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KURMA THE RESPROTOR: THE UNDERWATER SURVEILLANCE ROBOT

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Abstract: Kurma: Resprotor is an advanced underwater surveillance robot inspired by the turtle incarnation of Loard Vishnu. Designed for marine exploration, it is equipped with advance sensors, cameras and communication systems to monitor marine ecosystems, inspect infrastructure and conduct search and rescue operations. Its roboust, corrosion-resistant design ensures reliable operation in harsh underwater environments, supporting marine conservation and safety.

The underwater surveillance robot compliments these capabilities with a dual-motor propulsion system and vertical thruster for 360-degree control, enabling efficient navigation. Live video steaming, lightweight structures, and electrified systems guarantee sustainability, stability, and pilotability. This is perfect for underwater video shooting, environmental monitoring, and marine life protection.

Keyword: Underwater exploration, ATmega32 microcontroller, Corrosion-Resistant robot, Real-Time Data Collection, Search operation and underwater Video Streaming

1. INTRODUCTION

Kurma: Resprotor is an advanced underwater surveillance robot inspired by the turtle incarnation of Lord Vishnu. Designed for deep sea exploration, it is equipped with advanced sensors, cameras and communication systems to monitor marine ecosystems, inspect infrastructure and conduct search and rescue operations. Its robust, corrosion-resistant design ensures reliable operation in harsh underwater environments, supporting ocean conservation and safety.

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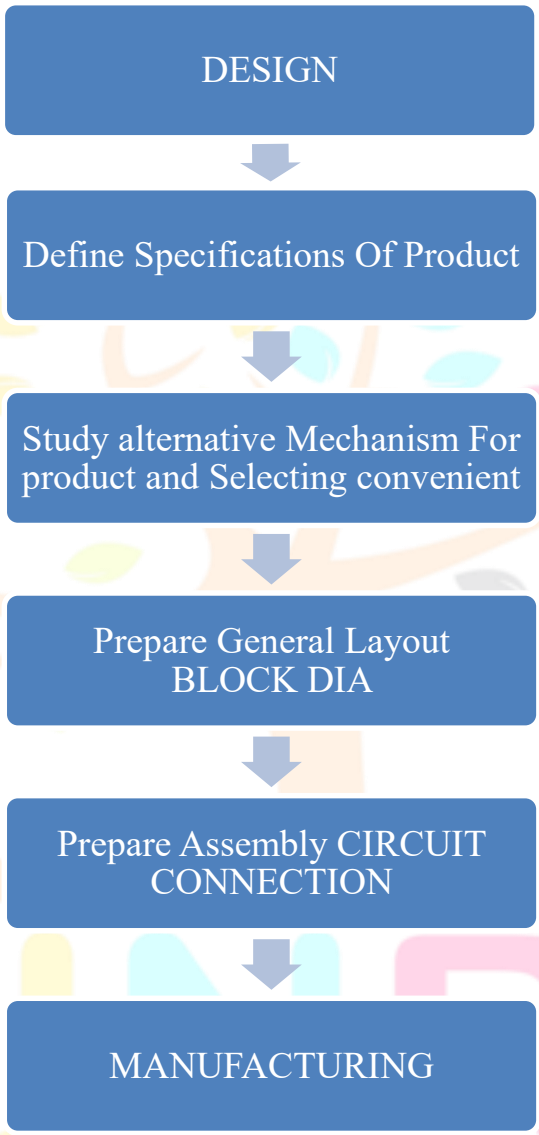
2. NEED OF THE STUDY

Research on underwater observation robots is important to monitor marine ecosystem, environmental protection, research and rescue missions, to support the underwater research and archeological research. These robots improve defense, industrial management, and climate monitoring reduce human costs and risks. Their development will foster advances in robotics, AI and sustainability, thereby addressing important global challenges.

3. THE OBJECTIVE OF THE PROJECT

- To make a robot easy to navigate underwater.
- To make a robot having 360 Degree direction control.
- Robot can give live footage viewing.
- To make robot lightweight and anti-rust design for long term usage.
- To make a robot which will give location of any stranger find out inside water.

4. RESEARCH METHODOLOGY



Phase I: Literature Survey and theoretical calculation.

Phase II: System Design.

Phase III: Design and development of actual mode.

Phase IV: Final tests and performance analysis.

5. BLOCK DIAGRAM

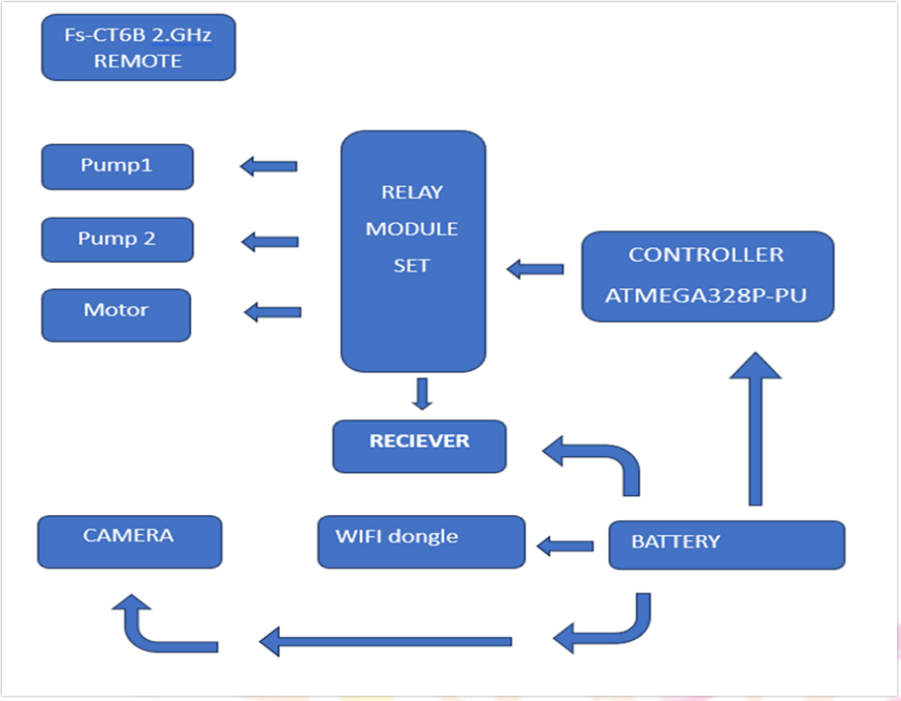


Fig 1: - block diagram

6. CIRCUIT DIAGRAM

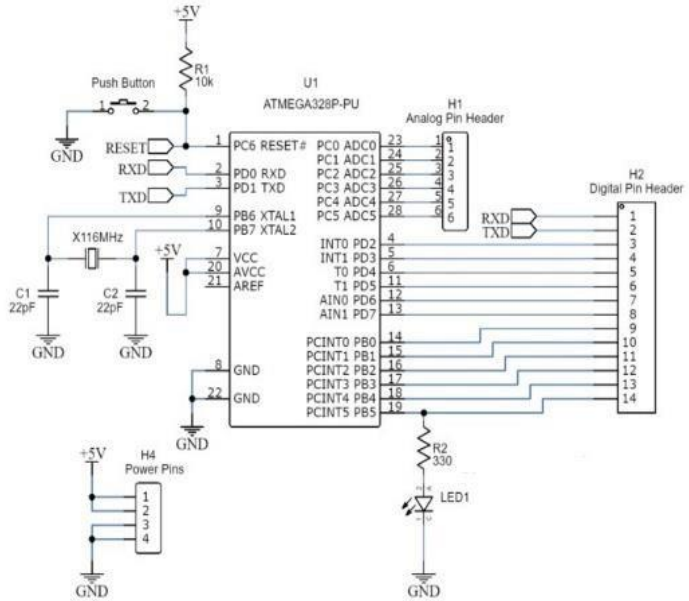


Fig 2: - circuit diagram

7. COMPONENTS

- **WIFI Camera Waterproof 4k: -** Waterproof 4k Wi-Fi cameras are multi-functional units that can take high-definition images as well as videos in exceedingly difficult places, such as underwater. Most action sports are covered using these types of cameras, but they are also used in underwater exploration and security surveillance.
- **FS-CT6B RC Controller: -** A radio frequency remote control, commonly used for remote control systems, to operate and navigate the robot.
- **Mechanical Relays: -** These are switches used to control high-power devices like motors. They isolate low-power control signals from high-power device.
- **ATMEGA32P-pu: -** A microcontroller commonly used in Arduino boards, responsible for controlling the logic and operations of the robot, such as movement and data processing.
- **Water Submersible Motor/ Thruster**

  1. **Water submersible: -** Known as a submersible motor, it is a motor that is fully submerged while working in liquid that may either be water or oil. A submersible pump and those types of application under the water where standard motors could not truly do a great job.
  2. **Thruster: -** A thruster is a population device that generates thrust to move or position a vehicle or object in a desired direction. Powerful propeller design and unique underwater operation for the robot. The underwater thruster has excellent performance and high efficiency.

- **GSM Module t900: -** A small GSM module is the SIM900A GSM Modem, which works in 900 MHz frequencies in the domain of dual-band GSM-enabled phones-as devices for SMS messaging, voice communication and data transfers. This device is set with a configurable baud rate (1200 - 115200 bps) and interfaces with either a PC or microcontroller using RS232 and TTL connections. The modem derives its power from a regulated power supply, although it accepts a variety of unregulated supply voltage levels. As supported by AT commands, the modem is perfect with the following functions: call making, SMS sending/receiving, and data transfer for machine-to-machine applications, including remote monitoring, asset tracking, and security systems.
- **GPS MODULE NEO 6M: -** Of all the tiny GPS receivers there are, one of the most accurate is the NEO-6M GPS module. It gives an accurate reading of the location, including latitude, longitude, altitude, speed, and time. This module employs the NMEA 0183 protocol and supports UART serial communication.
- **Motor Pump: -** The Agriansh 12V DC Pump is a high-pressure self- priming diaphragm pump that uses a 12V battery or adapter as the power supply. The pump ha a maximum flow of 4.5 L/ min with a head of 110 PSI and has an automatic cut-off system.
- **6V Motor Pump: -** High-end, multifunctional and economical, the mini submersible water pump is a variety of pumps in the range of 3-6V. It specializes in producing very reliable and long-lasting pumps, supported by 2.5 to 6V power supply, that are very convenient for DIY, water management and other applications. Thanks to its technology, high-grade build materials and ease of use, this pump is a favorite across all ages.

8. WORKING

The project beings with powering on the robot, which activates the system, including the GPS module. The GPS starts blinking and requires an open sky to receive signals. The robot movement is controlled using an RC remote. Two thruster motors at the back enable direction movement, allowing the robot to move forward, backward, left or right. Vertical motion (upward and downward) is controlled by the two water pumps, which fill or empty the on-board tank to adjust buoyancy. A waterproof camera mounted at the front provides live video footage, which is streamed to an Android app via a Wi-Fi connection. If a point interest is detected, the GPS button can be pressed to record the current co-ordination of the robot. For safety and reliability, all components, including the power pack, are housed in a water-sealed compartment. During the testing phase, Bluetooth connectivity is used for simple wireless control before fully implanting the system. This setup enables efficient underwater movement, real-time video surveillance and precise location tracking.

9. HARDWARE OF PROJECT

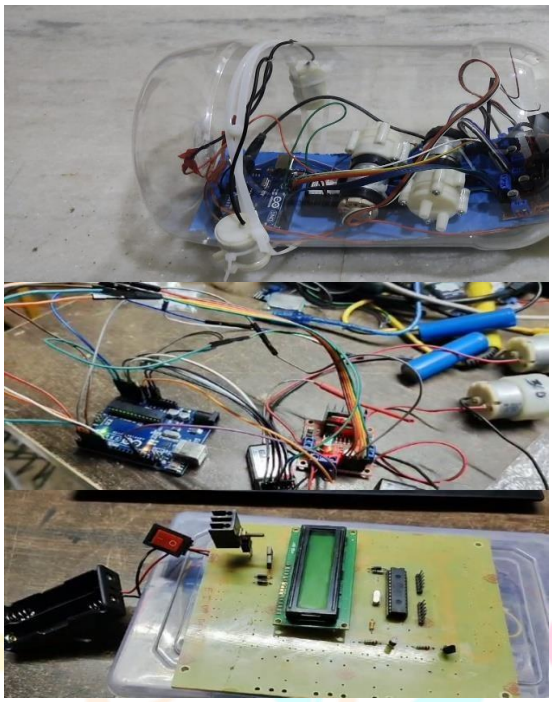


Fig 3: - hardware of project

10. ADVANTAGES

- Extended Monitoring Capabilities: - Robots can operate for extended periods, providing real-time data without human intervention and Robots can explore deep or hazardous environments that are too dangerous for human divers.
- Safety-Reduced Risk to Human Life: - By using robots instead of human divers, the risks associated with extreme underwater environment (e.g., high pressure, cold temperatures or toxic areas) are minimized.
- Data Accuracy and Precision.

  Versatile Applications: - Multi-purpose Use: Can be applied in various industries, including defence (e.g., detecting underwater threats), environmental monitoring (e.g., observing marine life) and infrastructure inspection (e.g., inspection pipelines, underwater cables).

- Initial cost is low.

11. APPLICATION

- Oceanography research
- Search and rescue
- Underwater archaeology
- Marine life and habitat monitoring
- Underwater infrastructure maintenance
- Environment monitoring
- Underwater photography
- Port security

12. FUTURE SCOPE

- The market for underwater robots has been experiencing substantial growth. Factor driving this growth include increased demand in sectors like marine security, offshore energy, and scientific research. The continue advancements in technology also play a crucial role in expanding the market reach of these robots.
- The market for underwater robots and drones is valued at an estimated (USD) $4.49 Billion. A healthy CAGR of 14.5% is expected from 2023 to 2030

13. RESULT

A functional robot capable of monitoring the underwater environment with features such as real-time data collection, efficient navigation and reliable sensing systems. It successfully fulfills its intended function for monitoring tasks such as environmental monitoring, inspection and security. Further optimization can improve its range, durability and effectiveness.

14. CONCLUSION

The underwater surveillance robot represents a transformative approach to monitoring and data collection in aquatic environments. Addressing current limitation through autonomous systems provides safer, more efficient and cost-effective solution. The future holds potential for significant advancement in underwater exploration, security and environmental conservation.

15. ACKNOWLEDGEMENT

An important development in the observation and investigation oof underwater environments is the underwater surveillance robot. Its cutting-edge sensors and creative design allow for uses like environmental monitoring, infrastructure maintenance and marine research. This technology is a significance advancement in underwater security and exploration.

16. REFERENCES

Strictly IEEE citation Format

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