

Spectral Template Based Classification of Robotic Whisker Sensor Signals in a Floor Texture Discrimination Task

Mat Evans¹, Charles W. Fox¹, Martin J. Pearson² and Tony J. Prescott¹

Abstract

Whisker-based floor texture classifications could form an important input to mobile robots for use in navigation and object recognition, especially in harsh and covert environments. Previous work [8], [10], [12] showed that artificial whiskers can be used for texture discrimination in controlled situations. In these experiments both the movement of the whisker and the textures used were carefully selected to constrain the problem. In contrast, the present study investigates whiskered texture discrimination in a practical, real-world task. An artificial whisker was attached to an iRobot Roomba vacuum cleaner, and its base displacement was sampled while the robot moved in different directions on four different real-world floor surfaces: rough and smooth carpet, vinyl and tarmac. Surface discrimination is possible using a template based classifier. The discrimination is dependent on knowing robot motion type, with different movement strategies providing better signals for certain texture discriminations.