Master's Thesis Defense Announcement
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EFFECTIVENESS OF CLOSED-LOOP INVERSE-KINEMATIC LANDMARK NAVIGATION METHOD ON DRIFTING AND HEADING ERRORS OF SLOPPY MULTI-LEGGED ROBOTS

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Abstract

This work addresses on the effectiveness of closed-loop inverse-kinematic landmark navigation method on alleviating drifting and heading errors on walking and turning of hexapod. Heading and drifting errors generally cause the imprecision of movement and the inaccuracy of motion planning, and landmark navigation plays an important role in alleviating these errors. With closed-loop landmark navigation, corrections of navigating errors are generated by actual and expected value, collected by sensors. The movement and the accuracy of autonomous robots could be improved.

The work is aimed at a sloppy hardware on unknown structured environments, which are commonly used for small project or studies. The hardware model is built and printed by 3D printer, due to the flexibility of 3D printing. Twelve servos are attached to move legs and Arduino is used to control those servos. A printed circuit board is created to simplify the circuit of current and data flow. Involved data processing in the control algorithm is captured by using camera and ultrasonic sensor as processing inputs. The well-known controller used is tripod gait, implemented with the closed-loop inverse-kinematic method. The experiment is to measure the heading and drifting errors caused by the movement, with and without method and implemented in a closed room area. Experimental results show a significant improvement in walking and turning of hexapod on unknown structured surface. Heading and drifting errors are significantly reduced, and probably neglected with an upgrade of hardware and controller.