# Wrist Actigraph Based Sleep Cycle Alarm Clock

Shiyue Xu, Dongxiang Mao, Shang Yang
{sx59, dm1154, sy466}@scarletmail.rutgers.edu
Advisor: Dr. Mehdi Javanmard

## Goal
- The goal of our project is to develop a product with application achieving the function that wake up the user in appropriate time. The appropriate time is the time when you get up most refreshing. Also, a line chart is produced based on movement data collected during sleep.

## Motivations and Objectives

### Motivations
- Most of us have the experience that we have enough sleep but still feel dizzy after we get up. Sometimes when we have less sleep but still feel refreshing getting up. We want to find the right time to wake people up.

### Objectives
- Track the movement of users during their sleep
- Predict the optimal time to wake them up based on the alarm clock they set

## Research Challenges
- How to make right prediction when is the exact time waking people up
- How to make hardware part work and transmit data to mobile phone
- How to make the algorithm associate with UI
- How to call alarm function of Android device

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## Methodology
- Collect movement data from gyroscope/accelerator
- Derive the resultant angular speed from raw data
- Filter the background noise in the movement data
- Evaluate sleeping status by moving average formula
- Determine the wake up strategy using support vector classifier
- Draw the sleep status trend chart with Achartengine

## Results
- Use trigonometric function to train the support vector classifier model
- Classify the sleeping score series from 90 minutes before window to the front edge of window
- Determine the wake up time by the result of classify

## References
2. https://www.csie.ntu.edu.tw/~cjlin/libsvm/