EE 267 Virtual Reality: Lab 5

Instructions

Students should complete this lab before starting to work on Homework 5. Completing the lab will give you useful information that will aid in completing the homework assignment.

For the programming part of Homework 5, you will mostly do Arduino programming with our VRduino. If you have a lot of experience with Arduino, you may skip this lab. If you have not worked with Arduino before or your skills are a bit rusty, please complete the tutorials listed below before starting the homework.

Task 1: Getting started with Arduino

We briefly discussed Arduino in class, but you may want to read the brief "official" introduction. The Arduino website https://www.arduino.cc should be your go-to place for all questions related to Arduino. Also read the information on Getting Started with Arduino.

Now that you have a reasonably good idea what Arduino is, download and install the Arduino IDE for your operating system. This should work on Windows, Mac OS, and Linux. You are free to edit your code from within the Arduino IDE, but if you find the editor lacking you can set it to external editor mode and use your favorite editor instead. You can do this by checking off "Use External editor" in the settings/preferences.

Task 2: Getting started with Teensy

The VRduino uses a Teensy 3.2 microcontroller. This Teensy is an Arduino-compatible board, but it is a bit more beefy than the official Arduino boards. The Teensy 3.2 uses an ARM Cortex-M4 processor that runs at up to 72 MHz and it is also smaller than the Arduino UNO, for example. The official Teensy website is https://www.pjrc.com/teensy/. Due to the fact that the Teensy is Arduino compatible, you can program it in pretty much the same was as any other Arduino and benefit from the Arduino IDE and strong community support on the internet.

If this is the first time you are using a Teensy, the Teensy First Use article will help you get started. To conveniently compile programs with the Arduino IDE, you also need to download and install Teensyduino, which is a software plugin for the Arduino IDE that lets you compile your code for the Teensy. Here is a brief tutorial on How to Setup Teensyduino.

Task 3: Practice your Arduino skills

If you feel confident about your C programming skills and the Teensy, go ahead and get started on the homework. If you'd like some more info on how to program Arduinos, you can find a lot of Arduino tutorials online. For example, these Arduino Video Tutorials for Beginners are very helpful.

Task 4: Installing Node.js

You are going to need a WebSocket server to communicate IMU orientation data to the browser in sections 2.4 and 2.5 in the homework. For this purpose we are using Node.js, which will setup this server. We provide you with the Node.js based script `server.js` that reads data from the serial port and publishes it through a WebSocket. To run it, you first need to install a few packages from a JavaScript package manager, `npm`. Follow these instructions:

1. Download and install Node.js (LTS version), which includes the package manager npm.

2. In a terminal, navigate to `server/` in your homework folder. This is where `server.js` is located.

3. Enter: `npm install`. This should install a `node_modules` folder with the required libraries.

4. With the Teensyduino connected, enter: `node server.js`. You should start seeing data streaming to the terminal.