H-infinity Control *of* an Autonomous Mobile Robot

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ABSTRACT

This thesis proposes a robust trajectory-tracking solution *for* a two-wheeled mobile robot using H-infmity (minmax) control techniques in the presence *of* uncertainties that arise *from* neglecting *some of* the system dynamics (e.g., motor dynamics, sensor noise, and unmodeled vehicle dynamics). *To* compensate *for* the unceliainties in the dynamic model, we illustrate *how* the kinematics model *of* the system can be used *to* design a robust minmax controller and compare it with a P controller and a PI controller. The nonlinear and the linearized models are simulated in MATLAB@and the results are presented *to* demonstrate the performance *of* the proposed controllers. The difference between the advanced control and the traditional control are explained. The second part *of* this thesis discusses the construction *of* the mobile robot system, which is an embedded system. It integrates hardware and software in its design and operation. Hardware includes the physical parts *of* the system and software includes the programs that determine the robot operation. A Microchip PIC16F877 microcontroller (programmed in assembly language) interfaces and controls the mobile robot devices.