Search and Reconnaissance using Spherical Robot

Problem Statement: Security agencies need assistance in their missions for search and reconnaissance. The researchers have developed a spherical robot that can help in such missions by transmitting real-time video feeds encompassing 360 degrees in unstructured and constrained environments. This robot also addresses the requirements of such a device that it should protect the internal electronics from impact and operate in stealth mode for security.

Uniqueness of the Solution: The spherical robot has a palm-sized ergonomic design that can be customised and upscaled to provide night-vision, audio, or any other application-specific sensing options. It has a 220-degree field of view and pan-360 degree vision system. The system includes a novel gearless two-pendulum-based actuation system to manoeuvre the robot. Ball-shaped outer body and gearless actuation facilitate withstanding impact. The variants of the designed spherical robot can be fabricated based on the application: by varying size; providing wireless communication modules to collect video and audio feeds; payload carrying capability; and easy deployment option. Variant design with a low-cost solution is also possible. The researchers are working on lightweight video processing and multi-robot collaboration.

Current Status of Technology: The researchers have developed a functional prototype of the robot. The spherical bot prototype is a mobile rolling robot teleoperated with an Android app that provides a real-time pan 360-degree video feed. It has been tested at a simulated environment for room intervention operations in a testing facility with a security agency. Palm-size and Football-size variants of the spherical robot are developed as prototypes.

Societal Impact: The spherical robot can assist the security forces with search and reconnaissance missions. The robot can be sent to infected areas to survey before actual contact to avoid casualties of our forces.

Patent(s): Filed

Relevant Industries: Robotics, Sensors, Electronics.

Faculty: Prof. Leena Vachhani, Systems & Control Engineering, Prof. Abhishek Gupta, Mechanical Engineering.