

Robotic-Boat Equipped with Definite Fishing Techniques To Undertake Commercial Fishing

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Abstract – This review paper titled “Robotic-Boat Equipped With Definite Fishing Techniques To Undertake Commercial Fishing” presents a way to develop and fabricate an automated system for commercial fishing. The overall system consists of a robotic boat embedded with desired fishing techniques.

The exact location comprising the school of fish is tracked using the remote sensing satellite technology. The remote sensing technology is already existing and is being used for fish tracking. This gives the probable GPS range where the school of fish may be present. Also several fishes present at the bed of the sea which remain immobile for a very long duration of time. These fishes can be tracked using Thermal Imaging Camera since the temperature of water and the fish will have a considerable difference.

Once the GPS location is known the information can be fed into the robotic boat via control station. The updated GPS location is continuously fed to the Robotic-Boat via Control-Centre and the Robotic-Boat is lead through a definite path to the prescribed GPS location.

Once the Robotic-Boat reaches the defined location definite fishing techniques are adopted to undertake the fishing operation.

Camera interface can be used to catalyse the fishing operation.

Keywords – Control-Centre; GPS; Thermal Imaging Camera; Remote Sensing

I. INTRODUCTION

Fishing in India has turned out to be one of the major commercial activity yielding heavy income. Several fishing areas in India provide enormous opportunities to undertake major fishing activity. But the lack of technological progress in the fishing sector has hindered the scope of fishing activity. So undoubtedly there exists a major need for the

advancement in fishing techniques. Thus use of technology for fishing will serve to be a major boon to the fishing industry.

II. DESIGN

The Robotic-Boat is basically designed to undertake fishing operation. It determines the position and the direction via a GPS Module. The exact location is monitored via GPS. The boat is directed to the definite fishing location using LIDAR which can avoid obstacles on the way. The boat can change direction if the equipped LIDAR has detected obstacles. Circuits for recognizing the daytime and the night-time may be designed too. A remote control circuit is designed, which makes manual control of the ship applicable. This is useful in some special circumstances, and thus can increase the practicability of the ship. To realize the functions mentioned above, the designed ship should be controlled by a microcontroller. It should also have power supply system, keyboard and display, obstacles detecting system, GPS Module and interface, motion controlling system, circuit for recognizing daytime and night-time, and remote control system.

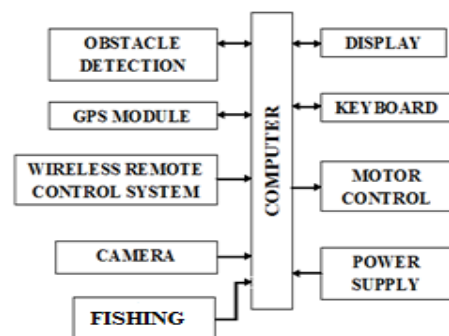


Fig. 1: Block Diagram of ASV

A. *Microcontroller System*

The main aim of our system is to undertake fishing operation. The main control is with microcontroller system which has an efficient crystal oscillator, a watchdog timer. We use a microcontroller produced by Atmel Corporation as its efficiency is good. Its basic features must include 8k bytes of on-chip flash memory, 256 Bytes of on-chip RAM, two 16-bit timers/counters, two external interrupt. The oscillating frequency of the microcontroller is 12 MHz. The Watchdog timer reset the computer system on power up, power failure, and other abnormality. The Watchdog circuit, produced by Maxim Corporation, which is dedicated to production of integrated circuits for power-detection and Watchdog timer.

B. *Design of the keyboard and Display Module*

ZLG7289 has been applied in both the keyboard circuit and the display circuit of our ASV. A ZLG7289 chip can drive 7-segment numeric LED displays of up to 8 digits, bar-graph displays, or 64 individual LEDs, and a keyboard of up to 64 keys. The key pin of the ZLG7289 becomes low when a key is pressed. The microcontroller system identifies the number of the keystroke by SPI bus when reading the low level signal. There are eight 7-segment numeric LED displays and six keys. 7-segment numeric LED displays the distance value obtained from the distance-detection system.

C. *Remote Sensing*

Existing remote sensing technology is used to detect the GPS range in which the school of fish are located. The remote sensing satellite gives the probable range in which the fish are present. Once the location is known the Robotic-Boat is guided to the defined location and fishing activity is undertaken.

D. *Design of the motion control by GPS*

GPS, which stands for Global Positioning System, is the system which is able to show us our exact position on the earth anytime, in any weather, anywhere. GPS satellites, 28 in all presently, orbit at 11,000 nautical miles above the Earth. Ground stations located worldwide continuously monitor them. The satellites transmit signals that can be detected by anyone with a GPS receiver. Using the receiver, you can determine the location with great precision. The robotic-boat is embedded with the GPS Module to provide the exact location of the Vehicle. The GPS location is monitored at the control centre and thus helps in defining the direction for motion, under manual control.

E. *Bypassing of obstacles*

The Robotic-Boat consists of two propellers that serve the purpose of movement. The two propellers are

used so that it is easily controllable. The ship direction may be controlled by reducing the speed of one propeller and increasing the other. If the right propeller is slowed down then the ship turns towards right and vice versa. The propellers are powered via DC Motors. The motor is used to drive the conveyor belt with gear case. Five controlling scenarios are designed which include going straight, turning to the left, turning to the right, turning to the left at rightangle and turning to the right at right-angle.

The laser scanner (also known as *LIDAR*) works like a radar. A laser pulse with a defined duration is sent and reflected by an object. The reflection of the object is captured by a photo diode and transformed into signals in an optoelectronic circuit. The time interval between the pulse of light being sent and its reflection being received indicates the distance to the object which reflected the light. In addition to the radar, the laser pulse is quite narrow. This gives the laser scanner a higher resolution of the object. By rotating a mirror, the laser range finder operates as a scanner and the mirror deflects each outgoing beam. The mirror's continuous rotation, in conjunction with the pulsing laser, generates a complete environmental profile of the vehicle within the laser scanners visible range. The laser scanning system has been adapted by several autonomous prototype vehicles.

F. *Design of the motor control system*

The DC motor solely powers the boat, including the conveyor belt of the refuse collection and transmission, and the two propellers. The two DC Motors are used to drive the two propellers. As defined earlier five controlling scenarios are designed which include going straight, turning to the left, turning to the right, turning to the left at right-angle and turning to the right at right-angle. This is done by controlling the speed of the Motor. The boat can be turned left at right angle when the left motor is stopped while the right side motor runs at the defined speed. In the contrary, the ship is turning right at right angle.

F. *Design of the remote control system*

The manual control of the ship is achieved via Remote control system. Radio frequency signals are transmitted to achieve the desired control. The ship can be controlled manually via Control-Centre. Its keys include the key to switch between the manual mode and automatic mode, the keys to control the moving directions, and the key to control the motor that drives the conveyor belt.

G. *Fishing*

Fishing operation can be undertaken using desired fishing methods. Based on the type of fish the relevant

fishing techniques are adapted. Thermal imaging cameras are used to detect immobile fishes present at the bed of the sea. This is achieved as a result of temperature difference with respect to the fish and the water.

H. Design of programs

According to the process of the work to undertake fishing, the programs of the main Microcontroller system are designed in a modular structure. The programs of the main Microcontroller system consist of the following modules, program for:

- Managing the Power System
- Remote control
- Communicating
- Controlling the moving directions
- Controlling the motors.

III. FURTHER RESEARCH

- Hovercraft can be used instead of a boat.
- Satellite Communication may be used for faster video transmission.
- Better algorithm for controlling the ship may be designed.

IV. CONCLUSION

This system serves to be a very productive tool in commercial fishing. Obstacle avoidance during the process is successfully achieved using LIDAR. The robotic boat can be manually operated and even run automatically. GPS Module is used to obtain the positioning of the boat and for path planning along with the positioning of the school of fish. More path situations can be programmed for better and smoother motion of the boat.

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