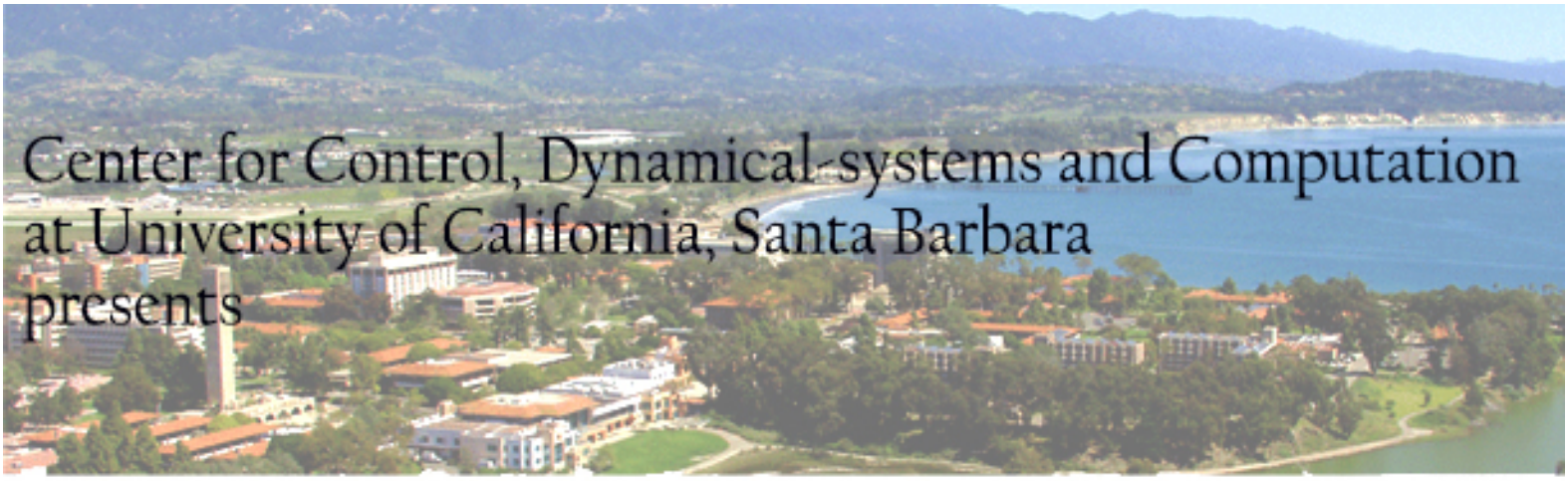

Object Based Mapping

Henrik Christensen

Friday, October 13, 2017 | 3:00 PM | Webb 1100

To build mobile systems that can operate autonomously it is necessary to endow them with a sense of location. One of the basic aspects of autonomy is the ability to not get lost. How can we build robots that acquire a model of the surrounding world and utilize these models to achieve their mission without getting lost along the way. Simultaneous Localization and Mapping (SLAM) is widely used to provide the mapping and localization compete to robots. The process has three facets: extraction of features from sensor data, association of features with prior detected structures and estimation of position/pose and update of the map to make it current. The estimation part of the process is today typically performed using graphical models to allow for efficient computations and enable flexible handling of ambiguous situations. Over time the feature extraction has matured from use of basic features such as lines and corners to utilization of significant structures such as man-made objects (building, chairs, tables, cars, ...) that are easily identifiable. The discriminative nature of major structures simplifies data-association and facilities more efficient loop-closing. In this presentation we will discuss our modular mapping framework - OmniMapper - and how it can be utilized across a range of different applications for efficient computing. We will discuss a number of different strategies for object detection and pose estimation and also provide examples of mapping across a number of different sensory modalities. Finally we will show a number of examples of use of the OmniMapper across in- and out-door settings using air and ground vehicles.

Dr. Henrik I. Christensen is a Professor in Dept. of Computer Science and Engineering, UC San Diego. He is also the director of the Institute for Contextual Robotics. Prior to UC San Diego he was the founding director of Institute for Robotics and Intelligent machines (IRIM) at Georgia Institute of Technology (2006-2016). Dr. Christensen does research on systems integration, human-robot interaction, mapping and robot vision. The research is performed within the Cognitive Robotics Laboratory. He has published more than 350 contributions across AI, robotics and vision. His research has a strong emphasis on "real problems with real solutions". A problem needs a theoretical model, implementation, evaluation, and translation to the real world. He is actively engaged in the setup and coordination of robotics research in the US (and worldwide). Dr. Christensen received the Engelberger Award 2011, the highest honor awarded by the robotics industry. He was also awarded the "Boeing Supplier of the Year 2011". Dr. Christensen is a fellow of American Association for Advancement of Science (AAAS) and Institute of Electrical and Electronic Engineers (IEEE). He received an honorary doctorate in engineering from Aalborg University 2014. He collaborates with institutions and industries across three continents.