THE REFLEXIVE INSTRUCTOR WITH DELIBERATE APPRENTICE ARCHITECTURE

by

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ABSTRACT

The Reflexive Instructor with Deliberate Apprentice Architecture

A framework allowing a discourse in autonomy applied to autonomous mobile robots is developed based on human autonomy. This framework is extended to mobile robotics and is used to evaluate the level of autonomy in a novel approach for constructing autonomous controllers called the Reflexive Instructor (RI) with Deliberate Apprentice (DA) architecture. We claim that the RI/DA architecture supports the construction of first-order autonomous learning agents restricted only by their ability to interact with their environments.

The architecture uses simple reinforcement signals provided by the RI component to train the DA. The DA is responsible for providing control signals to the agent's actuators based on received sensor input. Like most reinforcement learning systems it is not likely to do this very well until it has learned to avoid collisions and obstacles in its environment. The RI provides a measure of safety in this respect as it is responsible for taking over control of the agent if the DA makes a mistake as well as providing an appropriate signal to the DA so it might learn from the mistake.

The RI/DA interaction is advantageous because it protects the vehicle from its own ignorance and helps accelerate learning in the DA.

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DEDICATION

This work is dedicated to my wife Charmaine--without her there would be no work, and to Charlotte, my daughter.

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