
Spring 2019 Project Summaries

These are very brief descriptions of project concepts and ideas which don't necessarily have substantial detail specified. You should expect clarification as well as expansion of these ideas once projects are chosen.

1. Sleep Quality Monitor

The objective of this project is to develop a wearable monitor that measures the quality of sleep of its user. Measurements of heartrate (using a heartrate sensor consisting of an IR transmitter, an IR phototransistor, OP amp), respiratory rate (using a conductive, stretchable chord that changes its resistance as it contracts), and movement (using an accelerometer/gyroscope) can be made over time and wirelessly relayed to a base station. The base station receives the data, plots the output, and saves it for the user to review later. Data plotted over time can give information of the quality of sleep.

2. Image Processing/Software Engineering: Circuit Analysis

This project is basically a software-based project that uses a cell-phone's camera and some image processing to automatically analyze simple circuits on a breadboard. The image of the circuit would be segmented, parsed, converted to a SPICE script, and then sent to SPICE software for analysis. The student's software could then use the SPICE results to overlay the circuit image with voltages and current flows, just like my PowerPoint slides in the course notes of EE 210.

3. Voice-activated wheelchair controls

The goal of this project is to develop a voice-controlled wheelchair to assist physically handicapped persons. The user would be able to control the wheelchair by voice commands such as move forward, backward, stop, and recline the chair. A major challenge to overcome is ensuring the controls are locked to the user. In other words, commands coming from background noise should be ignored. This project requires a basic knowledge is voice recognition, however, open-source voice recognition libraries are available online.

4. Golf swing Analyzer

Design a putter to be able to calculate a target head velocity based on a hole distance entered by the user. The putter can then display how close the user's practice swings are to the target velocity. Additionally, the putter could analyze if the putter's head is perpendicular to the swing. This system would likely be based on an accelerometer/gyroscope to monitor the swing dynamics.

5. Human Lie Detector

This project involves building a portable lie detector that takes multiple physical measurements to determine the emotional state of the user. The emotional states can be detected by heart rate, facial flushing, acceleration and trembling hands, and also an increase in skin humidity (skin resistance decrease).