APP5-2

Localization and Mapping for HTS Maglev Test Vehicle Based on Visual SLAM

Yi Li[1], Zigang Deng[2]

School of Information Science and Technology, Southwest Jiaotong University, Chengdu 611756, China[1]
Applied Superconductivity Laboratory, State Key Laboratory of Traction Power, Southwest Jiaotong University, Chengdu 610031, China[2]

Real-time position information is the future development of high-temperature superconducting (HTS) maglev test system toward intelligence. However, due to the design parameters, drift, magnetic field interference of the system, traditional methods are difficult to maintain real-time performance when the positioning system is simplified. In navigation, mapping and odometry for indoor and outdoor environment, visual simultaneous localization and mapping (Visual SLAM) is the computational problem that constructs a map of an unknown environment and keeping track of real-time location simultaneously by visual sensors. In order to explore the accuracy and robustness of the visual SALM method under the HTS maglev test system, this paper focuses on the different behaviors of multi-sensor fusion SLAM method and monocular SLAM method in the measurement environment. Compared to the monocular SLAM with only a single camera, the multi-sensor fused SLAM method using cameras, IMU and active IR detector is more robust in low-texture and high-frequency texture environments. This method can improve the feature matching precision of the system and provide powerful guarantee for real-time positioning and mapping. On this basis, this work comes strong support for evaluating the driving characteristics of maglev vehicles at different speeds, and offers a fresh idea for the positioning method of rail transit experimental system.

Keywords: SLAM, Multi-sensor data fusion, Localization, High-temperature superconducting maglev