

# Bio-Behavioral System to Motivate and Reinforce Heart Health

## Team FitByte

Jake Farrar, Jacob Lemon, Austin Pederson

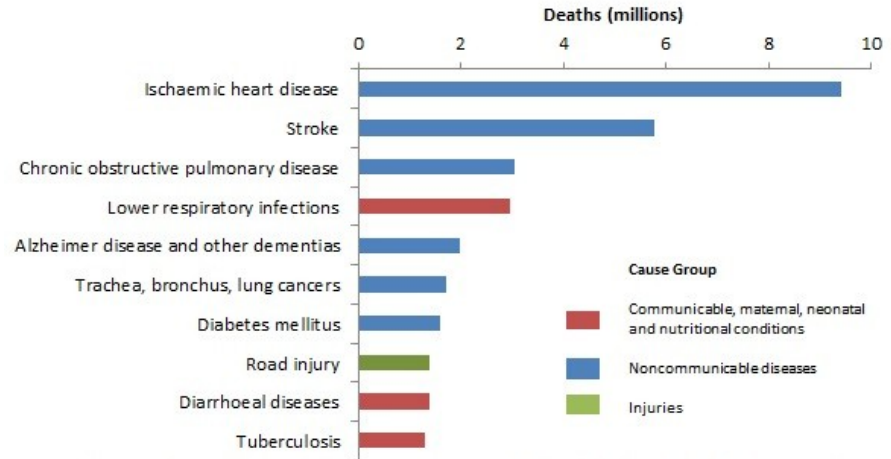
Sponsors: Dr. Kyle Winfree, Dr. Gregory Dominick  
Mentors: Ana Paula Chaves Steinmacher, Dr. Eck Doerry



# Motivation

- Heart Health
- What is Fitbit

Top 10 global causes of deaths, 2016



Source: Global Health Estimates 2016: Deaths by Cause, Age, Sex, by Country and by Region, 2000-2016. Geneva, World Health Organization; 2018.

# Sponsors



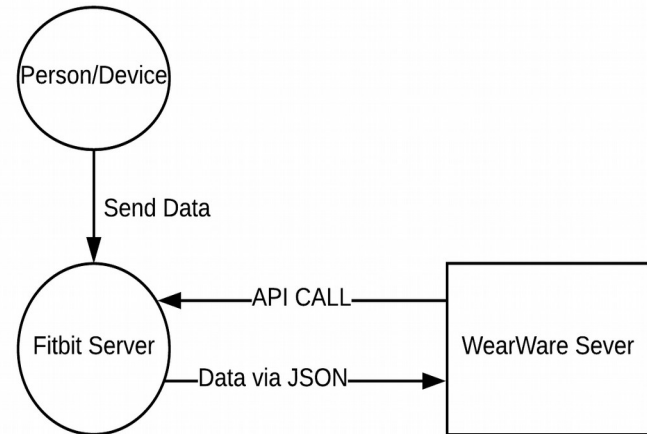
Dr. Kyle Winfree, NAU



Dr. Gregory Dominick, UDel

# Currently Working Product: WearWare

- Developed by former NAU employee, Adam Perrv
- Updated by NAU employee, Mike Fell
- Problems with product
  - Poor UI
  - No Contact Tool
  - Localized
  - Limited Analysis





## Problems



## Solutions

Localized

Poor UI

No Contact Tool

Limited Analysis

API access

Updated WebApp

Notifications

Analysis software used



# **WearWare 2.0**



# Requirements

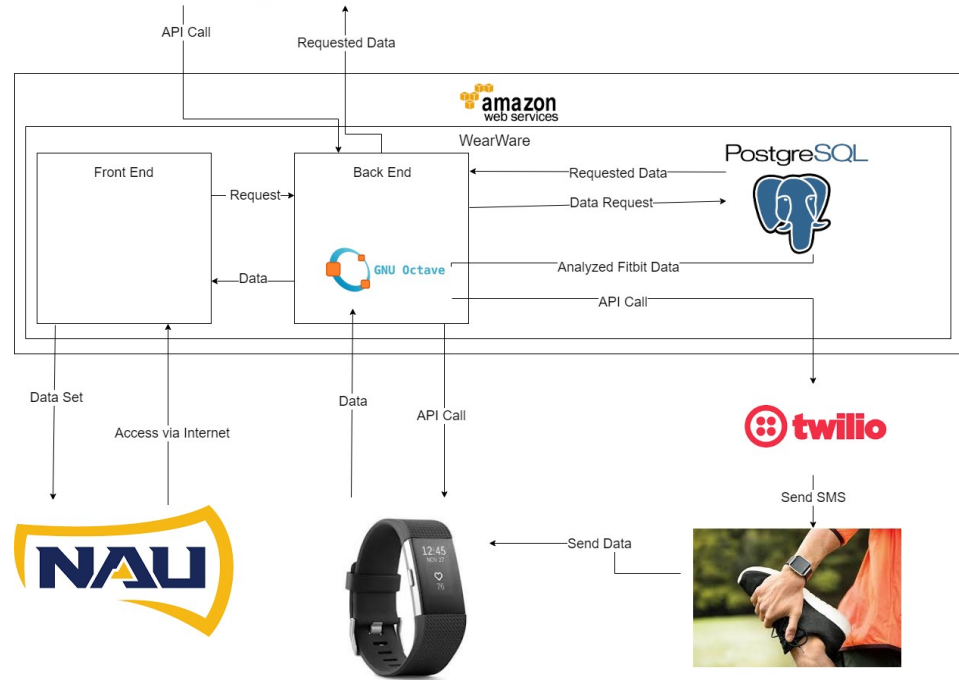
- Collecting and processing Fitbit data
  - Previous Solution
- Messaging functionality
- Study collaboration
- API data transfer
- User friendly application



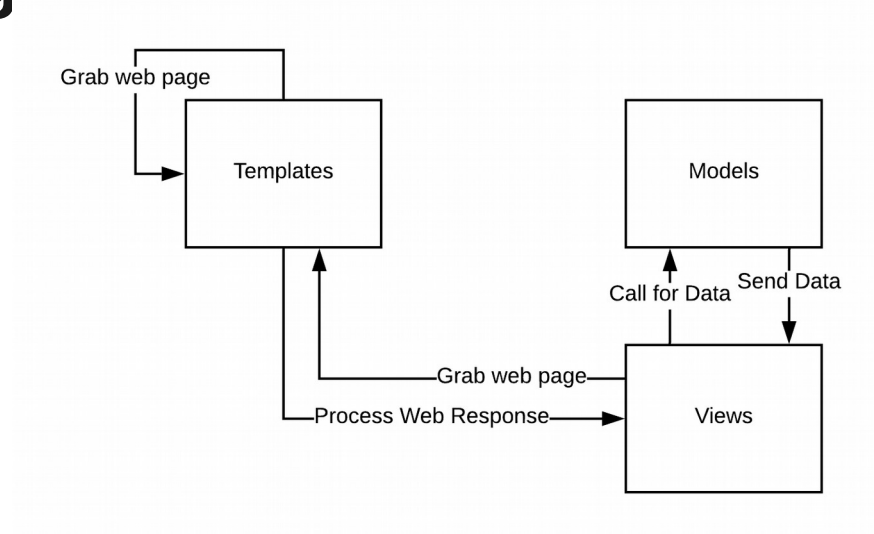
# Implementation Overview

- Amazon Web Services
- Django Web Framework
- PostgreSQL
- Octave
- Twilio



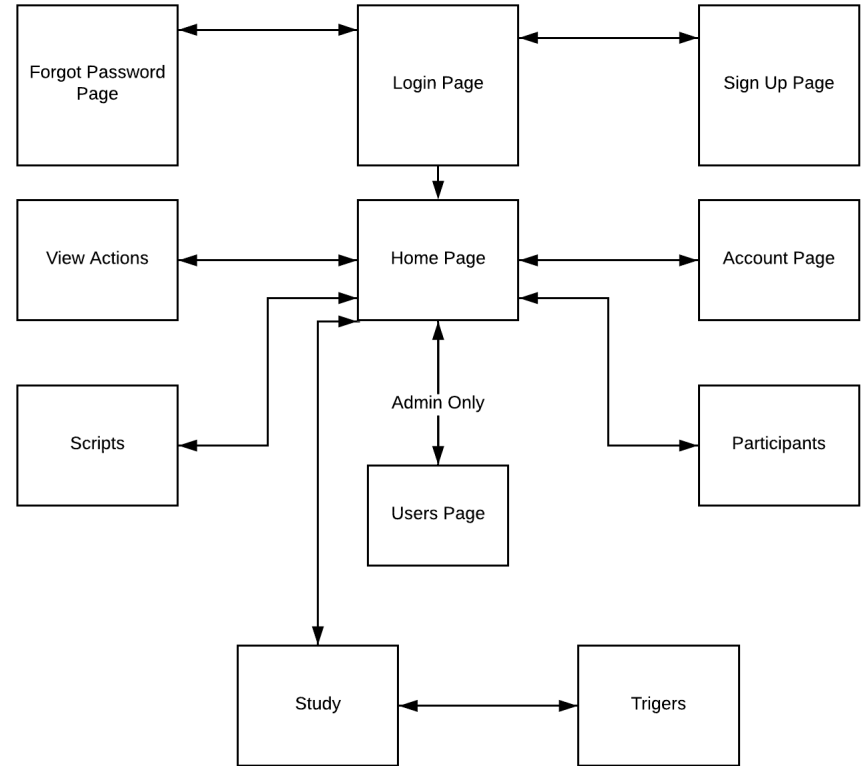


# Flow of Django





# Navigation Structure



# Localized



# API Access

Django REST framework

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Api Root / User List

## User List

OPTIONS

GET



GET /api/users/

HTTP 200 OK

Allow: GET, POST, HEAD, OPTIONS

Content-Type: application/json

Vary: Accept

```
[
  {
    "url": "http://localhost:8000/api/users/1/",
    "email": "",
    "username": "AnonymousUser"
  },
  {
    "url": "http://localhost:8000/api/users/3/",
    "email": "bob@gmail.com",
    "username": "bob"
  },
  {
    "url": "http://localhost:8000/api/users/2/",
    "email": "amp845@nau.edu",
    "username": "austin"
  }
]
```



# Poor UI



# Updated WebApp

- WearWare
- Participants
- Scripts
- Administrator

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WearWare

User Info

Austin Pederson

April 11, 2019

amp845@nau.edu

Announcements This is the message of the day!

Edit Announcements

Add Study

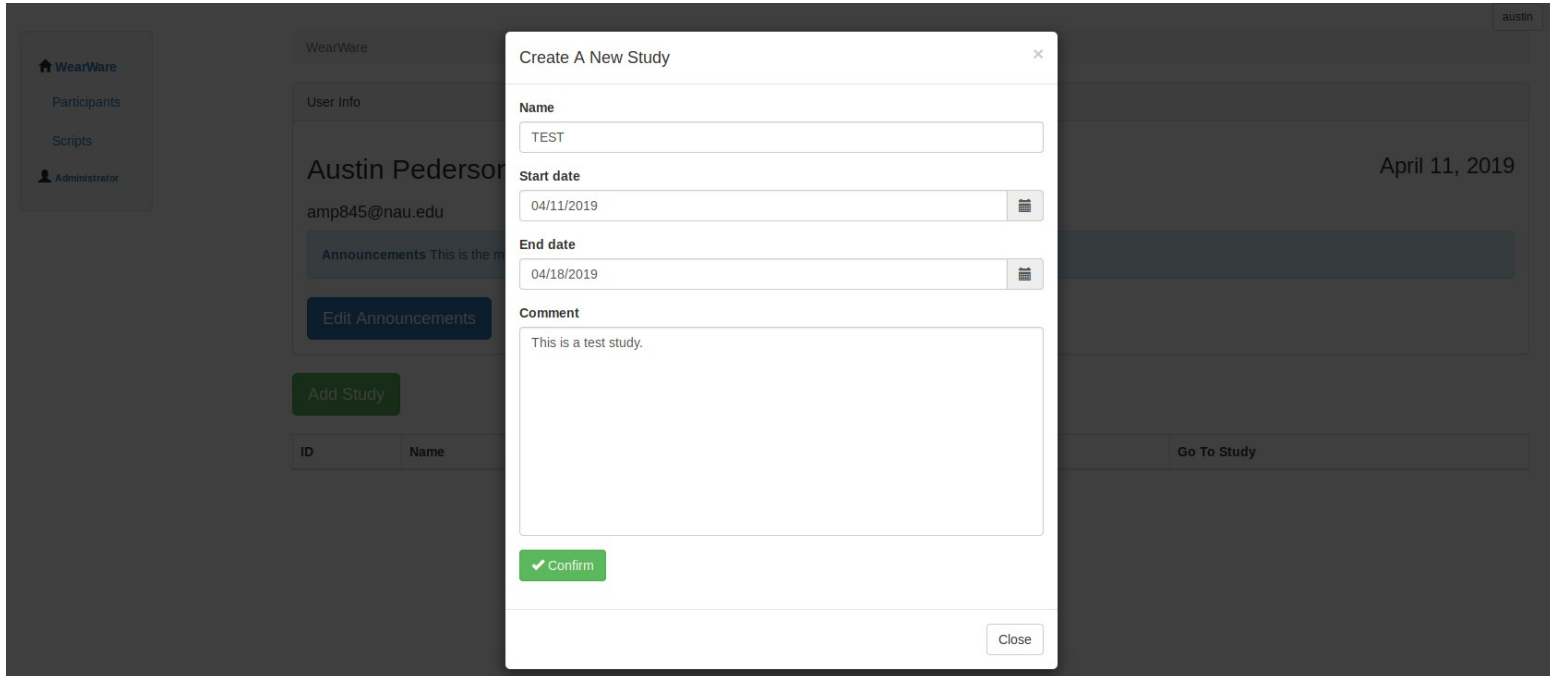
| ID | Name | Start Date | End Date | Go To Study |
|----|------|------------|----------|-------------|
|----|------|------------|----------|-------------|



# Poor UI



# Updated WebApp



The screenshot displays the 'WearWare' web application interface. A modal window titled 'Create A New Study' is open, featuring the following fields:

- Name:** A text input field containing the value 'TEST'.
- Start date:** A date picker field showing '04/11/2019'.
- End date:** A date picker field showing '04/18/2019'.
- Comment:** A text area containing the text 'This is a test study.'

At the bottom of the modal, there is a green 'Confirm' button with a checkmark icon and a 'Close' button. The background interface includes a sidebar with navigation links (WearWare, Participants, Scripts, Administrator), a user profile section for 'Austin Pederson' with email 'amp845@nau.edu', an 'Announcements' section, and a table with columns 'ID' and 'Name'.

# Poor UI WebApp



# Updated

WearWare

Participants

Scripts

Administrator

WearWare

Success! Created a new study titled: TEST

User Info

Austin Pederson

amp845@nau.edu

Announcements This is the message of the day!

Edit Announcements

April 11, 2019

Add Study

| ID | Name | Start Date     | End Date       | Go To Study              |
|----|------|----------------|----------------|--------------------------|
| 1  | TEST | April 11, 2019 | April 18, 2019 | <a href="#">CLICK ME</a> |

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# Poor UI



# Updated WebApp

 WearWare

Participants

Scripts

 Administrator

WearWare / Study: 1

Back to Dash

View Triggers

## Study: TEST

Start Date: April 11, 2019

End Date: April 18, 2019

Description: This is a test study.

Add Participant

Invite User to Study

Participants

| Identifier | First Name | Last Name | Email | Phone | Fitbit Account | Active |
|------------|------------|-----------|-------|-------|----------------|--------|
|------------|------------|-----------|-------|-------|----------------|--------|

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# No Contact



# Contact Tool

WearWare

localhost:8000/redesign/participants

WearWare / Participants

Back to Dash

## Participants

Import

Export

| Identifier | First Name | Last Name    | Email | Phone | Fitbit Account           | Active | Mark                                |
|------------|------------|--------------|-------|-------|--------------------------|--------|-------------------------------------|
| 1          | Jake       | CONFIDENTIAL |       |       | <a href="#">REGISTER</a> | True   | <input checked="" type="checkbox"/> |
| 2          | Brett      |              |       |       | <a href="#">REGISTER</a> | True   | <input checked="" type="checkbox"/> |
| 3          | Karla      |              |       |       | <a href="#">REGISTER</a> | True   | <input checked="" type="checkbox"/> |

Test

Notify Participant

Test

Text Message



# Customization Software



# Analysis

← → ↻ ⓘ localhost:8000/redesign/scripts ☆ 🔴 🟢 | J ⋮

jakefarrar

🏠 WearWare

Participants

Scripts

👤 Administrator

WearWare / Scripts

Back to Dash

## Global Scripts

Update svn

| Script Name                              | Script Description |
|--|--------------------|
| <a href="#">confusionmatrix.m</a>        |                    |
| <a href="#">cpa.m</a>                    |                    |
| <a href="#">createLabels.m</a>           |                    |
| <a href="#">describeStruct.m</a>         |                    |
| <a href="#">flag_implicit_skip_nan.m</a> |                    |
| <a href="#">geomean_safe.m</a>           |                    |
| <a href="#">harmmean_safe.m</a>          |                    |
| <a href="#">kmeans.m</a>                 |                    |
| <a href="#">kmeans2split.m</a>           |                    |



# Challenges

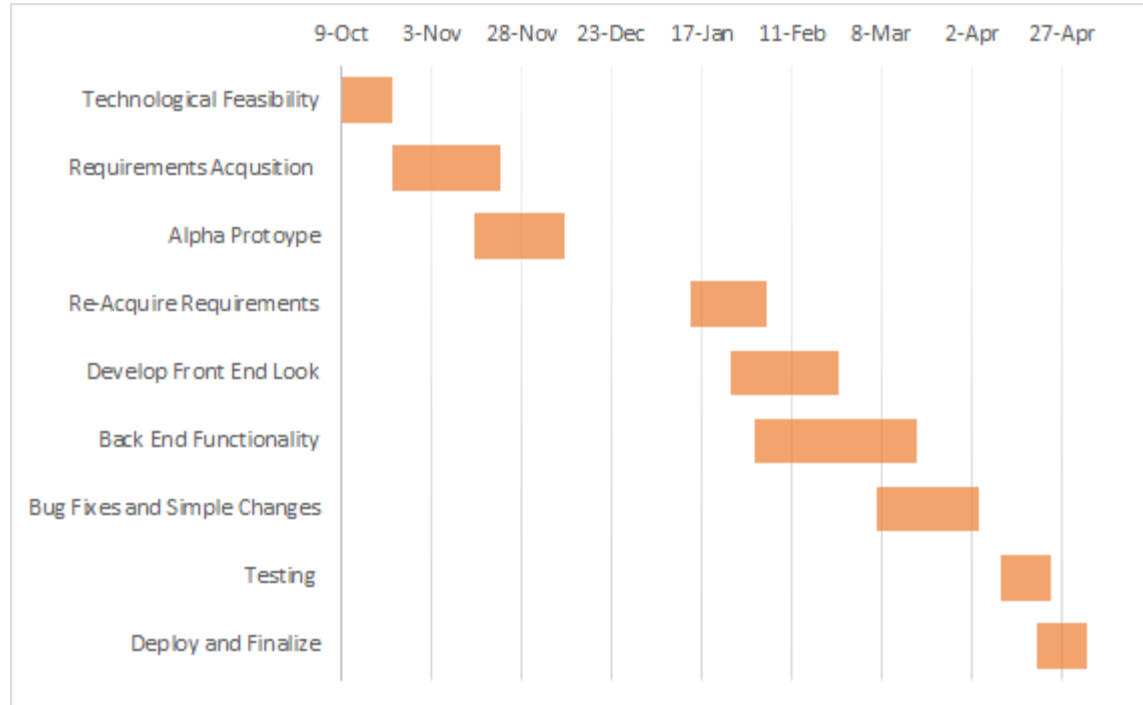
1. Large number of participants in the database
2. Potential Security Flaws



# Testing Plan

- Unit Testing
  - Small test suite checking individual pieces of functionality to make sure the correct responses are generated
- Integration Testing
  - Validate larger flows within our web app to check functionality of important features
- Usability Testing
  - Working with users to make sure that the program flows well and is simple to user

# Schedule





## Future Work

- Sufficient data collection for years to come
- Dynamic design allows for upgrades
- Data collected will remain in the system for future studies



# Conclusion

- Work with our sponsors to expand the functionality and usefulness of their existing solution
  - Improved the UI
  - Implemented an API
  - Implemented notifications
- Created better workflows
- Motivated and excited for the overall outcome of the project



# Questions?