

Distributed Architecture Web Application

Tom Williams <twilliams@mines.edu>

March 24, 2021

1 Laboratory Background

The MIRRORLab at the Colorado School of Mines is a Human-Robot Interaction research laboratory that studies human-robot communication through the combination of various computational techniques (including integrated cognitive architectures, mixed reality visualization, and reasoning under uncertainty) with theories and methods from other fields (such as philosophy, linguistics, cognitive psychology, human factors psychology, social psychology, moral psychology, design, anthropology, and feminist theory).

2 Project Overview

Most robot control software developed in the MIRRORLab is developed using the Agent Development Environment: a middleware for developing distributed, integrated agent architectures.

Unlike most programs that students are typically used to developing, ADE configurations are distributed networks of integrated programs. Instead of speech recognition, dialogue, and goal management being distinct software libraries that are integrated into a single program, they are kept as separate programs that run in parallel, possibly on different machines, and exchange information between each other as needed. These separate programs, called *Components*, can be started and stopped as needed, and each Component has no guarantee of any other Component being available. This means that the set of things a robot is capable of doing, talking about, and thinking about may change dynamically as Components are started and stopped.

During the Pandemic, the MIRRORLab has been increasingly running experiments online. Instead of studying how people interact in person with a robot, we have had to instead film staged videos of robots, show these videos to people online, and have those people assess the quality of the robot behaviors without actually interacting with the autonomous system. When participants engage with a lab experiment over Amazon's Mechanical Turk, they are directed to a website created using the python-based psiTurk (<https://github.com/NYUCCL/psiTurk>) experimental framework, running on a Heroku server. This website typically

consists of a simple series of HTML websites, flow between which is controlled via javascript.

In this project, we would like a student to integrate ADE with this framework, so that an experimental participant will be able to send information to and receive information from an instance of ADE running on the Heroku server.

This will require: (1) creating a heroku configuration that will deploy the java 8-based ADE alongside the python-based psiturk; (2) starting up an ADE configuration at the beginning of an experimental session; (3) sending and receiving data between the javascript that controls the experiment webpage logic, and a dedicated experimental Component of that integrated system; (4) terminating the architecture upon experimental completion.

- **Recommended Team Size:** 3-4
- **Work From:** anywhere.
- **Desired Skillset:** Full-stack web development including HTML, Javascript, Java, and Heroku.