The Field Robotics Center

Seminar Series

Friday, 22nd September **NSH 1507 12:30 – 1:30pm**

Lunch will be served

Chen Zhu

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Institute for Communications and Navigation

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Fusion of Cameras and Sparse Ranging Measurements in Multi-agent SLAM

Abstract: Cameras are widely used for localization and navigation in GNSS-denied environments. By exploiting VSLAM (Visual Simultaneous Localization and Mapping) techniques, vehicles equipped with cameras are capable of estimating their own trajectories and simultaneously building a map of the surrounding environment. In many applications, multiple cooperative robotic agents (robotic swarms) are used in order to improve the robustness to malfunctions, exploration or mapping efficiency, and localization accuracy.

This talk shows that by using sparse ranging measurements between a pair of dynamic rovers and onboard cameras, the relative pose between the two agents can be estimated. If monocular cameras are used, the global scale factors can be jointly obtained. The algorithm can also be applied in a single-rover/single-base-station scenario, but the polar angle of the rover with respect to the base station remains ambiguous. In addition, it is shown that the error accumulation problem in VSLAM is mitigated by including ranging measurements, without requiring the rovers to revisit mapped locations for loop closures. The localization accuracy improvement is analyzed using Cramér–Rao lower bounds.

Speaker Bio: Chen Zhu is currently pursuing his Ph.D. at Technische Universität München (Technical University of Munich) in Munich, Germany as a full-time researcher at the Institute for Communications and Navigation. He received his B.Sc. in Automation Engineering from Tsinghua University, in Beijing, China in 2009, and his M.Sc. in Communications Engineering in 2011 from Technische Universität München. In 2012, he has won the IEEE Region 8 (Europe, Middle East and Africa) student paper contest (2nd place) with the paper “High accuracy multi-link synchronization in LTE: Applications in localization”.

Since 2012, Chen Zhu works on the DLR (German Aerospace Center) project “Valles Marineris Explorer” (VaMEx). His research interests include visual navigation, robotic swarm navigation, and multiple sensor fusion in autonomous vehicle navigation.

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