



USC Viterbi School of Engineering

Seminar

Ming Hsieh Department of Electrical and Computer Engineering



Entrepreneurial Road Towards a Robust 3D Tracking Solution with UWB

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Abstract: As industries strive to enhance quality control and to ensure thorough traceability, the demand for sophisticated 3D tracking solutions drastically increased over the last years. LoconIQ stands out with a robust solution to empower new applications with high-precision and real-time 3D tracking. The company's main innovations are a time-of-flight based ranging algorithm that allows for sub-centimeter distances measurements and a proprietary sensor fusion that integrates ultra-wideband (UWB) data and auxiliary sensors. The solution utilizes UWB signal characteristics and noise/outlier classification models of sensors to facilitate a weighted unscented Kalman Filter (UKF) approach for the localization. With these innovations, LoconIQ delivers a robust 3D tracking solution at a centimeter level accuracy with latencies of only a few ms. The talk will provide insights into the technology and provide real-life examples, outlining step-by-step improvements from a simple Kalman Filter based localization approach to the company's current UKF with weighting and an advanced sensor fusion. The talk will, furthermore, provide some insights into the applications for such a technology and address the entrepreneurial journey from a university spin-off to a million-dollar company.



Bio: The talk will be given by **Daniel Neuhold**, who embarked on his Ph.D. journey focusing on wireless communication for aeronautical applications. More particularly, working with Airbus in a project to eliminate wires from commercial airplanes and Ariane carrier rockets. Aiming to substitute data cables with wireless communication to drastically reduce the aircraft's weight. Daniel then pivoted to the utilization of the used ultra-wide band (UWB) communication to facilitate real-time and high-precision wireless ranging. With this research topic, Daniel performed a seven-months long research stay at the University of Southern California in 2018. After which, he pursued his entrepreneurial path and patented algorithms for precise and low-latency ranging. These efforts culminated in a first prototype solution, which demonstrated the capabilities of the developed technology to raise millions in funding, leading to the incorporate and scale-up of the company. LoconIQ now enables robust and high-precision 3D tracking with a small and battery-powered sensor device, that comes as a turnkey solution right out-of-the-box.

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