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- Device attached to a shirt, encouraging mobility and ease of use.
- Accelerometer and flexometer work together to help ignore noise.
- Updates clients to their posture in real time.



“BUILD A DYNAMIC POSTURE MONITORING DEVICE TO HELP PREVENT BACK/NECK PAIN AND SPINAL DEFORMITIES.”

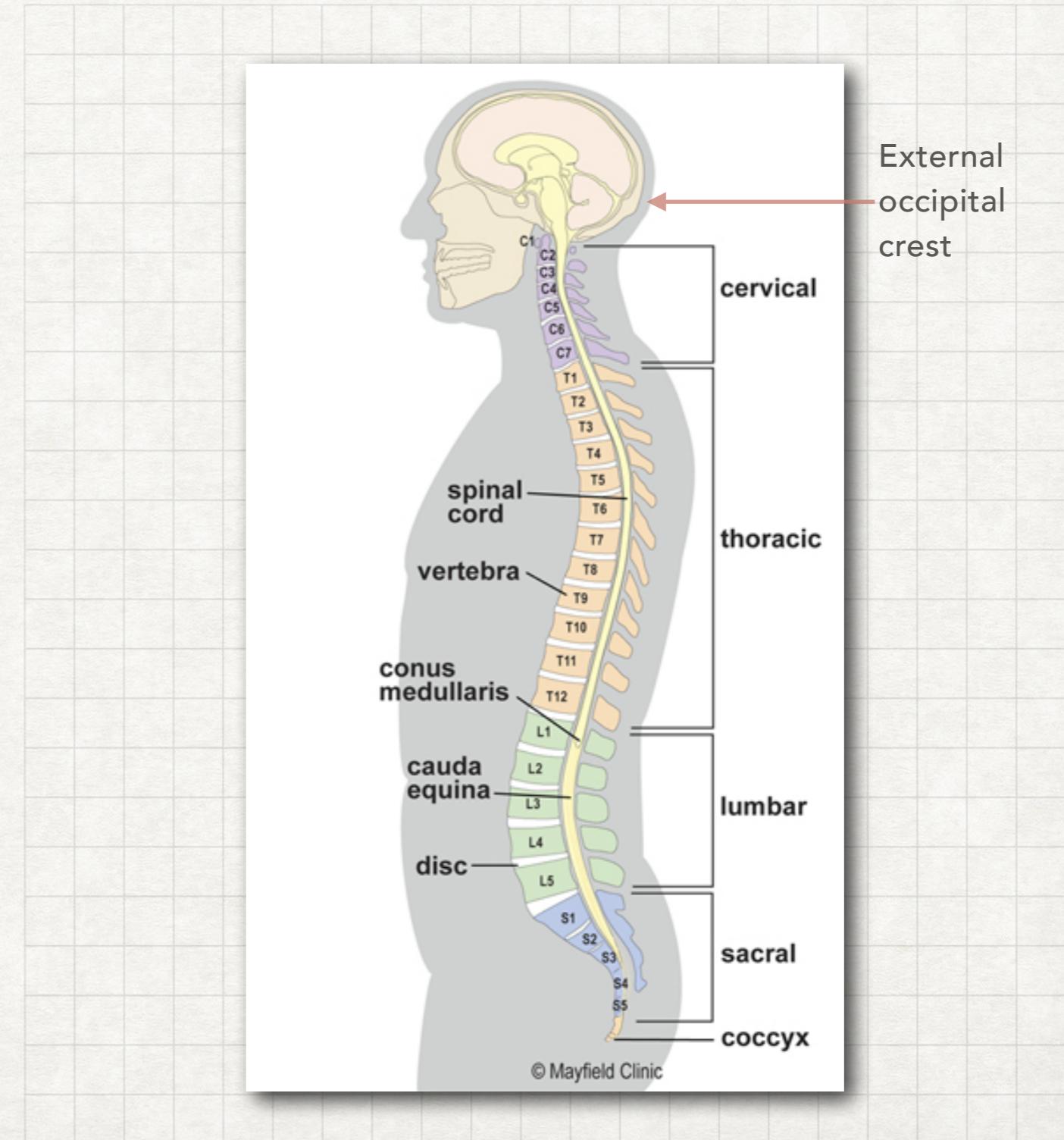


- Our product calculates the position and orientation of your skull, and the curvature of your back to ensure correct posture while standing and sitting.
- This helps protect from back/neck pain and long-term spinal issues.

OBJECTIVES

"BUILD A DYNAMIC POSTURE MONITORING DEVICE TO HELP PREVENT BACK/NECK PAIN AND SPINAL DEFORMITIES."

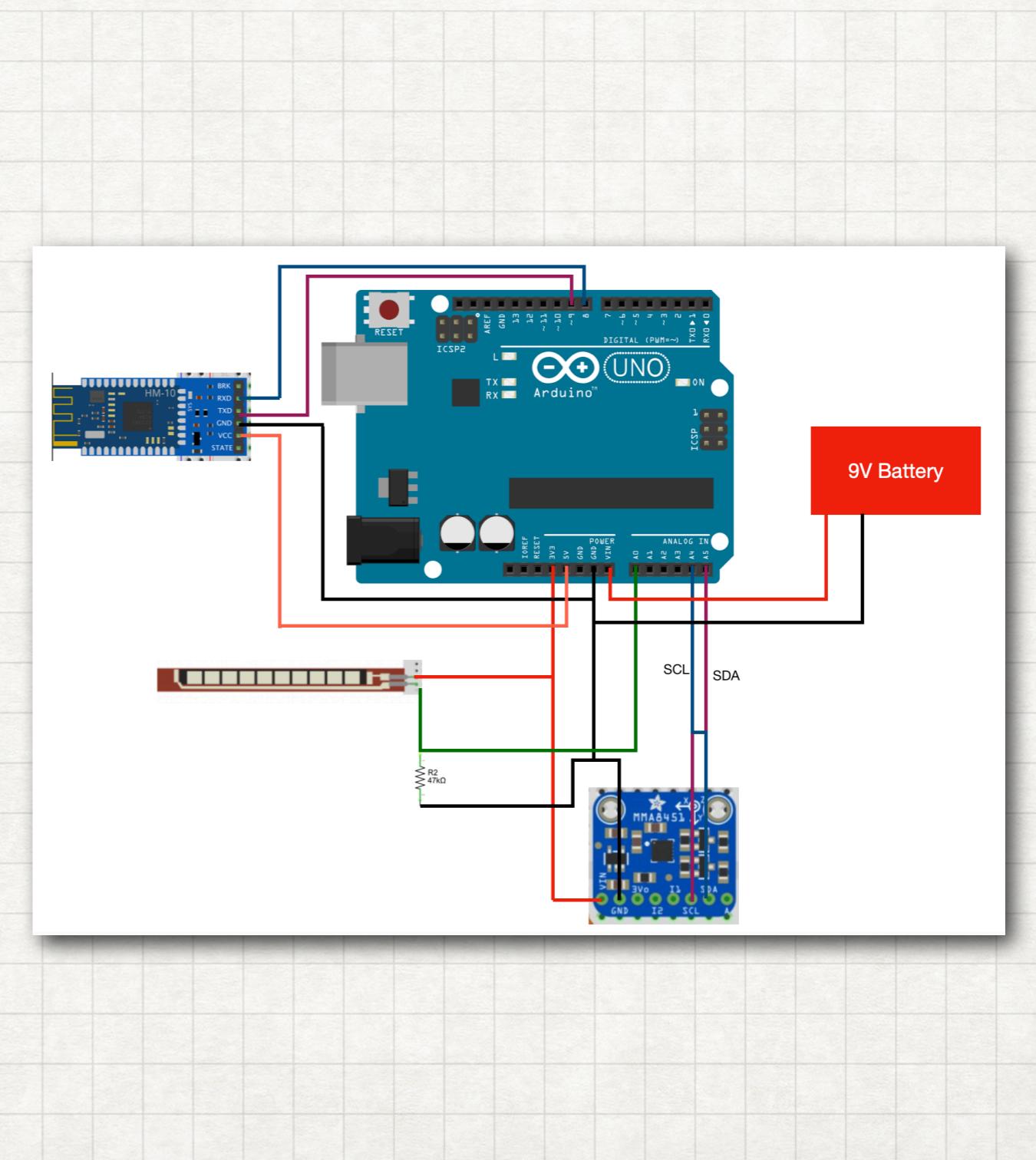
1. Define the areas that we will measure:
 - A. Flexometer: curvature of the lower thoracic region of the spine (T7~T12).
 - B. Accelerometer: orientation/motion of the skull (rear of the skull below the external occipital crest)
2. Build hardware to measure and output this data.
3. Build software for a mobile app to prevent the client adopting poor posture.



HARDWARE

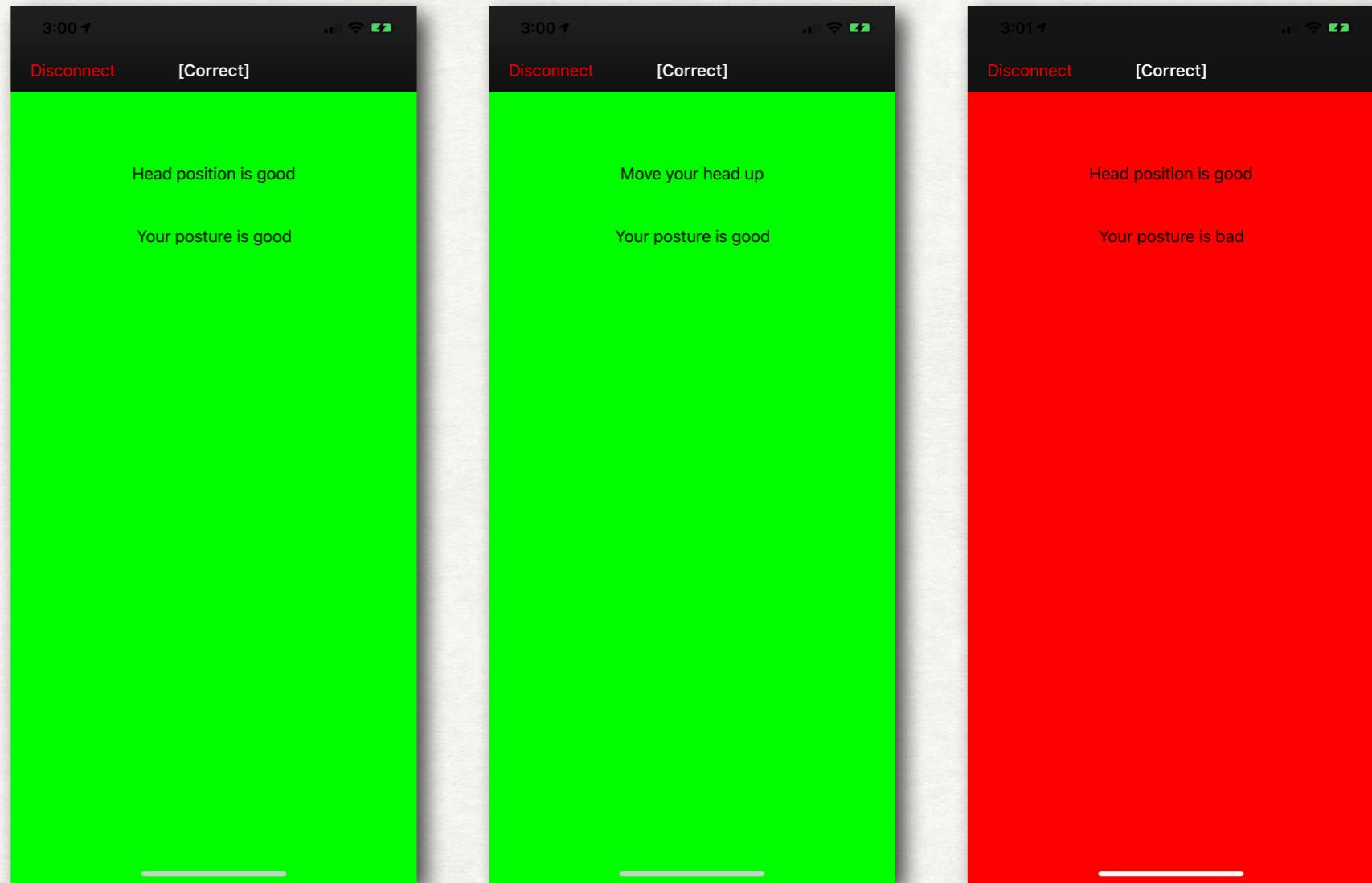
ARDUINO

- HM-10 Bluetooth: Sends one chunk of data every 10 ms.
- Accelerometer: Measures acceleration in three dimensions, and outputs floats. This is used to identify head tilt, neck flexion, and slouching.
- Flexometer: Measures the angle of the curvature of the back, and outputs an integer. This is used to identify slouching.



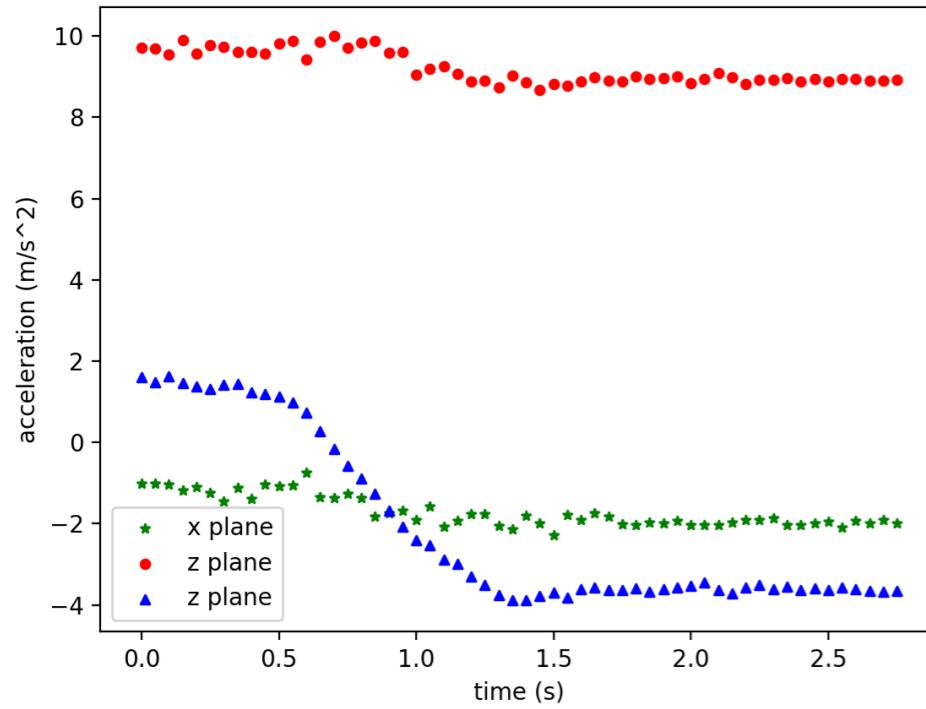
SOFTWARE MOBILE IOS APP

- Swift 4.1 used to write the frontend
- Connects to Arduino via bluetooth
- Uses mathematical equations to calculate best posture from both sensors



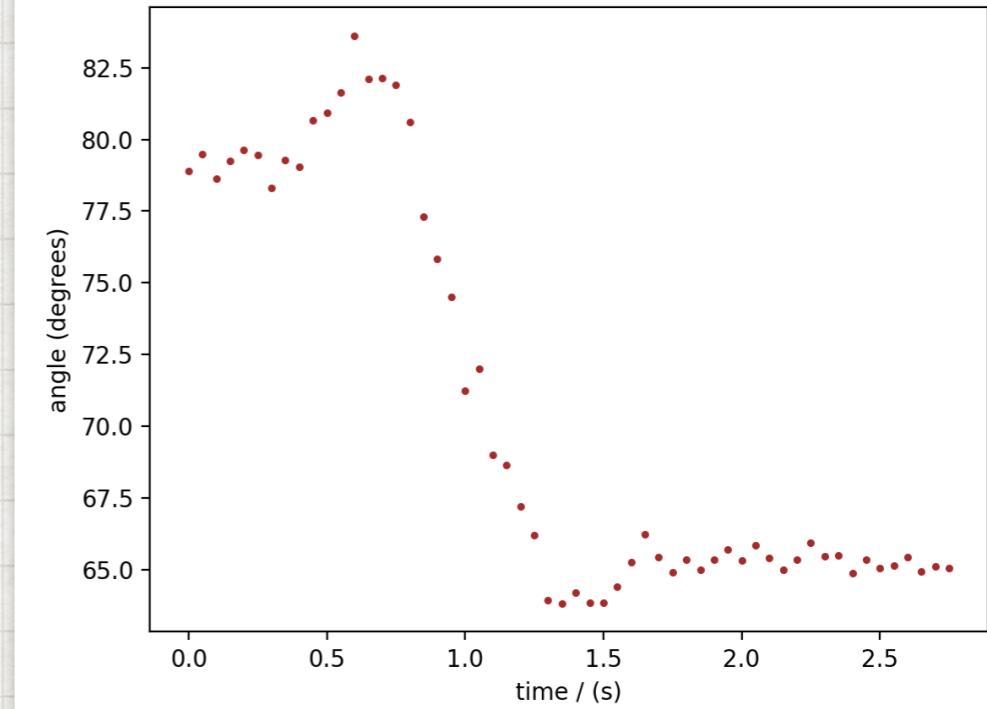
ACCELEROMETER

Single Nod - accelerometer data

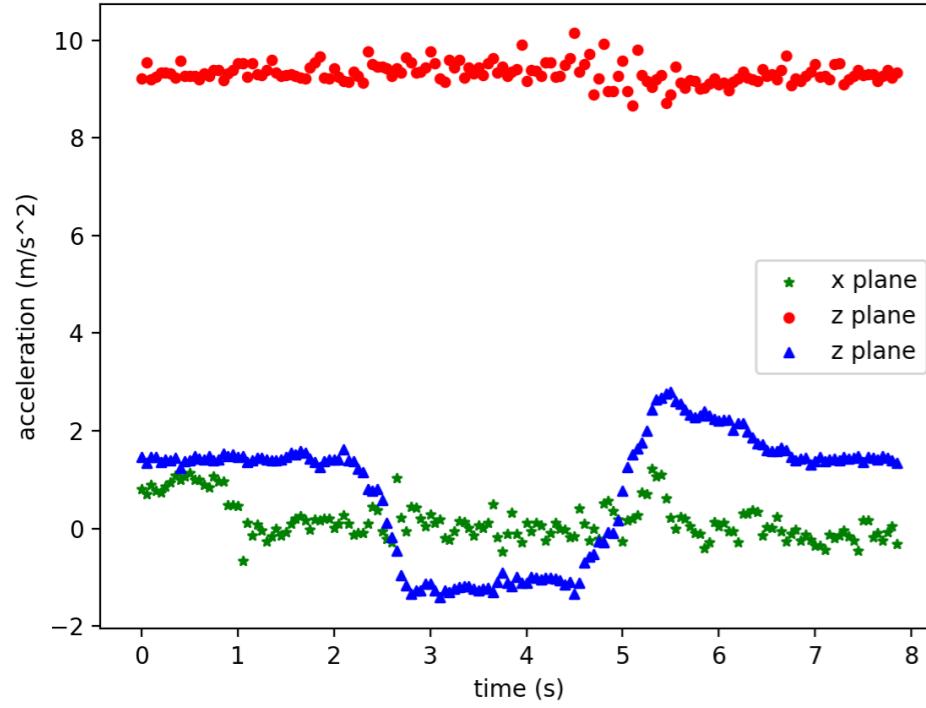


$$\beta = \tan^{-1} \frac{a_x}{\sqrt{a_y^2 + a_z^2}}$$

Single Nod - Neck Flexion Angle

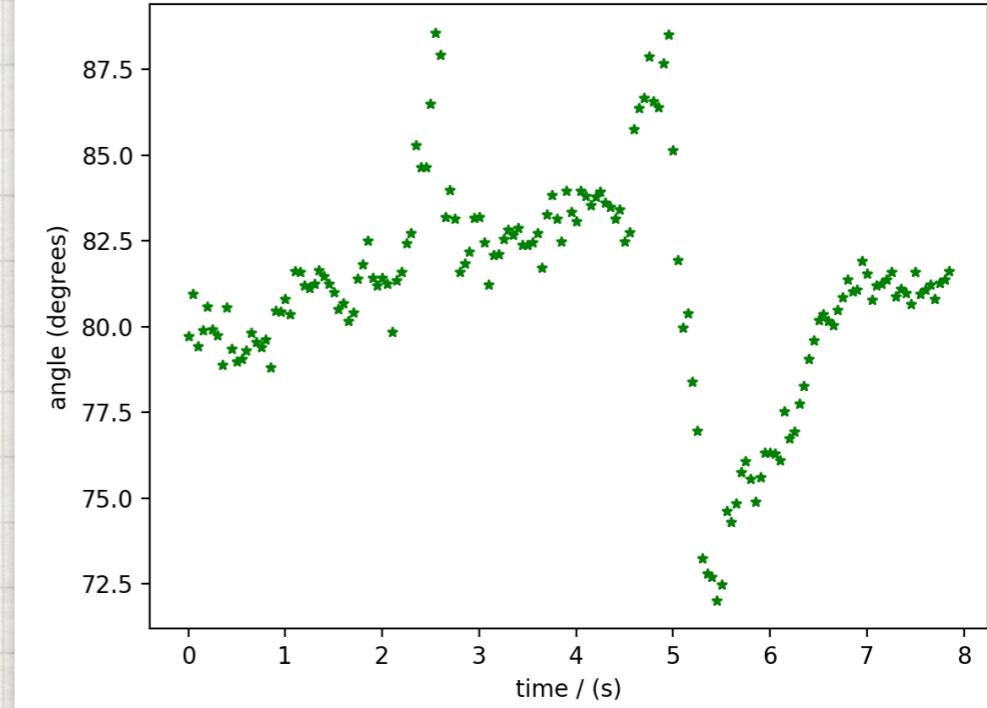


Hunch - accelerometer



$$\beta = \tan^{-1} \frac{a_x}{\sqrt{a_y^2 + a_z^2}}$$

Hunch - Neck Flexion Angle



FUTURE WORK

- Wireless accelerometer & flexometer
- Miniaturisation of microprocessor system
- Apple watch support
- Improved packaging of components in shirt
- Headband + t shirt bundle
- More functional iOS app with multiple modes for exercise
- Strong adhesives for flexometer
- Calibration of devices for each user