Project Description

Project Background:
The objective of this group of projects is to create a series of sensors that will measure motion of the human body during rehabilitation and clinical evaluation. Prior work has been done to evaluate a series of sensors capable of performing this measurement.

Problem Statement:
The current team is tasked with creating a system that is capable of measuring the angles between two rigid links in 3-D space with a level of accuracy and precision suitable for clinical use. Anticipating the future application of such a device to measurement of knee flexion and measurement of head tilt in patients with cervical dystonia, the team is also tasked with fully characterizing the current clinical practices to measure these motions and relating those clinical practices to the output of the system designed with this project.

Objectives/Scope:
1. Demonstrate that the device can measure two angles in space.
2. Communicate with base unit
3. Modify existing available test fixtures to provide a test bed for future devices

Deliverables:
- Functional Prototype
- Test rig
- Analytical models for angle calculations
- Bill of materials
- CAD drawing package
- Circuit schematics
- User's Manual

Expected Project Benefits:
- Provide quantitative measures of patient progress
- Provide quantitative measures of effectiveness of treatment
- Provide a test bed for future motion tracking systems

Core Team Members:
- Brittany Bochette – EE
- Lindsey Clark – EE
- Michael Ostertag – EE
- Maya Ramaswamy – ISE
- Andrei Stithi – ME

Strategy & Approach

Assumptions & Constraints:
1. The device will communicate with the base unit being developed in parallel with this project (P11010) using an interface agreement defined with both teams’ approval.
2. The device will only measure rotational degrees of freedom.
3. The team’s budget for development of this prototype is $1000. This can be negotiable, with appropriate justification.

Issues & Risks:
- Project Issues/Risks/Constraints
  - Unfamiliar areas of study needed for this project
  - Misinterpreting information from clinicians.
- Available Resources
  - Lead Time
  - Parts not in stock
- Device Issues
  - Accuracy will not be acceptable to end users
  - Errors introduced by inconsistent placement of the device(s) on a patient.