# Heart Rate Determination

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# Problem

- We saw in Shwetak Patel's work that common sensors in cell phones can be effectively used to sense complex phenomenon
- Record image data and determine the heart rate of that person
- Make the whole process as auotomated as possible

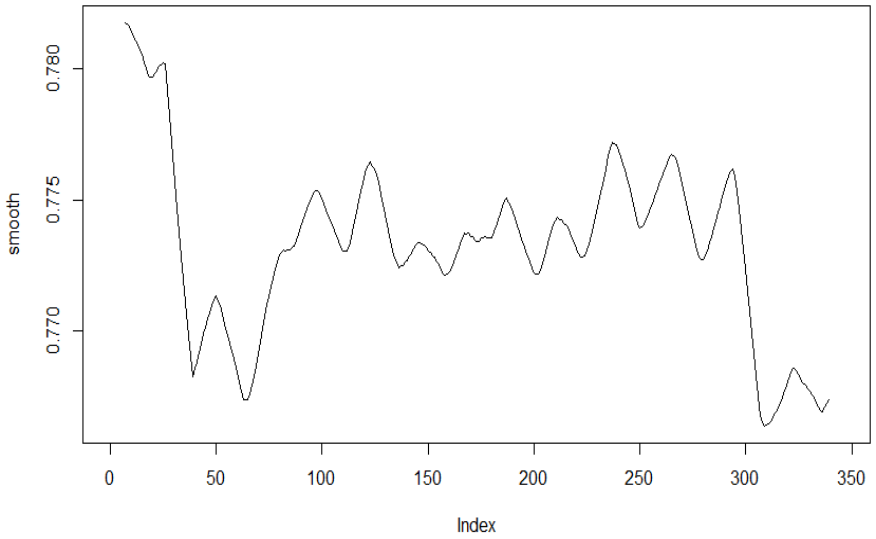
# Measurement and Encoding

- To measure Jon’s heart rate, he had to put his finger over a camera and record his finger for 10 to 15 seconds
- He did this in 3 different scenarios
  - Resting state
  - Holding his breath
  - Running
- Broke videos down into frames
- Converted the red in each pixel into percentage values

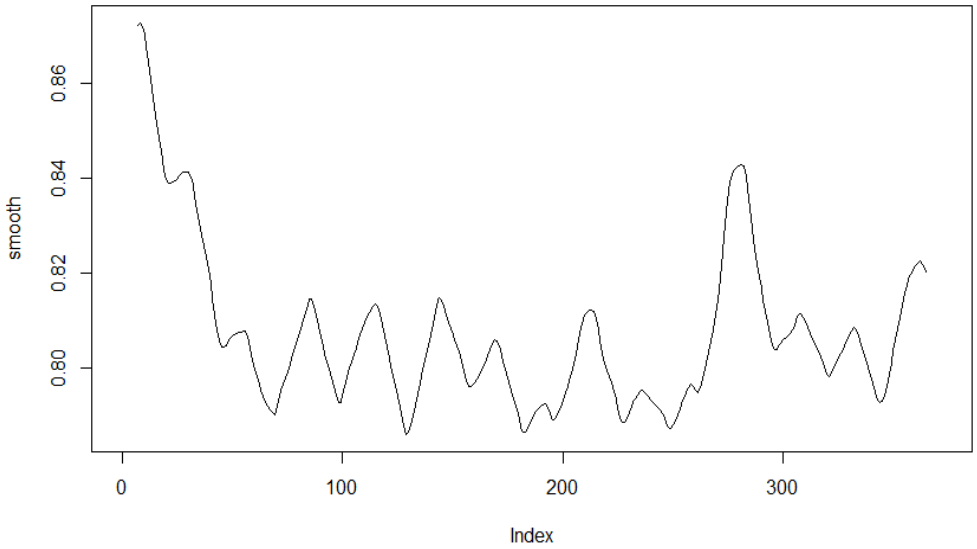
# Cleaning and Exploring

- Made vectors of the means of red pixel values in each frame
- Graphed vector to get curves representing possible heartbeats
- Smoothed curves to get more concise graphs
- Used graphs to find heart rate

# Resting Heart Rate

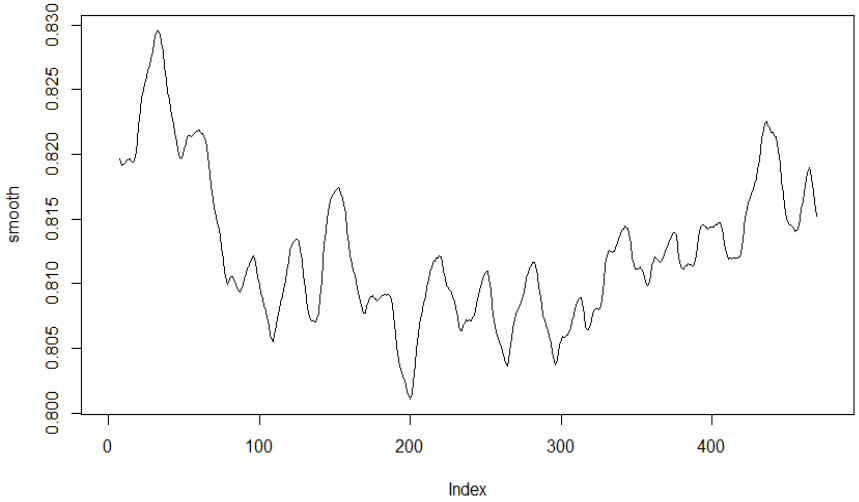



13 beats
12 sec video
heart rate of 65 BPM

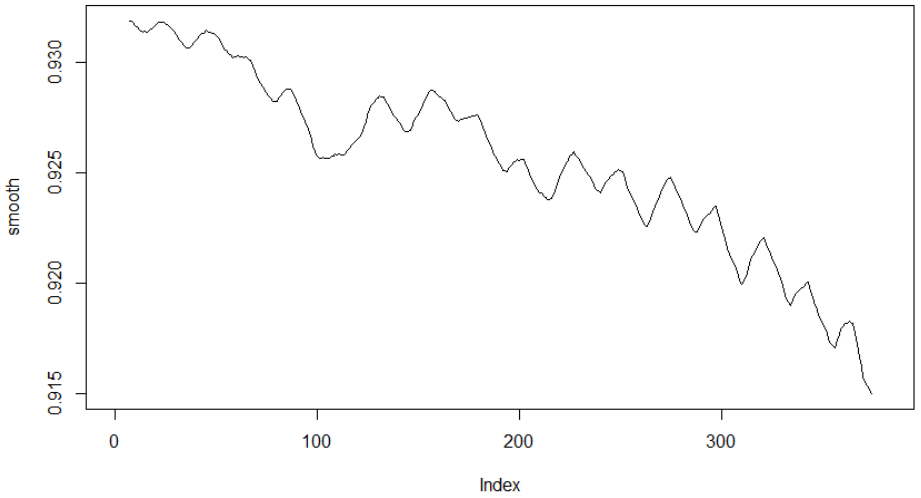



15 beats
12 sec video
heart rate of 75 BPM

# Breath Holding Heart Rate

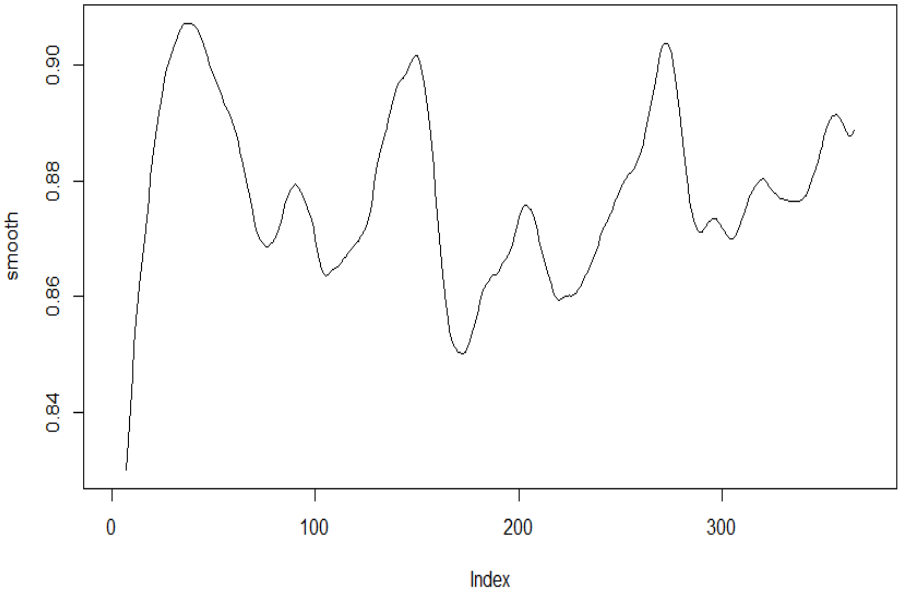


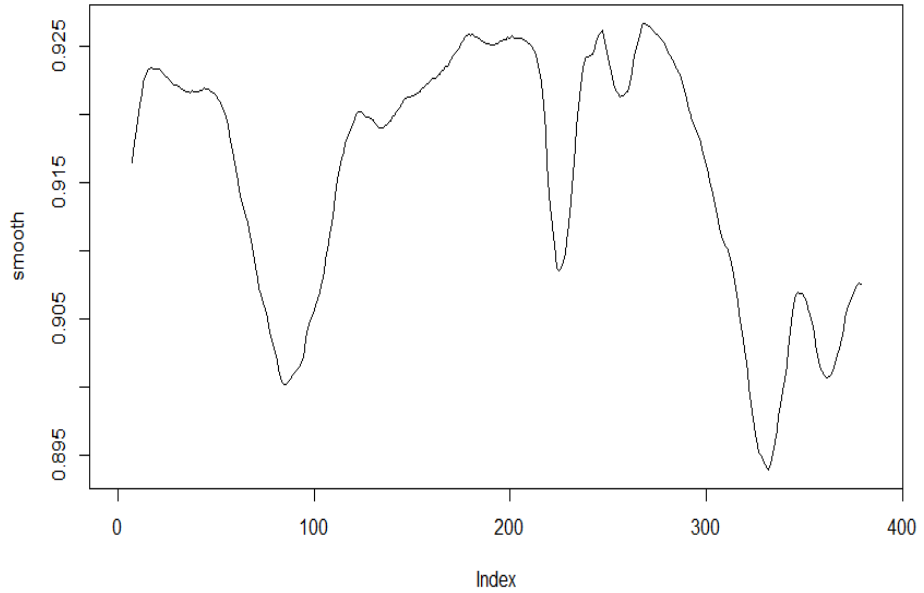

28 beats
16 sec video
heart rate of 105 BPM



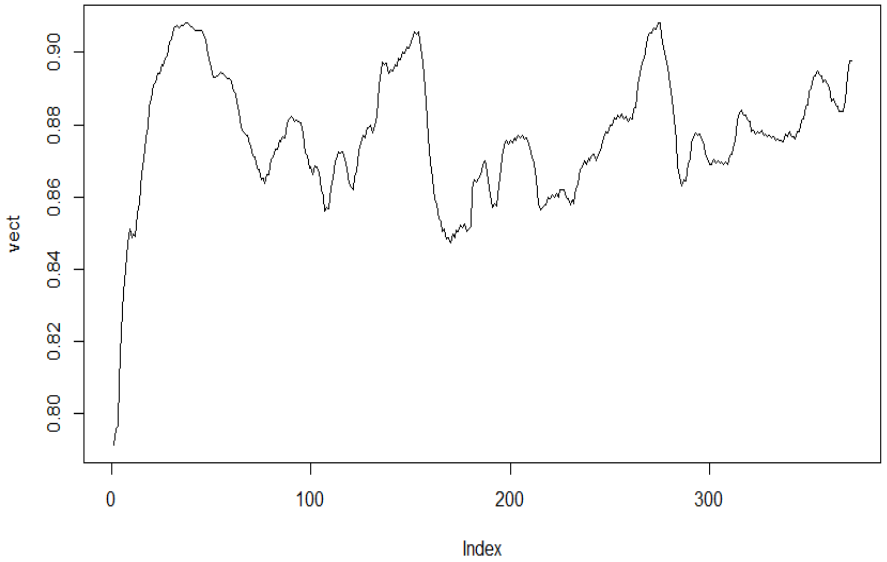

18 beats
13 sec video
Heart rate of 83 BPM

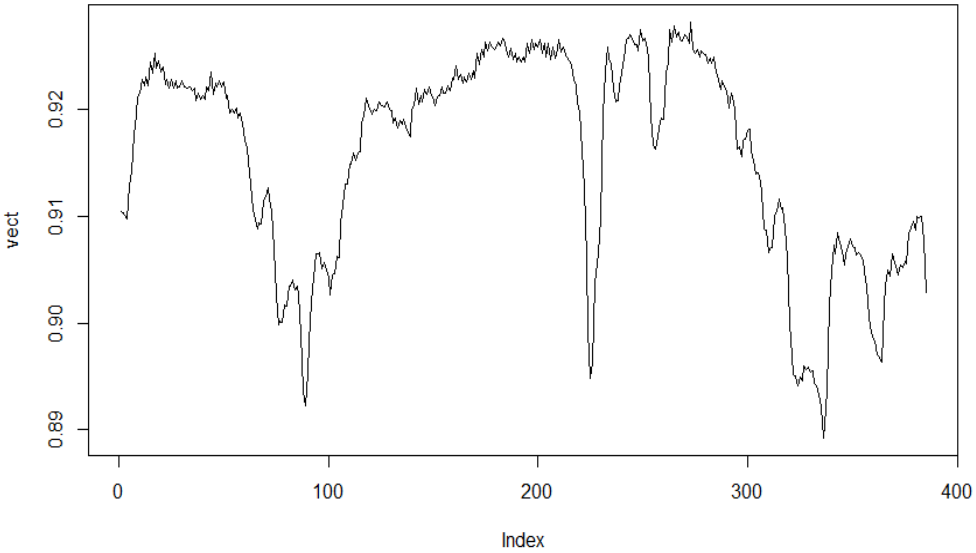
# Running Heart Rate - Smooth



# Running Heart Rate - Unsmooth




21 beats
13 sec video
Heart rate of 96 BPM

16 beats
12 sec video
Heart rate of 80 BPM

# Solutions, Causes, and Policy

- Monitors for heart conditions
- Health apps
- Crop monitor