RB5: A Low-Cost Wheeled Robot for Real-Time Autonomous Large-Scale Exploration

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***Abstract*—In this paper, we present a robotic system-of-systems involving a six-wheel mobile robot with resilient autonomy, as well as mapping, planning, and navigation capabilities to explore complex ground and underground environments.**

***Index Terms*—Article submission, IEEE, IEEEtran, journal, LaTeX, paper, template, typesetting.**

I. Introduction

WIDELY used in cluttered environments [1]–[4], mobile robots can both substitute [5] and outperform humans in, e.g., areas that are too far or too dangerous to navigate [6]. In these areas, robots are often required to identify their surroundings by sensing the environment [7] and planning and executing complex trajectories [8] with little or no human interaction [9]–a problem known as autonomous exploration [8]. Despite recent advancements, autonomy is limited and costly. Many approaches that tackle autonomous exploration integrate commercial robots with sensing equipment that is both prohibitively expensive and difficult to maintain [10], [11]. Furthermore, in areas that are ambiguous or challenging to traverse–albeit autonomous–state-of-the-art approaches rely on humans for supervision and high-level decision-making [3]. As a result, robots often have to operate close to humans or require expensive network equipment.

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