Unmanned Vehicle Model Through Markov Decision Process for Pipeline Inspection

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Abstract

Frequent inspection and proactive monitoring are crucial in monitoring the health of a pipeline else, leakages because of inner corrosion, pipeline wear out or vandalism of pipeline may lead to loss of lives and properties. This research addresses the challenges or limitations of pipeline inspection methods. We demonstrated how a simulation of pipeline inspection can be managed by Markov decision process (MDP). The proposed policy selection was controlled by an algorithm that manages how the mobile agent (unmanned ground vehicle) responds to observed conditions of the pipes in its immediate vicinity. Based on various simulated experiments the ground vehicle correctly detects defects in pipes without false alarm and stores details for the maintenance team to carry out necessary actions. The size of pipeline corrosion was measured by two different robots. Statistical tests were hence conducted to compare the performance of the 2 robots. The result show that variation in the size of corrosion for both robots is not statistically difference.

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