Transferable Belief Models for Lightweight Simultaneous Localization and Mapping

Kirill Krinkin, Ph.D., Adjunct Professor

Head of Department on Software Engineering and Computer Applications
Saint Petersburg State Electrotechnical University "LETI", Russia
kirill@krinkin.com

Abstract — **Truly autonomous mobile robots have to solve the SLAM problem (i.e. simultaneous map building and pose estimation) in order to navigate in an unknown environment. This is a core problem to solve in order to reach real robot autonomy. Unfortunately, despite many solutions that exist, there is no robust and reliable solution for mobile platforms with limited resources. It's always a trade-off between robustness, performance, and computational resource requirements. In this talk, we discuss how to improve SLAM quality without increasing computation/memory limits, by using Dempster-Shafer probability and Transferable Belief Models. With the toy example (tinySLAM) it will be shown how small enhancements can affect scan matching and occupancy tracking. Probability extensions could be one of the ways toward cheap smart spatial sensors.**

Keywords- Depster-Shafer Theory, SLAM algorithms, Transferable Beliefs Models, Low Cost Mobile Platforms

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About the Speaker

Kirill Krinkin *is an Adjunct Professor, Head Software Engineering and Computer applications Department in Saint Petersburg State Electrotechnical University "LETI", Director of International Innovation Institute on Artificial Intelligence, Cybersecurity, and Communications (Popov Institute). He is a professional member of IEEE, ACM, Robotics, and Automation Society. For the last more than twenty years, Kirill has been doing research and development with international companies and Universities in Software Engineering, Autonomous Mobile Robots, and related domains. Kirill Krinkin is an Author and co-author of more than 100 technical papers. He is actively giving lectures in universities on Mobile Robotics and operating systems development. He is an organizer of many hands-on STEM schools in Russia and Europe.*

He is a supervisor of the student team in Artificial Intelligence driving Olympics Challenge – a benchmark the state of the art of artificial intelligence in autonomous driving technologies in standardized simulation and hardware environments for tasks related to multi-sensory perception and embodied AI. His team took the 1st place twice in this challenge in 2019 at ICRA2019 and NeuroIPS2019 conferences.