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Keynote Lecture I

Achieving Long-term Autonomy in Realistic Environments

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Abstract - Autonomy of unmanned UxV systems has widely been applied for operation in artificial or dedicated environments. Adjusting the environment to operation of unmanned systems stands in constraining its' complexity or taking the advantage of existing infrastructure to attain the given task of unmanned robot control and survival. Nevertheless, targeting operation of autonomous robots in ordinary natural and/or human-oriented environments has to cope with increased complexity of its' shape and structure. Above that, raw environments must not deliver the desired infrastructures as land marking systems, GNSS services, or similar, allowing direct robot navigation. In these cases, the complexity and diversity of the environment shape and structure can be used for reliable navigation through such spaces, making-use exclusively natural scene features. The mentioned properties may be extracted from diverse types of sensory measurements but having available more capable sensing systems nowadays, the vision-based solutions seem to be the most efficient approach that attains expected level of autonomy. As many diverse approaches have been applied recently, observation of robust image features together with scene depth estimates denotes one possible way to robust and reliable representation of robot environments and can efficiently serve for navigation purposes. Therefore, the talk will target selected vision-based method capable of achieving long-term navigation in highly complex, varying (human oriented and/or natural) environments and their prospective applications in UxV field.