

## Special Session

# Service Robotics in Challenging Environments

### Description/Scope

For the last six decades, we have witnessed the gradual robotic colonization of industrial spaces with great success. These spaces are often specially adapted for robots, so that they can perform their tasks as precisely and efficiently as possible. Robotics has slowly started its journey from industrial environments to service environments by developing systems to assist humans, typically by performing jobs that are dirty, dull, distant, dangerous, or repetitive. Service robotics encompass a broad field of applications, most of which having unique designs. Differently to industrial robots, service applications are commonly developed in rich/complex dynamic scenarios, where the robot must explicitly consider uncertainty in both perception and action. To deal with such a variety of environments and applications, service robotics span equally grounded, aerial, and underwater systems. Consequently, numerous service applications face challenges such as navigating in GPS-denied, dynamic or partially unknown environments, dealing with limited robot perception and communication, and making complex decisions. Despite significant advancements in robot autonomy in recent years, many of the existing solutions in the field lack the necessary robustness and reliability to operate effectively in challenging environments. Factors such as low visibility, fog, dynamic surroundings, or incomplete environmental information are deliberately introduced to compromise the quality of these solutions.

### Topics (but are not limited to)

- GPS-denied localization
- Control in complex environments (slippery terrains, wind turbulences, ocean currents, etc)
- Planning in dynamic scenarios
- Reliable inter-robot communications
- Perception in low visibility
- Mapping or SLAM in low visibility
- Reliable/robust multi-sensor estimations

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