read();
    Stop(); //initialize with motors stoped
    //Change pin mode only if new command is different from previous.
    //Serial.println(command);
    switch(command){
     case 'L':
      left();
      break;
    case 'R':
      right();
      break;
      case 'W':
      digitalWrite(6,HIGH);
      break;
      case 'w':
      digitalWrite(6,LOW);
      break;

     }
  }
}
```

```
void left()
{
   myservo.write(pos);              // tell servo to go to position in variable 'pos'
  pos++;
}
void right()
{
   myservo.write(pos);              // tell servo to go to position in variable 'pos'
    pos--;
}
```

REFERENCES:

1.)http://www.instructables.com/id/How-to-make-a-RC-Hovercraft/
2.)http://www.instructables.com/id/Hovercraft-Everyone-Can-Build/
3.)http://www.instructables.com/id/Autonomous-wirelessly-controlled-hovercraft/