

Turtlebot Control in the DIARC Robotic Architecture

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The MIRRORLab seeks to understand how robots can and should interact with humans through natural language. The MIRRORLab's research towards this goal uses robots in two ways. First, we develop algorithms with DIARC – the *Distributed, Integrated, Affect, Reflection, Cognition* architecture, to enable autonomous robots to communicate through natural language. Second, in order to determine how to design these algorithms, we perform human-subject studies investigating how humans interact with robots that are either autonomous or *Wizarded*, i.e., remotely controlled but made to appear autonomous.

In this project, students will work to enable both autonomous and wizarded control of the Kobuki *Turtlebot 2*. Specifically, the project has two overarching goals: (1) integrate the Turtlebot 2 into the DIARC Robotic Architecture, so that it can be controlled through natural language commands; (2) develop a Wizard-of-Oz interface that can be used to see through the turtlebot's camera and remotely control its behavior. In more detail, the project's goals include:

Tier I: Required

- Enable motor commands to be sent from DIARC to the Turtlebot's motors
- Enable speech commands to be sent from DIARC to the Turtlebot's speakers
- Design and implement a Wizard-of-Oz control interface that streams the view from the robot's camera and allows sending of motor and speech commands.

Tier II: Desirable

- Enable information from the robot's sensors to be sent from the Turtlebot to DIARC
- Make the WoZ interface usable with different robots, with different control elements present depending on what robot is being controlled and what configuration file is loaded.

Tier III: Would-be-nice

- Enable above functionality by interfacing directly with the robot, i.e., without going through ROS.
- Make the WoZ interface aesthetically pleasing.

Team Size: 2-4

Skills: Programming in C++ and Java; Version control (git); Linux; ROS

Location: Mines Campus