Title: Mathematical modeling of instant reflex of autonomous mobile robots towards to dynamic obstacle in unknown indoor environment

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Abstract:
The structure of the autonomous robot is composed of several subsystems. These subsystems can be categorized in two parts which are structural and behavioral features. Structural features involve all mechanical properties of systems. The behavioral features states that intelligence is the result of the interaction among an asynchronous set of behaviors and the environment. Classical control approaches point out to control physical parts of robots. Stability is the most important point for this approach. Usually, it has long response time when stimulants are detected in dynamic environment. Because of this reason, new control paradigm is developed for fast independent reflex. A behavior is a reaction to a stimulus. The keystone ideas behind Behavior-Based control paradigm are embodiment, situatedness, emergent complexity and no planning. Behavior-Based control paradigm affects not only software but also hardware design. Sensor structure and types has an important role to build the formulation of instant decision making systems. Classical control approach is inadequate to make a fast decision when instant events are occurred. Independent behavioral based control approach should be produced to control decisions of autonomous systems during that kind of events. In addition to this, Mathematical modeling of instant reflex of autonomous mobile robots towards to dynamic obstacle is extremely challenging topic. Furthermore, modeling of instant reflex is very important to determine the dynamic parameters for the control design. In this study, new mathematical approach to formulate instant reflex of autonomous robots is presented for two-wheel-drive mobile robots towards to dynamic obstacle in unknown indoor environment. The two-wheel-drive Arduino mobile robots are used for experimental studies. Proposed new behavioral-based control paradigm is observed faster than classical control approach.

Keywords: instant reflex modeling, behavioral-based control, autonomous systems.