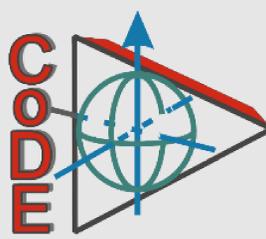




# Design of a Phone Based Pulse Oximeter

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## Diabetes



Figure 1: Diabetes statistics [1]

- For the past 100 years, we have has the ability of externally regulating blood glucose
- Models of the blood sugar levels exist but require blood oxygenation levels [2]
- Using these models we can automatically regulate blood glucose
- Current devices for measuring blood origination levels require specialized hardware [3]

## Physics Behind Setup

- As light passes through the finger its absorption is a function of: blood, skin, etc.
- Different chemicals dissolved in the blood change the absorption spectrum.

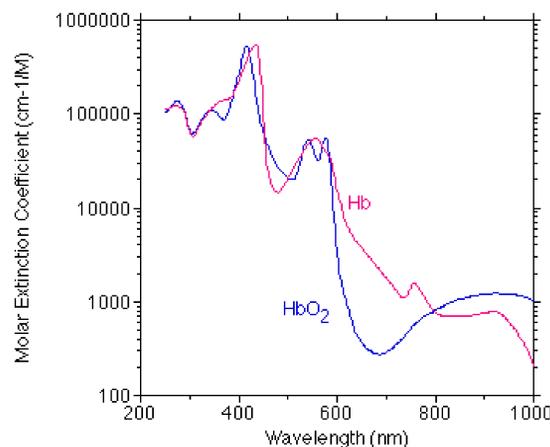


Figure 2: Absorption of oxygenated vs deoxygenated blood[4]

## Phone hardware

- This project attempts to use a smartphone without additional hardware to measure blood oxygenation level
- The phones flash is used to provide constant illumination
- The phones camera is used to collect light in the red, green and blue spectrum

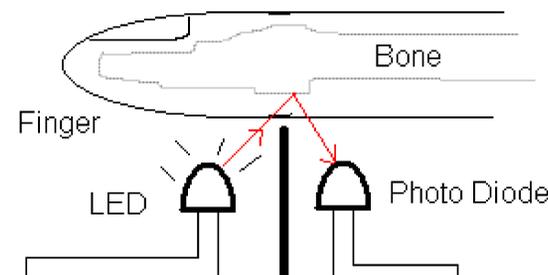


Figure 3: Figure of light passing though the finger [5]

## Mathematical Test

- Averaging several nearby pixels to reduce noise
- Use green pixels to detect proper placement of finger on device
- Ratio of Blue to Red pixel to determine signal intensity
- Signal intensity over time provides exertion level and blood oxygenation

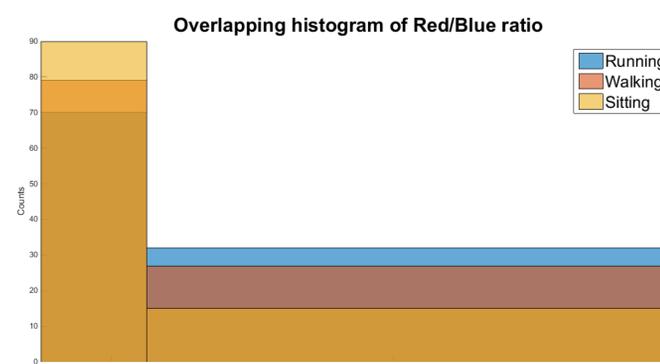


Figure 4: PBOM discerning between different activity modes

## Future Work

- Testing is required to determine
  - Accuracy and Precision of percent oxygenation characterization
  - Robustness to personal factors like skin color and different phones
  - Human testing requires IRB approval
- Improving stability
- Incorporate movement data collection and pulse tracking to improve sensitivity

## Acknowledgments



# CURCA

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