



Industrial Consultancy & Sponsored Research (IC&SR)

REMOTELY OPERABLE UNDERWATER ROBOTIC SYSTEMS IITM Technology Available for Licensing

Problem Statement

- The problem statement discussed in the present invention is **how to provide device/system to test & inspect underwater assets, & floors or reservoirs without complex & difficult operation including additional instruments and control system.**
- Hence, there is a need to address the issue & said invention provides the solution efficiently.

Technology Category/ Market

Technology: Underwater robotic systems ;
Industry: Robotics, Autonomous Underwater Vehicles; **Application:** Remotely Operated Vehicle, Defense & Security, Scientific Research & etc.

Market: The global underwater robot market is projected to reach **US\$5.57billion** by the end of **2034** at a **CAGR** of **13.7%** during the forecast period (**2024-34**).

Technology

- Present patent describes an **underwater system** for **inspecting reservoirs or tanks** comprising of:

1

• a robotic vehicle comprising of a chassis, a single cylindrical hull mounted on the chassis with wheels and a motor in a motor enclosure connected to a navigation system, positioning system, vision system, and a non-destructive evaluation system;

2

• a processing means to control the robotic vehicle and receive a plurality of data from the systems mounted on the vehicle;

3

a control system to drive the vehicle (100) in accordance with the instructions received from the control system.

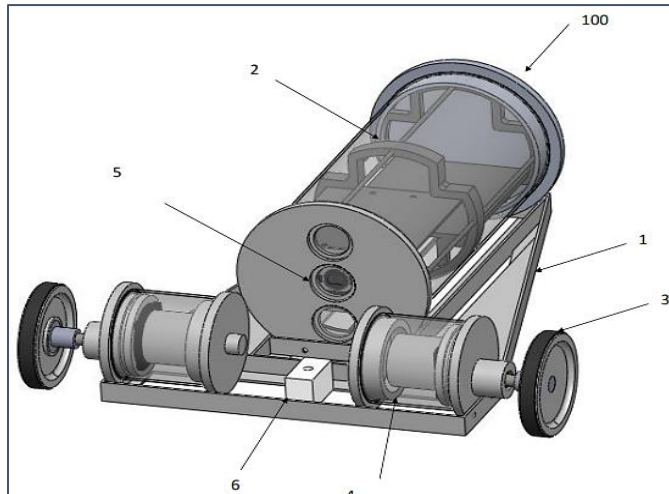


Fig.1 depicts a schematic diagram of 3D design of **underwater system**;

- The system is having the non-destructive evaluation system which includes **ultrasound transducers** mounted on the vehicle connected to the **processing means**.
- said processing means is a **programmable microprocessor** with storage and display means. Said system is tested under various environment. (Image of a test case (on Aluminum plate) shown herein)



Intellectual Property

IITM IDF Ref. 1470; IN Patent No. 516897

TRL (Technology Readiness Level)

TRL-4, Technology validated in Laboratory

Research Lab

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Images

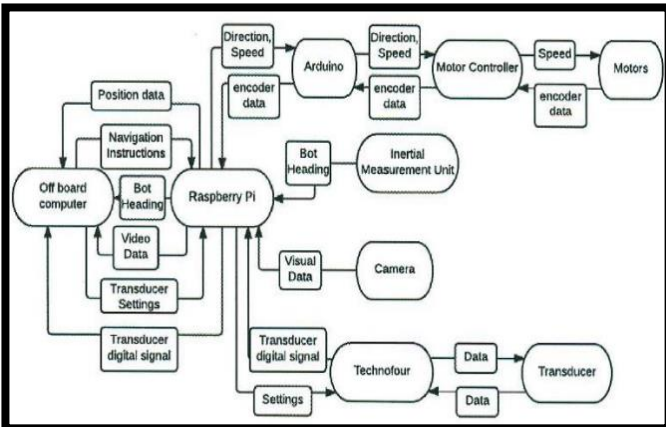


Fig.2 depicts schematic representation of total communication system between all electronic systems inside the vehicle.

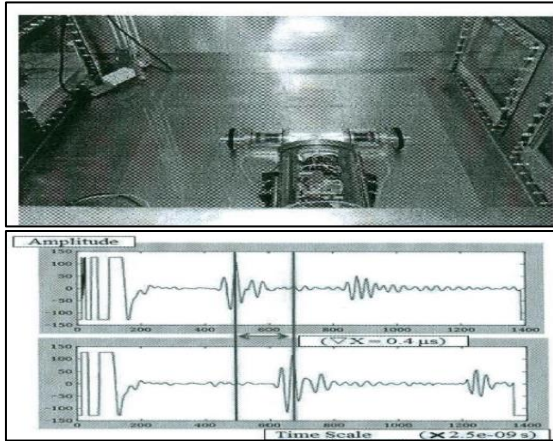


Fig.3 (left) shows an image of the vehicle underwater over an Aluminum plate with pre-created defects

Fig.4 (above) depicts graphical representation of the NDE signals over the plate and defect.

Key Features / Value Proposition

❖ Unique Modular Design including other Industrial Features

- ❑ Capable of accommodating multiple **non-destructive evaluation sensors**, peripheral electronic as well as **mechanical systems**.
- ❑ It has an **encoder-based dead-reckoning positioning system** independent of the properties of the fluid.
- ❑ **Three-point contact chassis** without suspension **minimalizes** the **slippage problem** & provides **better control** of the vehicle.
- ❑ Its **on-board platform** is capable of **real time data transfer of sensor, telemetry & video data**.
- ❑ The front two wheels are **powered** using **brushless DC motors** and an **Omni-directional wheel** used at the back to facilitate **smooth and stable turns** of the vehicle. Further provide **better braking** and **control** features.

- ❑ The vehicle is made negatively buoyant to **avoid pitch, yaw, roll & heave motion control**.
- ❑ The vehicle can be operated under **flammable fluidic conditions** as well.
- ❑ Claimed invention has **large mounting capacity** & a **plug and play payload architecture**.
- ❑ The proposed system is **compact in size & modular to enable upgradation of technology**.
- ❑ The system is designed also for **online inspection of storage tanks & pressure vessels**.
- ❑ The system can also be used for **tanks in nuclear power industries & scientific exploration purposes**.

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