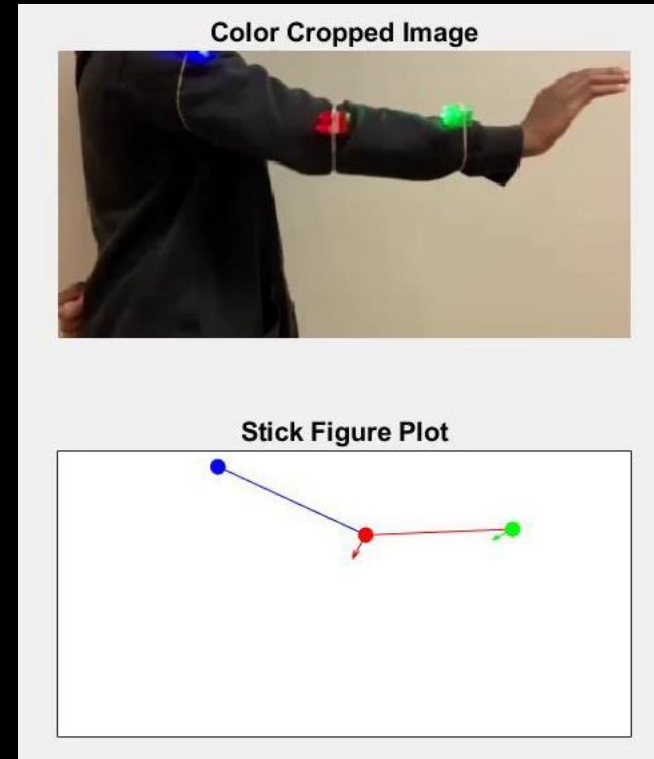
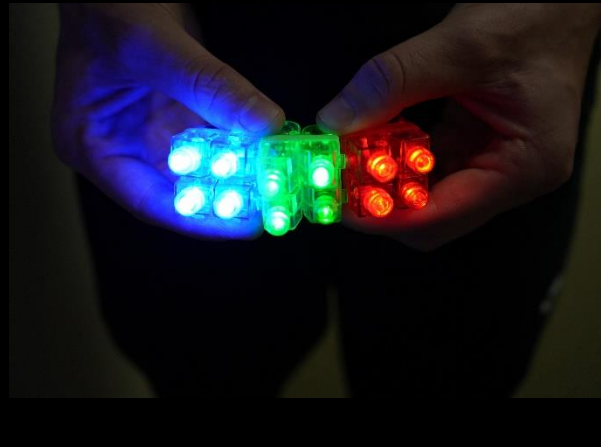


DIY Motion Capture



Naji Husseini, nshusseini@ncsu.edu

Joint Department of Biomedical Engineering at UNC Chapel Hill and NC State University

Pain!

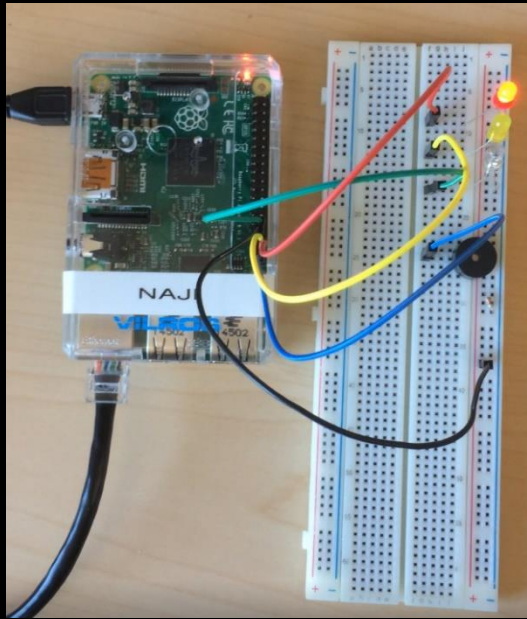
- Intro programming classes are disconnected from real world
 - No data collection
 - No data output
 - Low interest and ownership
- Many general engineering programming classes don't use BME applications

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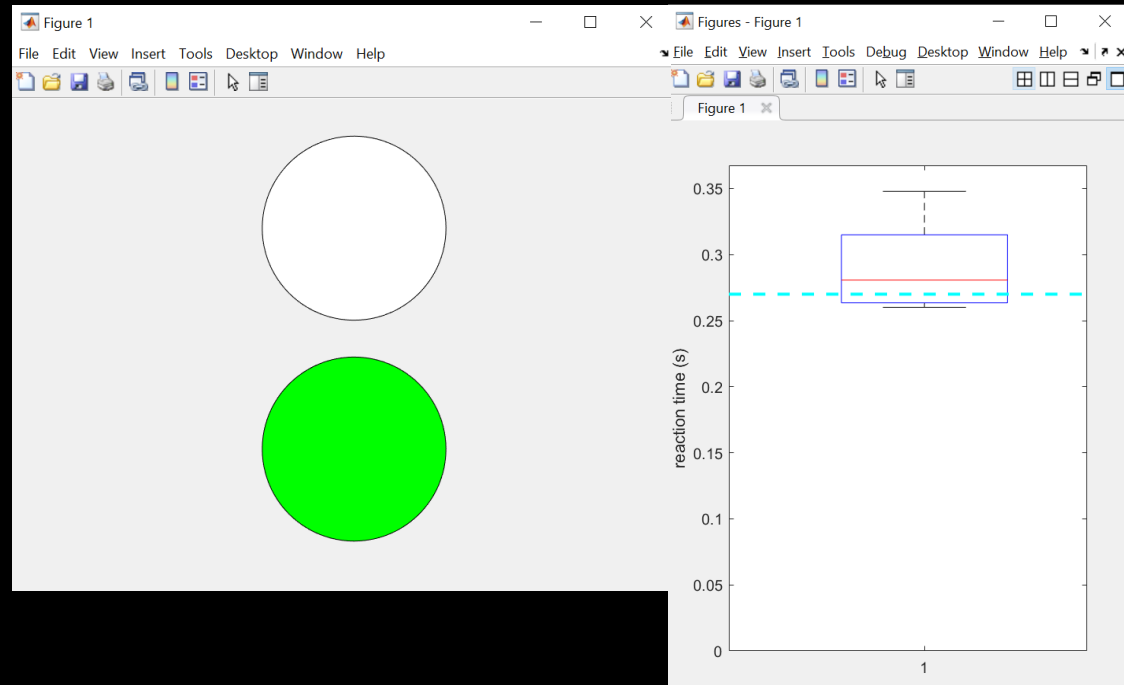
Solution: practical in-class activities early and often

Stoplight

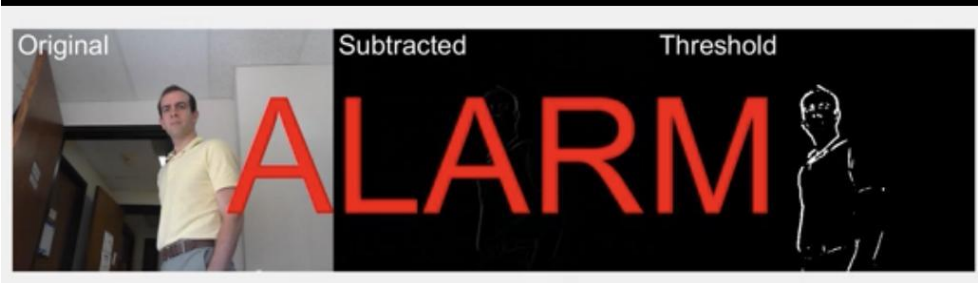


Examples

Reaction test



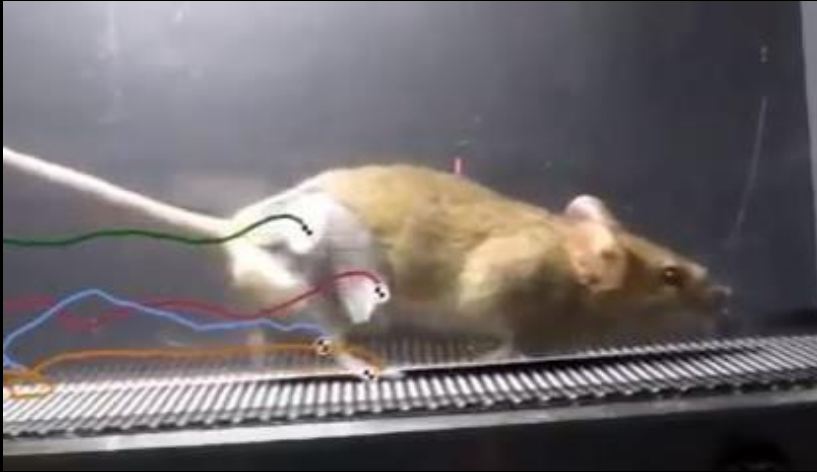
Motion detector



N.S. Husseini, I. Kaszubski.
"Incorporating the Raspberry Pi into laboratory experiments in an introductory MATLAB course"
2017 ASEE Annual Conference and Exposition, Columbus, OH, (2017).



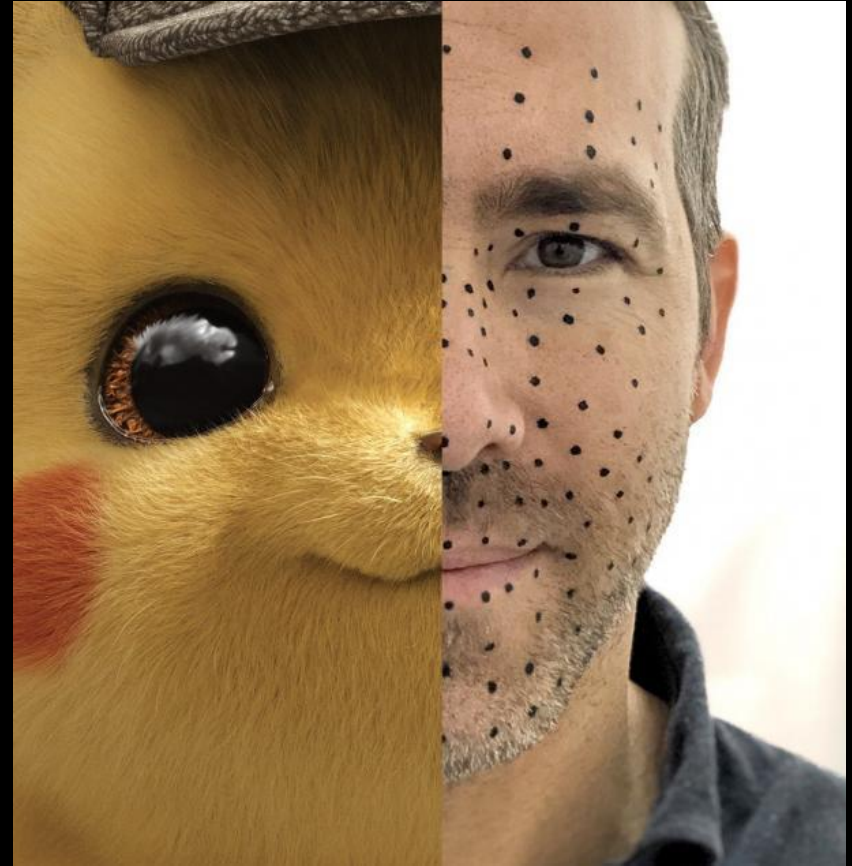
Motion capture



Orthopaedic Mechanobiology Lab, Hanne and Cole, NC State



<https://sporttomorrow.com/6-ways-how-sports-benefits-from-motion-capture/>



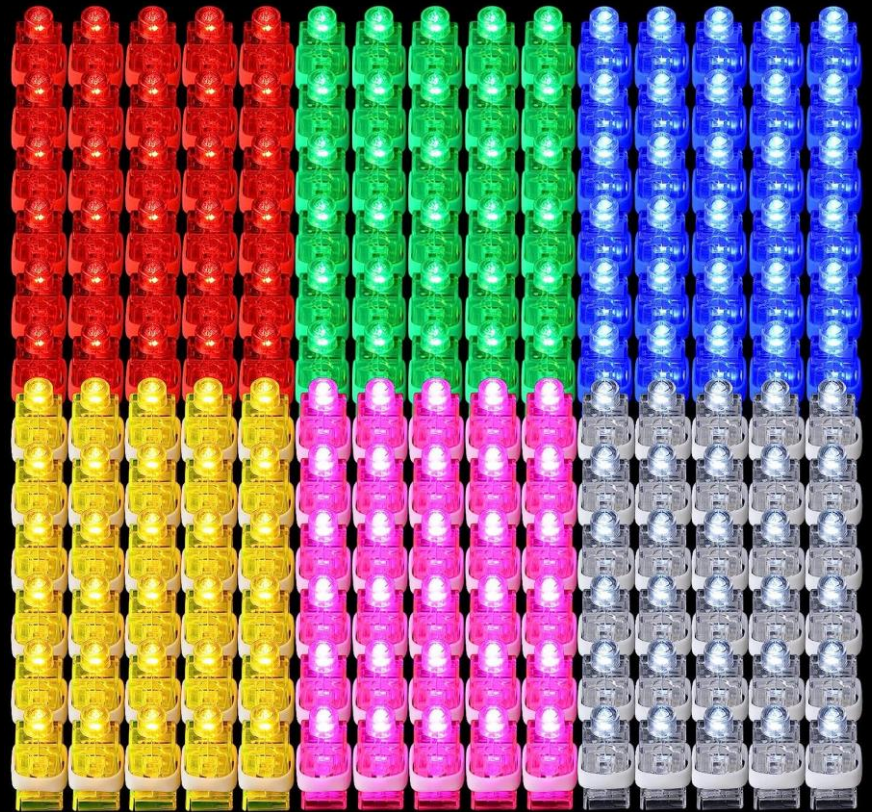
https://www.reddit.com/r/pokemon/comments/ab6acv/ryan_reynolds_shares_behind_the_scenes_image_of/

Motion capture

- Faculty perspective: cheap, “easy,” effective
- Student perspective: fun, creative, visual

Motion capture

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- Needs:
 - Finger lights (~\$30)
 - Rubber bands or tape



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Motion capture

- Faculty perspective: cheap, “easy,” effective
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- Needs:
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 - Video on phone
 - MATLAB or other language



Week 1

- During in-class lab, process instructor-provided video of walking (continues over next week independently)
- Locate joints by segmentation
- Find velocities of joints
- Make stick figure with velocity vectors

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Color cropped image



Thresholded Image



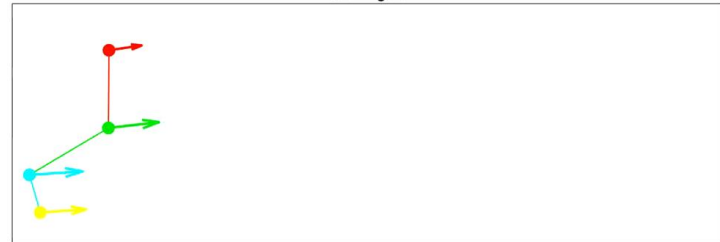
Joint centroids



Color cropped image



Stick Figure

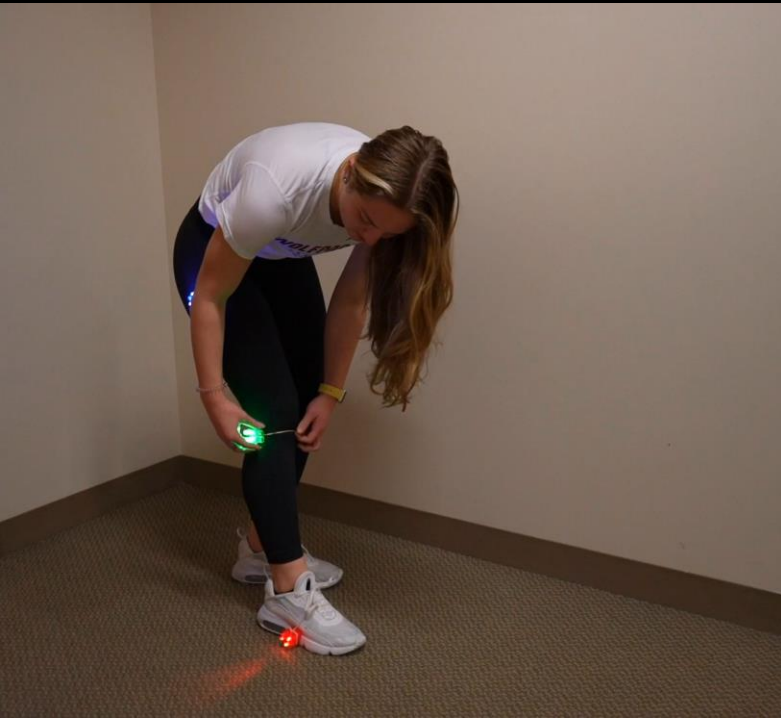


Week 2

- Make own video in class doing any activity
 - Much easier after doing initial video and getting feedback
- Encouraged to be creativity and do action related to hobbies



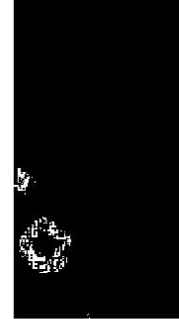
DIY



Color Cropped Image



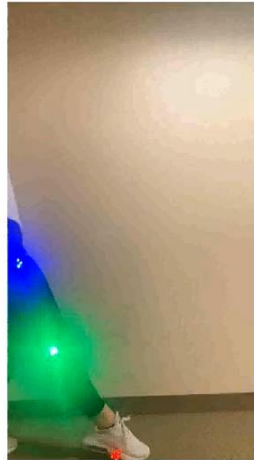
Thresholded Image



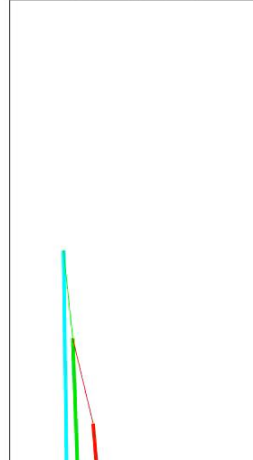
Joint Centroids



Color Cropped Image

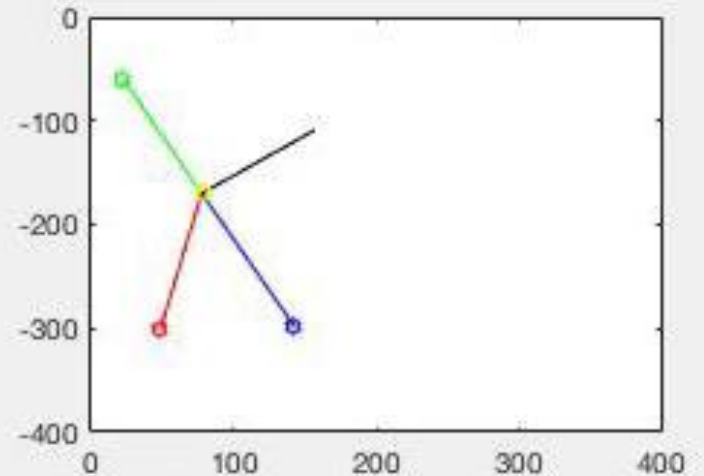
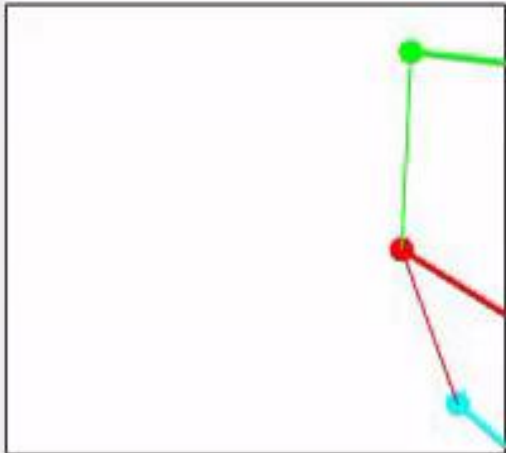


Stick Figure Plot



DIY

Color Cropped Image



Take-home messages

- Introduces curiosity in programming's applications
- Draws connections to hobbies and outside work
- Creates value when they see applications to medical applications, rehabilitation, sports training, etc.

Take-home messages

- Introduces curiosity in programming's applications
- Draws connections to hobbies and outside work
- Creates value when they see applications to medical applications, rehabilitation, sports training, etc.
- Much more fun than “hello world” and simulated EEGs
- Always gets good mentions on course evaluations
- Good visual for job search interviews and portfolios

Naji Hussein
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