KineJax

Mentor: Kyle Winfree

Team: Anthony Black, Cherie Parsons, Christopher Whitney, Grant Swenson, Jack Jenkins

Team Intro

- Lead: Christopher D. Whitney
- Security Assurance: Anthony Black
- Recorder: Cherie Parsons
- Editor: Grant Swenson
- Release Manager: Jack Jenkins

Client: Kyle Winfree

- Education:
  - PhD, Biomechanics and Movement Science, University of Delaware
  - MSE, Robotics, University of Pennsylvania
  - BS, Physics, Northern Arizona University
- Uses wearable devices to measure and improve health care
- Interested in studying neurological impairments including:
  - Stroke
  - Parkinsons
  - “Locked-in” Syndrome
- Data analysis & machine learning algorithms to diagnose conditions

Background

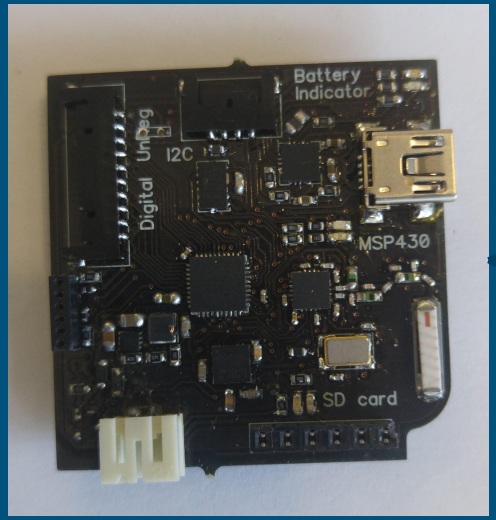
- Approximately 500,000 people in the US alone have Parkinson’s disease
- Over 20,000 have Amyotrophic Lateral Sclerosis
- Over 400,000 have Multiple Sclerosis
- One in every 360 children have Tourette Syndrome
- Approximately 10 million Americans have essential tremor
- All of these disabilities cause mobility issues

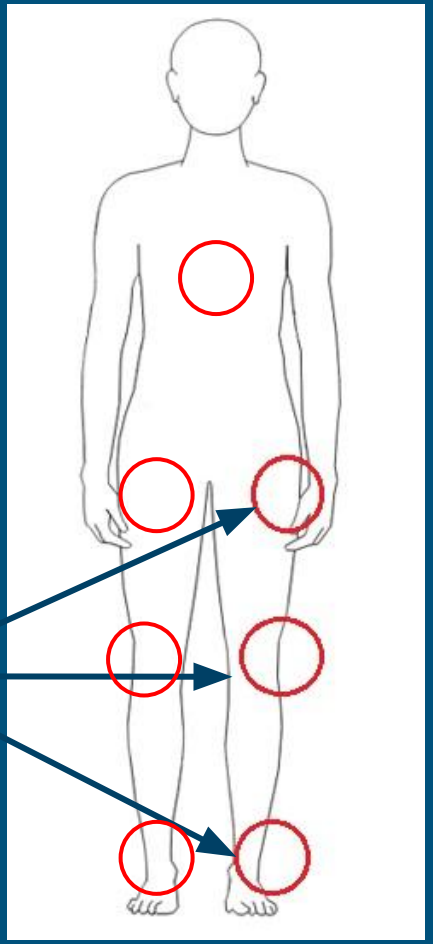
Current Limitation

- Current data collection methods of individuals with mobility impairments are extremely limited
  - Require clinical examinations
  - Examinations are timely to set up and perform
  - Limited in the scope of measureable activity (i.e. number of steps)
  - Can’t evaluate different treatments
- These clinical examinations do not tell the full story of the individual's activity which can lead to inadequate treatment

The Solution: KineTrax

- A meshed network of wearable devices that can log individual's gait over an extend period of time
- Collect up to a month of data at a time
- Inexpensive compared to usual lab techniques





Plan of Action

Methods:

- Weekly meetings with sponsor
- Weekly group lab development (Kanban)
- Bi-weekly reviews
  - Code reviews
  - Presentation review
  - Documentation review

Semester Objectives:

- Prototype wireless network
- Prototype device time synchronization
- Prototype GUI (processing.org)
- Prototype data logging
- Initial validation test using NAU's Human Performance Lab

In Summary...

Sponsor: Kyle Winfree

Problem: Millions of people worldwide suffer from walking impairments

Solution: The KineTrax project will allow doctors to collect essential data required to better treat these patients

“I think in this century we’ll largely eliminate disability through a sophisticated machine-human interaction”

- Hugh Herr, 2010