

A SIMPLE AND HIGHLY MOBILE HEXAPOD ROBOT

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ABSTRACT

Mobile robots are autonomous devices that are capable of locomotion. In this work, a “Hexapod”, which is an off road robot consisting of six independent actuators, that enable independent control of the blades for stable navigation in rough terrain, is presented

The robot consists of a rectangular chassis with semicircular curved blades. The chassis is required to have light but tough properties therefore aluminum and acrylic were used. Toughness for the blades was required to retain the weight of the structure, while enabling the push forward. Therefore, an iron mixed alloy was used for the blades, whereas the friction was provided by the rubber coating at the point of contact of the blades with the surface.

The advantage of a hexapod compared with typical four wheeled mobile robots is that its blades allows it to move in rough surfaces and adapts to any environment or terrain. The six blades also provide greater stability while moving and standing. Blades were used instead of wheels in order to give the structure a forward push, when the blades come in contact with the rough surface the robot runs on. Friction plays a major role in providing this forward push.

Maintaining the robots stability while it moves is a challenge in operating a hexapod robot. Hexapod's locomotion relies on synchronization of three blades. The three blades are the corner blades on one side, and the middle blade of the opposing side. In order to identify status of each blade to maintain synchronous operation, pressure sensors, encoders, current sensing, etc. can be used. Due to the need for real-time feed-back to control two sets of blades, current sensing was selected.

Current readings were monitored, and when there was a contact between the blade and the surface, the reading raised significantly. Using this, the motors were controlled to stop and drive as desired. The contact of the desired three wheels will be detected, and they will be stopped till the detection of the contact of the other three. After that, the previously stopped three will move while the others are at rest. However, blades tend to turn due to the weight of the system. To overcome this, worm wheels were used to avoid rotation of the spindle due to external torque applied.

Key words: Hexapod robot, Self – navigation, off-road robot