

Hashim A. Hashim Mohamed



Abstract:

Autonomous mobility is a hallmark of modern transportation and is an active engineering research area. Autonomous motion of unmanned vehicles (ground robots and unmanned aerial vehicles) presents a number of challenges, including attitude and pose (attitude + position) estimation, simultaneous localization and mapping (SLAM), and robotic navigation. SLAM constitutes a challenging process of concurrent estimation of an unknown vehicle's pose and its unknown environment. The robotic navigation task, on the other side, requires estimation of the three main components that unambiguously characterize the vehicle's motion in space: attitude, position, and linear velocity. Navigation estimation solutions become indispensable in environments where GPS-based navigation is impracticable. In absence of GPS, vehicles equipped with low-cost measurement units (e.g., inertial measurement unit (IMU)) face the challenge of unknown linear velocity and pose.

In this brief technical talk, several recent projects related to robotics and control are presented. The long-term goal of my team and I will be introduced. My short-term objectives will be outlined and they include: 1. Development of nonlinear filters for SLAM/inertial navigation accounting for the low-cost unit measurement noise; 2. Development of SLAM/navigation-filter-based controllers that incorporate measurements from low-quality sensors providing fully autonomous solutions. Addressing these short-term objectives will meet a variety of current and future needs of the Canadian society, and will lay a foundation for rapid autonomous solutions which are vital in high-risk areas to maintain health and safety of the public.

Biography:

Hashim A. Hashim Mohamed is an Assistant Professor at the Department of Engineering & Applied Science at Thompson Rivers University (TRU), Kamloops, British Columbia, Canada. He received a Ph.D. degree in Robotics and Control from the Department of Electrical and Computer Engineering, Western University (UWO), London, Ontario, Canada, in 2019. Prior to this he received a M.Sc. degree in Systems and Control Engineering from the Department of Systems Engineering, King Fahd University of Petroleum and Minerals (KFUPM), Dhahran, Saudi Arabia, and a B.Sc. degree in Mechatronics from the Department of Mechanical Engineering, Helwan University (HU), Helwan, Egypt. He is a registered Professional Engineer (P.Eng.) in the province of British Columbia, Canada, and a member of IEEE. Also, he is currently serving as an associate editor in IEEE Canadian Journal of Electrical and Computer Engineering (IEEE CJECE) and is an active reviewer in many prestigious journals and top technical conferences. His current research interests include guidance, navigation and control, robot localization and mapping with inertial vision systems, sensor-fusion-based estimation, linear and nonlinear filtering, distributed control of multi-agent systems, and stochastic systems.

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