Further Explorations in Visually-Guided Reaching: Making MURPHY Smarter

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Abstract: MURPHY is a vision-based kinematic controller and path planner based on a connectionist architecture, and implemented with a video camera and Rhino XR-series robot arm. Imitative of the layout of sen(cid:173) sory and motor maps in cerebral cortex, MURPHY'S internal representa(cid:173) tions consist of four coarse-coded populations of simple units represent(cid:173) ing both static and dynamic aspects of the sensory-motor environment. In previously reported work [4], MURPHY first learned a direct kinematic model of his camera-arm system during a period of extended practice, and then used this "mental model" to heuristically guide his hand to unobstructed visual targets. MURPHY has since been extended in two ways: First, he now learns the inverse differential-kinematics of his arm in addition to ordinary direct kinematics, which allows him to push his hand directly towards a visual target without the need for search. Sec(cid:173) ondly, he now deals with the much more difficult problem of reaching in the presence of obstacles.