Robot Posture Estimation Using Inner-Pipe Image

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This paper proposes the methodology in image processing algorithm that estimates the pose of the pipe crawling robot. The pipe crawling robots are usually equipped with a lighting device and a camera on its head for monitoring and inspection purpose. The proposed methodology is using these devices without introducing the extra sensors and is based on the fact that the position and the intensity of the reflected light varies with the robot posture. The algorithm is divided into two parts, estimating the translation and rotation angle of the camera, followed by the actual pose estimation of the robot. To investigate the performance of the algorithm, the algorithm is applied to a sewage maintenance robot.

Stabilization of Attitude for Autonomous Bicycle System Using Sliding Mode Control

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In this paper, attitude control of autonomous system using bike based on variable structure control is discussed. Variable structure control is more than a promising technique in the field of nonlinear control. It permits the realization of very robust and simple regulators, with appealing sliding mode characteristics especially if the considered dynamics requires a very short sampling time. We derive dynamic equation of it and demonstrate that the designed controller stabilizes attitude simultaneously regardless of wheel position by computer simulation.

Reinforcement Learning Algorithm Using Domain Knowledge

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Q-Learning is a most widely used reinforcement learning, which addresses the question of how an autonomous agent can learn to choose optimal actions to achieve its goal about any one problem. Q-Learning can acquire optimal control strategies from delayed rewards, even when the agent has no prior knowledge of the effects of its action in the environment. If agent has an ability using previous knowledge, then it is expected that the agent can speed up learning by interacting with environment. We present a novel reinforcement learning method using domain knowledge, which is represented by problem-independent features and their classifiers. Here neural network are implied as knowledge classifiers. To show that an agent using domain knowledge can have better performance than the agent with standard Q-Learner. Computer simulations are …