Avionic Perception-Action Model for UAV Aimed at Avalanche Buried Searching

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Starting from the basic paradigm of perception–action, an avionic system for an UAV aimed at avalanche rescue is derived as autonomous agent. Using last advances in cognitive science, situatedness and embodiment [2] for the agent are analyzed, and exploited to reach the mission goal. Part of the searching algorithm is introduced as one of the complex behaviors in which the agent must decide between different intents [6].

A stacked layers architecture [1] is presented. At the lower levels, algorithms run for stabilization and obstacles avoidance; those ensure drone's survival. Upper layer provides an estimation of orientation over ground [7] and generates a reference in such a way that ARTVA signal is maximized, while safety for rescuers is ensured. Highest layers are reserved for searching routines. It is well known that pinpointing a victim – due to the particular shape of near-field transmitting source – using ARTVA signal is a difficult task. In this paper we present a way for searching buried victims that differs from the one presented in [4, 5], in which two routines works together in order to find the field origin. The first routine exploits gradient information to reach the highest signal strength location, while the second tries to identify a confidence region through an internal emulation of the field (optimization problem).

When no beacons are detected the agent behavior changes and a search over a wider region is performed. So far, boundaries for the region are provided by an external agent, such as a rescuer. The switching between the two intent – i.e. scanning vs. active searching – is operated by an implementation of the radar detection algorithm [3].

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