ZacharyTaylor

Personal Info

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Links to More Info

zjtaylor.com
Github
Google Scholar
Research Gate
My PhD Thesis
ASL ETHZ

Programming Languages

Strong
C++
C
Matlab

Basic
Python
Cuda
Latex

Hobbies

Running
Hiking
Skiing
Diving

Education and Experience

2015 - now **Senior Researcher** ETHZ, Switzerland
Working in the rotary wing group at the Autonomous Systems Lab ETHZ

2011 - 2015 **Doctor of Philosophy** University of Sydney, Australia
Title: Automatic Markerless Calibration of Multi-modal Sensor Systems.
Supervisors: Juan Nieto (Primary) and David Johnson (Associate)

2008 - 2011 **Bachelor of Engineering (Mechatronics)** University of Canterbury, NZ
1st Class Honours

Publications

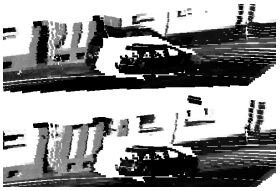
18 Publications (7 first author) in top rated robotics publications in the last 6 years
9 conferences, 5 journals and 4 workshops. See my **website** or google scholar for the list. A few indicative publications:

Helen Oleynikova, Zachary Taylor, Roland Siegwart, and Juan Nieto.
Safe Local Exploration for Replanning in Cluttered Unknown Environments for Microaerial Vehicles. IEEE Robotics and Automation Letters 3, no. 3 (2018).
This paper looks at the problem of navigating a microaerial vehicle (MAV) to a given goal in an initially unknown, unstructured environments. An approach is devised that allows the system to incrementally build an ESDF map and plan a local path that for static environments is guaranteed to be collision free. It is demonstrated running fully onboard an MAV navigating in a forest.

Alexander Millane, Zachary Taylor, Helen Oleynikova, Juan Nieto, Roland Siegwart, César Cadena.
A Scalable and Consistent TSDF-based Dense Mapping Approach. Submitted to IROS 2018 (awaiting reviews).
Maintaining a real-time dense map of the environment is important for many robotic planning and navigation applications. However, these maps can easily become inconsistent due to accumulated camera tracking error and delayed loop closure. To prevent this we present an approach where sub-maps are continually created and fused once they are well localized. The system is demonstrated running in real-time onboard an MAV mapping a machine hall.

Zachary Taylor, and Juan Nieto.
Motion-based calibration of multimodal sensor extrinsics and timing offset estimation. IEEE Transactions on Robotics 32.5 (2016).
This paper presents a system for calibrating the extrinsic parameters and timing offsets of an array of cameras, 3-D lidars, and global positioning system/inertial navigation system sensors, without the requirement of any markers or other calibration aids. It operates by aligning the observed motion of the sensors. Where camera and lidar sensors posses overlapping fields of view, this calibration is further refined via the minimization of a multi-modal intensity metric.

Research and Project Experience Highlights



PhD Thesis 2011 - 2015

Thesis Title: Automatic Markerless Calibration of Multi-modal Sensor Systems.
My PhD thesis at the Australian Center for Field Robotics was in multi-modal sensor calibration with a focus on aligning lidar and camera systems without the need for any markers. This work studied a range of approaches and use cases, from motion based strategies for aligning vehicle mounted sensors with no overlap, to high resolution tripod mounted setups where the extrinsic sensor placement is changed between each scan.

Postgraduate Research Supervision 2015 - 2018

One of my main roles at ASL has been the supervision of postgraduate students. This includes the day-to-day management of the rotary wing PhD candidates, assistance with their projects and the supervision of their research. The primary research focus of my group is on enabling autonomous micro aerial vehicles to perform tasks in an unknown and unstructured environment. In addition to my work with these students I supervise a range of robotics masters theses and semester projects. I also co-supervised the Voliro focus project which designed and developed a novel omni-directional hexacopter.

Robotics Projects 2011 - 2018

During my time as a PhD student and postdoctoral researcher I have been involved in a large number of robotics projects, challenges and demonstrations. My responsibilities on these projects have ranged from the development of the initial proposal and managing the tasks, through to writing code for software deliverables and performing on sight experiments and demonstrations. These projects have involved close collaboration with large industry partners and/or a consortium of other academic and government groups. The project I have been most closely involved with is the European Robotics Challenge (see below).

European Robotics Challenge (EuRoC) 2016 - 2018

The European Robotics Challenge is a FP7 project that aims to get research out of the lab and into the hands of European industry. It has a core consortium of 9 institutions, and a further 31 academic and industrial groups that make up the 15 challenger teams (5 per challenge). I am in charge of the organization and management of Challenge III, which focuses on the use of micro aerial vehicles for industrial inspection tasks. My responsibilities include providing challenge infrastructure, co-ordinating the assessment of the challenge stages and assisting the efforts of the challenger teams and their industrial partners.

Micro Aerial Vehicle Platform Integration 2017 - 2018

To validate the research done at the ASL a large range of systems and sensor payloads are required. When I joined ASL they were relying on commercial hexacopter systems, however the inflexible nature of such systems continually caused issues and in 2017 I led an effort to integrate our own platforms. The focus was on the use of easily obtainable hobbyist and 3D printed components while allowing complete control over all systems. My work in this area covered all aspects of the system, from micro-controller code to the component layout.