RESEARCH AT
INTELLIGENT TACTICAL MOBILITY ROBOTICS LABORATORY

The Intelligent Tactical Mobility Robotics (ITMR) research group at Tennessee State University (TSU) is conducting interdisciplinary research activities with participation of students and faculty from mechanical, electrical, and computer science. The laboratory has received multiple funded research projects in the past ten years from several funding agencies including: Office of Naval Research (ONR), National Science Foundation (NSF), US Army Tank Command and Armaments (TACOM), National Aeronautics and Space Administration (NASA), Jet Propulsion Laboratory (JPL), Tyndall Air Force Base, Army Research Office (ARO), Rolls-Royce Corporation, and Boeing Corporation, and Penn State Applied Research Laboratory (ARL). The research focus of the laboratory is toward progressive robotic intelligence, namely, advancement of embedded technologies enabling robots to think, sense, perceive, and take intelligent decision under task uncertainties. Robot autonomy is deemed essential to allow the robot to sense and perceive objects in the environment, reason about objects, react to objects, and to learn from its experience via fusion of multi-modality sensory stimuli and management of short and long term memory. One important aspect of ITMR robotic research is towards Cooperative Robotics, type of technology facilitating achievement of tighter cooperation and coordination among multiple robotic agents operating in urban terrain environment. In particular, the focus is concentrated toward development of embedded behaviors enabling two or more robots share their sensing discoveries, sharing their resources, communicate knowledge learned from experiences, and dividing task plans in order to execute them in synchronization and harmony in collaboration with one another and human operators in-the-control-loop. Applications of such technology are tremendous from space exploration to battlefield surveillance and reconnaissance to homeland security requiring multiple robots to provide a persistent surveillance and reconnaissance, tracking one or more target simultaneously, executing collaborative tasks in succession. A current research is being undertaken to enable robots traverse outdoor unstructured environments intelligently and swiftly. Such technology is crucial for enabling robots to maneuver and traverse natural unstructured terrain like in Mars, crowded urban terrain, and natural disaster sites. In another Air Force project, an intelligent robot is being trained with visual perceptive capability to remediate environment from unexploded ordnance. In a different vein, a research is being undertaken to achieve a better human-robot interaction – namely, making the robot acting more humanly with habitual gestures, fluent speech recognition and synthesis, making facial impressions, and social skills suiting the robot for assistance in teleoperated operation either for space, homeland security or military battlefield. Such technology has a number of civilian applications, for instance, assisting elderly and handicap individuals with their daily activities. A publication collection of TSU robotics researcher now is available in a book entitled, "Advances in Intelligent Robotic Systems: From Theory to Knowledge and Practice." The book is published by the College of Engineering, Technology, and Computer Science.

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