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Challenges for Safe Autonomous Flight

Sebastian Scherer

Robotics Institute,
Carnegie Mellon University,
Pittsburgh, PA, USA
basti@andrew.cmu.edu

Abstract

Autonomy holds a great promise by improving the applications, safety, and efficiency of flight. If little operator input is necessary, unmanned rotorcraft have a wide range of applications ranging from cargo delivery to inspection. Currently unmanned rotorcraft are underutilized because they either have to fly on preplanned missions at high altitude or require careful teleoperation. A capable autonomous rotorcraft will have to react quickly to previously unknown obstacles, land at unprepared sites, and fly with semantic information to enable long-term autonomy in cluttered environments.

In this talk we give an overview of how autonomy systems are currently designed and how pushing the performance and safety of these systems challenges current verification paradigms. In particular we will address how a supervisory layer in the motion planning system can improve safety, a sensor steering system enables us to optimize coverage for safe trajectories, and how semantic information can help us guide the rotorcraft.

Biography

Sebastian Scherer is a Systems Scientist at the Robotics Institute (RI) at Carnegie Mellon University (CMU). His research focuses on enabling autonomy for unmanned rotorcraft to operate at low altitude in cluttered environments. He and His team have shown the fastest and most tested obstacle avoidance on an Yamaha RMax (2006), the first obstacle avoidance for micro aerial vehicles in natural environments (2008), and the first (2010) and fastest (2014) automatic landing zone detection and landing on a full-size helicopter. Dr. Scherer received his B.S. in Computer Science, M.S. and Ph.D. in Robotics from CMU in 2004, 2007, and 2010. He is a Siebel scholar and a recipient of multiple paper awards and nominations, including AIAA@Infotech 2010 and FSR 2013. His research has been covered by the national and internal press including IEEE Spectrum, the New Scientist, Wired, der Spiegel, and the WSJ. His work on self-landing helicopters has received the Popular Science Best of What's New 2010 Award and in Fall 2016 he demonstrated his inspection robots to President Obama.