Dr. Gyula Mester, University Full Professor

Biography

Dr. Gyula Mester received his D. Sc. degree in Engineering from the University of Novi Sad in 1977. Currently, he is a Professor at the University of Szeged, Faculty of Engineering, Hungary. He is the author of 212 research papers, (Number of citations: 275), h index: h=9. His professional activities include R/D in different fields of robotics engineering: Intelligent Wheeled Mobile Robots, Humanoid Robotics, Sensor-Based Remote Control.
He is an invited reviewer of more scientific journals and the author of several books. He is the coordinator of the Robotics Laboratory from the University of Szeged, in European Robotics Research Network.

His CV has been published in the Marquis "Who's Who in the World 1997".

Dr. Gyula Mester won a special award from American Biographical Institute:
Man of the Year 1997, and Man of The Year representing Hungary 2011.

Intelligent Mobile Robot Navigation in Unknown Environments

Abstract

The presentation regards sensor-based, non-visual navigation and integrated control of indoor ambient adaptive wheel-based mobile robots in complex unknown environment. The proposed architecture couples at the high functional level two specialized modules: a knowledge-based block and a model-based block. The cognitive knowledge-based block is synthesized for sensor-based navigation and spatial reasoning while the complementary model-based module is dedicated to the integrated control of robot motion and system dynamics. Navigation and control modules are coupled within a unique mobile robot controller that is designed to ensure non-visual, target-oriented accurate navigation in unknown complex environments with contingency risks. The risks regard to variable tire-road interaction conditions such as uncertainty in slipping conditions and rolling resistance as well as in variety of obstacle shapes and sizes. Cognitive navigation module has to enable a reliable, collision free motion in presence of different obstacles.

The proposed integrated control of mobile robot is designed to improve dynamic performances of mobile robotic system and to ensure accurate tracking of target direction towards a goal point. The presentation considers the non-linear form of tire model and tire-ground interaction effects. Two characteristic approaches to integrated control are evaluated – a kinematical as well as dynamic one in sense of control efficiency and robustness to the environmental and model uncertainties. Characteristic simulation tests are performed to verify the proposed algorithms.

The presentation gives autonomous locomotion of humanoid robots in presence of mobile and immobile obstacles. The article is addressed to the control synthesis of an intelligent autonomous locomotion of biped robots operating in unknown and unstructured dynamic environments, based on perception, spatial reasoning, and learning the skill of human locomotion. Focusing the research activities to the embodied cognition and computational intelligence, this chapter contributes to the

extension of the intelligent robot behavior through building advanced algorithms for dynamic environment understanding, simultaneous localization, trajectory prediction, path planning, obstacle avoidance, collision avoidance and scenario-driven behavior. The chapter includes characteristic simulation result to demonstrate the efficiency of the developed control algorithms and verify the obtained results.