

IAF SPACE EXPLORATION SYMPOSIUM (A3)
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ASSUMPTION-BASED PLANNING WITH INCOMPLETE INFORMATION ABOUT THE
ENVIRONMENT : HOW TO ACT SAFELY ?**Abstract**

Safe navigation of autonomous systems is a very complex task, indeed, even the most advanced systems could experience failure at some point. In practice it is impossible to secure the absolute safety of an agent in a partially known environment, however, some techniques and frameworks have been developed over the years in order to give some degree of safety for the navigation of autonomous agents. For instance imposing strong assumptions on robot sensing capabilities and on the dynamic behavior of the environment, with the aim of reducing the uncertainty and eventually producing a plan that solves the task at hand. Nevertheless, autonomous systems can cause damage to themselves and their physical environment especially in partially known environment, therefore, a safe approach to robotic planning is necessary. Several approaches that guarantee safety have been developed over the years, these approaches focus on the validity of initial assumptions before doing a “risky” manoeuvre. These approaches have encountered some success; however, they are not able to quantify the “risk” or give a clear “risk” evaluation. This work presents a safe approach to robotic planning while giving an explainable “risk” evaluation. This could be particularly interesting for Mars missions where the knowledge about the environment is, in some cases, partially known.