Modular Robotics and Terrain Detection Using Inertial Measurement Unit Sensor

Authors : Shubhakar Gupta, Dhruv Prakash, Apoorv Mehta

Abstract : In this project, we design a modular robot capable of using and switching between multiple methods of propulsion and classifying terrain, based on an Inertial Measurement Unit (IMU) input. We wanted to make a robot that is not only intelligent in its functioning but also versatile in its physical design. The advantage of a modular robot is that it can be designed to hold several movement-apparatuses, such as wheels, legs for a hexapod or a quadpod setup, propellers for underwater locomotion, and any other solution that may be needed. The robot takes roughness input from a gyroscope and an accelerometer in the IMU, and based on the terrain classification from an artificial neural network; it decides which method of propulsion would best optimize its movement. This provides the bot with adaptability over a set of terrains, which means it can optimize its locomotion on a terrain based on its roughness. A feature like this would be a great asset to have in autonomous exploration or research drones.