

Advanced Hovercraft to Travel on Surface and Water

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Abstract - The small autonomous vehicles of the future will have to navigate close to obstacles in highly unpredictable environments. Risky tasks of this kind may require novel sensors and control methods that differ from conventional approaches. Recent ethological findings have shown that complex navigation tasks such as obstacle avoidance and speed control are performed by flying insects on the basis of optic flow (OF) cues, although insects' compound eyes have a very poor spatial resolution. The present paper deals with the implementation of an optic flow-based autopilot on a fully autonomous hovercraft. Tests were performed on this small (878-gram) innovative robotic platform in straight and tapered corridors lined with natural panoramas. A bilateral OF regulator controls the robot's forward speed (up to 0.8m/s), while a unilateral OF regulator controls the robot's clearance from the two walls. A micro-gyrometer and a tiny magnetic compass ensure that the hovercraft travels forward in the corridor without yawing. The lateral OFs are measured by two minimalist eyes mounted sideways opposite to each other. For the first time, the hovercraft was found to be capable of adjusting both its forward speed and its clearance from the walls, in both straight and tapered corridors, without requiring any distance or speed measurements, that is, without any need for on-board rangefinders or tachometers.

Keywords: Micro-Gyrometer, Optic flow, Conventional, Hovercraft.

I. INTRODUCTION

Robots have been with us for less than 50 years but the idea of inanimate creations represents a sincere bid whose success is much older. But real robots did not come into existence until 1950s and 60s. With the growing invention of transistors and integrated circuits, computer industry added brains to the brawn of already existing machines. In 1959, researchers illustrated the possibility of robotic manufacturing when they unveiled a computer-controlled milling machine. Bluetooth technology was created by telecom vendor Ericsson in 1994. A Bluetooth device is able to communicate with up to seven Bluetooth modules at same time through one link whose normal working area is within eight meters. The basic function of Bluetooth serial module is replacing the serial port line by connecting one to Bluetooth master device and the other

connecting to slave device. Today, robots are enjoying resurgence. As computer processors are getting faster and inexpensive, robots can afford to get smarter. While, researchers are working on ways to help robots move and “think” more efficiently. Since most robots in use today are designed for specific tasks, our goal is to someday make universal robots that are flexible enough to do just about anything a human does and more.

II. METHODOLOGY

The aim of this project was to design the shape of the small working model hovercraft with dimension included. The model must be well designed and powered. The working model hovercraft must perform basic function of hovercraft and able to travel on water surface. This model must able to produce enough air cushion to hover its body and also can lift some loads. The hovercraft must able to produce enough thrust to move along the ground by itself and with some loads.

In this system AT-Mega 328 Microcontroller retrieves the data from Bluetooth receiver and Ultrasonic sensor and transmits. The scheme has the following components:

- AT328 Microcontroller
- LCD Display
- Power Supply
- Relay
- LED
- HC-04
- Motor Driver
- LiPo battery
- BLDC Blades
- DC Motor

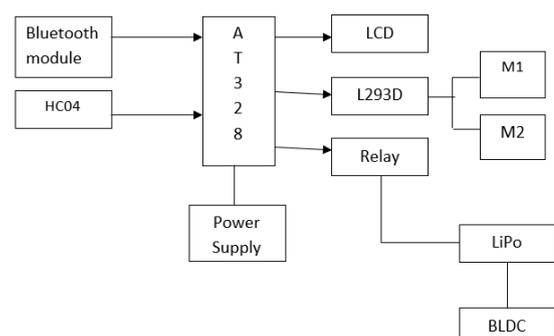


Figure 1: Block Diagram

The bot is controlled through an android application Bluetooth module receives the signal and passes it to microcontroller HC04 sends data to microcontroller Message is displayed on LCD Microcontroller sends signal to motor driver and relay Motor driver sends signal to motors and moves is assigned direction Relay is triggered and it passes current to BLDC and it starts rotating.

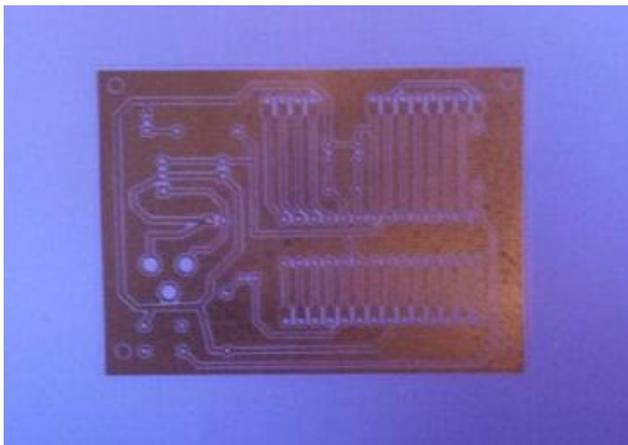
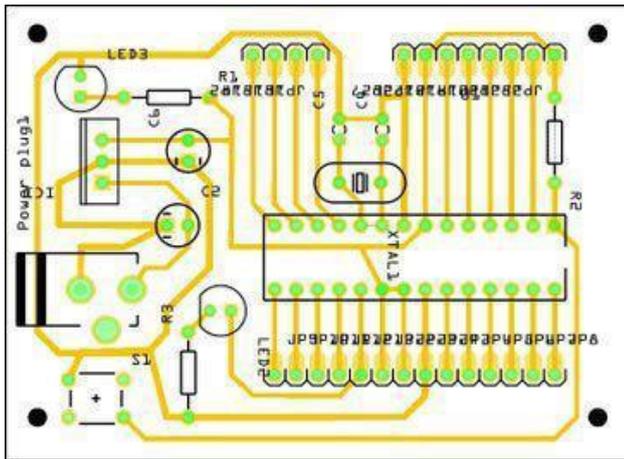


Figure 2: Circuit Diagram

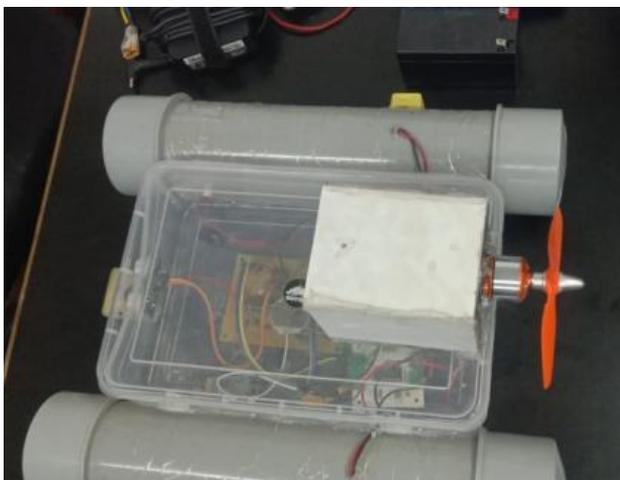


Figure 3: Hardware Implementation

III. RESULTS AND CONCLUSION

In this research, the principles of the hovercraft have been demonstrated using suitable material and power sources. The design of the hovercraft has become to the level of expectations and helped a lot in constructing the model. It is proved that it can work well as an amphibious vehicle that can be used on land and water after trial and error tests. The thrust and lifting systems gave excellent performance. Propulsion system is very useful to achieve considerable good maneuverability. In the future, heading stabilization of hovercraft with PID control will be discussed and then it will be applied in many areas.

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