PROBABILISTIC MODEL OF LASER RANGE FINDER FOR THREE DIMENSIONAL GRID CELL IN CLOSE RANGE ENVIRONMENT

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Abstract

The probabilistic model of a laser scanner presents an important aspect for simultaneous localization and map-building (SLAM). However, the characteristic of the beam of the laser range finder under extreme incident angles approaching 900 has not been thoroughly investigated. This research paper reports the characteristic of the density of the range value coming from a laser range finder under close range circumstances where the laser is imposed with a high incident angle. The laser was placed in a controlled environment consisting of walls at a close range and 1000 iteration of scans was collected. The assumption of normal density of the metrical data collapses when the beam traverses across sharp edges in this environment. The data collected also shows multimodal density at instances where the range has discontinuity. The standard deviation of the laser range finder is reported to average at 10.54 mm, with 0.96 of accuracy. This significance suggests that under extreme incident angles, a laser range finder reading behaves differently compared to normal distribution. The use of this information is crucial for SLAM activity in enclosed environments such as inside piping grid or other cluttered environments.

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