Gait Predictive Model

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Our Plan: two-part gait analyzation

Part 1: Accelerometer

- “Physics toolbox accelerometer”
- Used to quantify g-force over time
- Shows the specific acceleration patterns a specific person’s gait

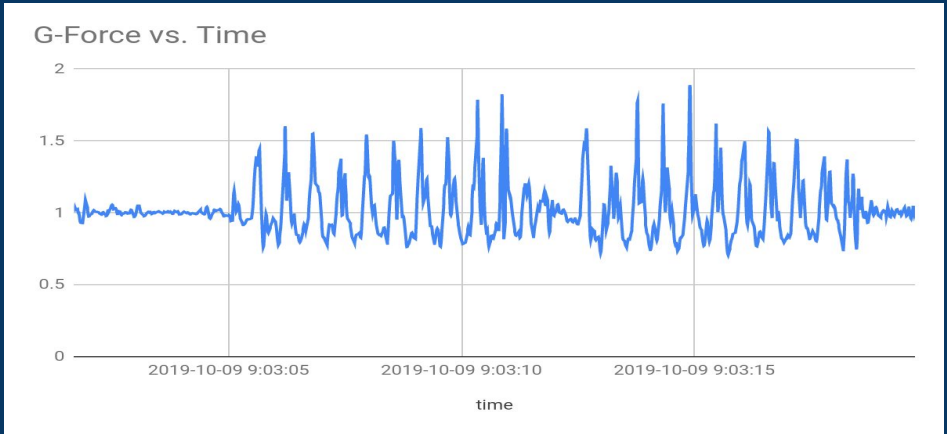
Part 2: Physical Gait Analysis

- use of markers to measure other gait components such as:

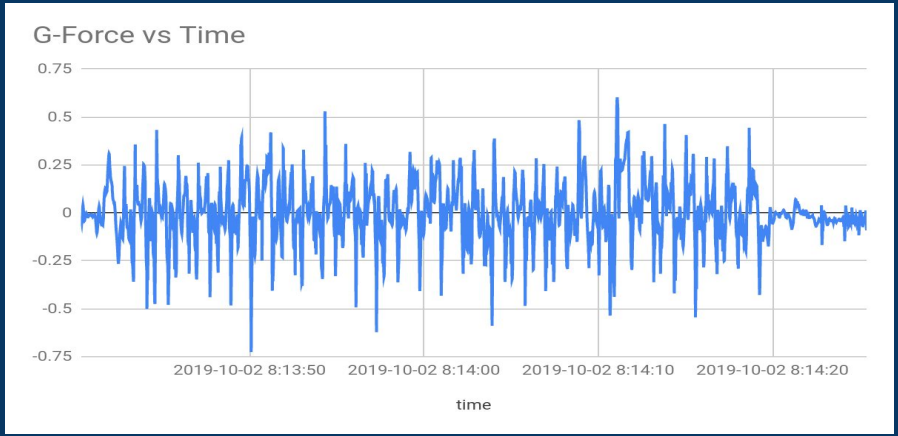
  -stride length

  -degree of movement during various stances of the walk

Graph #1



Graph #2



- Analyzing these graphs can let us predict who is taller and heavier
- Graph #1 has a peak of almost 2 G's
- Graph #2 has a peak of around 0.6 G's
- Generally, the individual's graph with the higher G-Force will be taller and heavier

Step I: Measurements

Taking precise measurements will help us model an individual's gait later on.

	matt	jill	thomas	josh
height	180.34	162.56	172.18	187.96
hip hieght	104.14	39	99.06	99.06
knee height	56	45.72	53.34	58.42
shoulder height	153	132	149.86	152.4
hip width	35.56	34.29	33.02	39.37
shoulder width	45.72	36	40.64	48.26
arm length	70	62	68	69.85

*we also noted preexisting conditions/injuries that may have and effect on gait

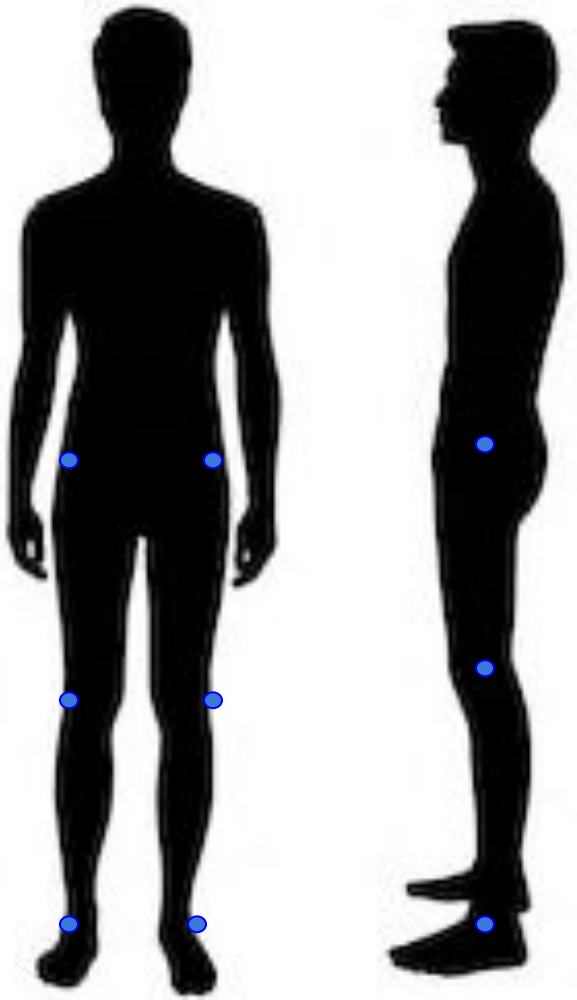
Step 2: Record gait on video

- Each group member wore markers on the midpoints of the ankle, knee, and hip
- All walked a 10 foot distance in a straight line
- We chose to use images from 3 points in the walk:

  -initial middle stance

  -terminal stance

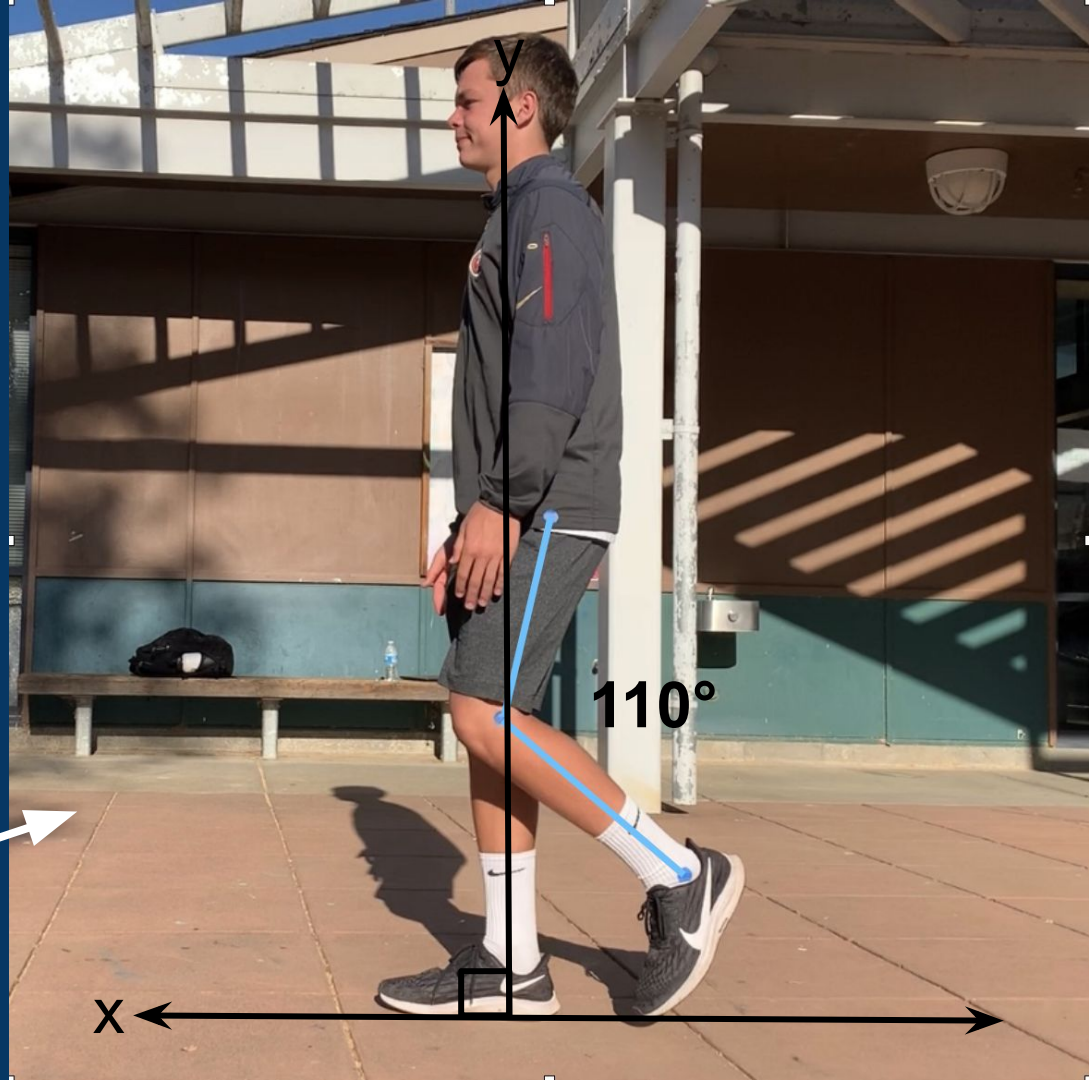
  -secondary middle stancem (opposite)



Initial Middle Stance

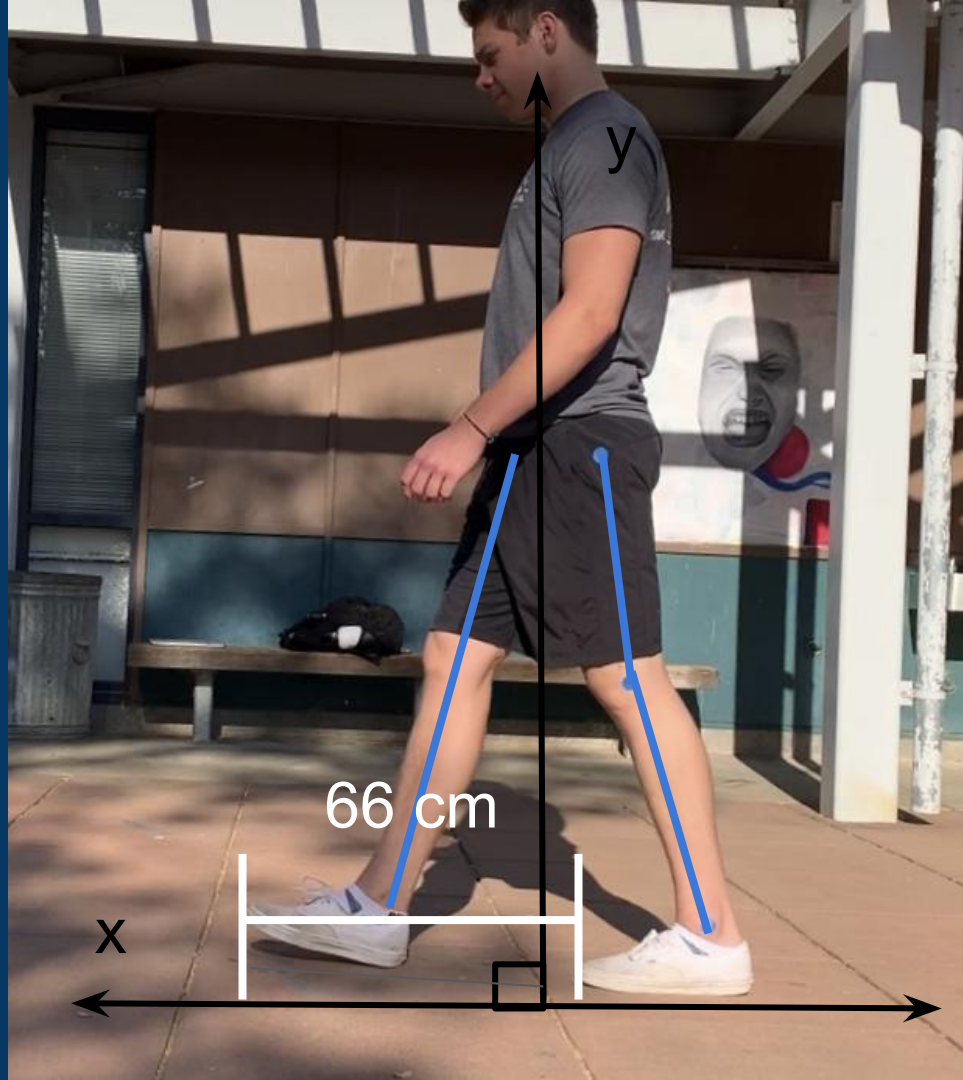
- All weight is on one foot
- Standing leg is perpendicular to the ground
- We measured the degree the swinging leg was lifted at this moment
- Shows how much each person picks their feet up when they walk

example



Terminal Stance

- Weight is distributed between 2 feet
- Feet are at max. distance apart at this position
- Stride length is measured here (toe to toe)



Secondary Middle Stance

- All weight is on one foot
- Standing leg is perpendicular to the ground
- Measure degree if lift on opposite leg
- Allows us to analyze gait symmetry

Results & drawn conclusions

Josh's gait lacks symmetry because of knee injury

	matt	thomas	jill	josh
deg. of lift-initial	110	165	140	152
deg. of lift-2nd	112	170	145	180
stride length	60 cm	72 cm	49 cm	66 cm

Matt picks up his feet a lot when he walks

Jill takes short steps

$$h = \frac{(3.31f)+(2.87l)}{2}$$

- Average correlation of height as related to stride frequency and length
- Let f = stride frequency
- Let l=stride length
- Use of 2 types of data improve the accuracy of the equation
- Coefficients can be tweaked for accuracy with the addition of more raw data

Thank you! >