



# Bio-Behavioral System to Motivate and Reinforce Heart Health



## Team FitByte

Jake Farrar, Jacob Lemon, Austin Pederson

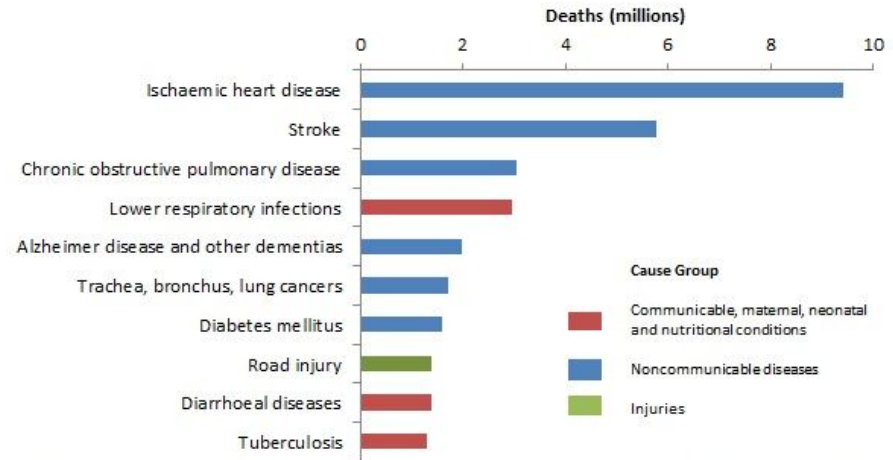
Sponsors: Dr. Kyle Winfree, Dr. Gregory Dominick

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



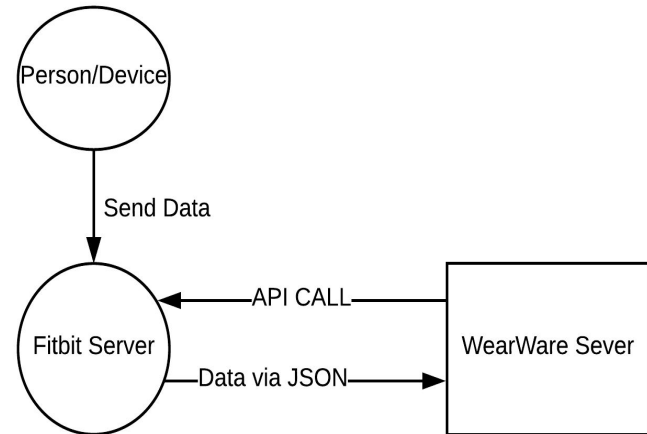
Dr. Kyle Winfree, NAU



Dr. Gregory Dominick, UDel

# Currently Working Product: WearWare

- Developed by former NAU employee, Adam Perry
- 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

- 🏠 [WearWare](#)
- [Participants](#)
- [Scripts](#)
- 👤 [Administrator](#)

jakefarrar [Log Out](#)

WearWare

User Info

**Jake Farrar**

April 25, 2019

voteablemango@gmail.com

**Announcements:** Welcome to WearWare

[Edit Announcements](#)

[Add Study](#)

ID	Name	Start Date	End Date	Go To Study
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# Requirements

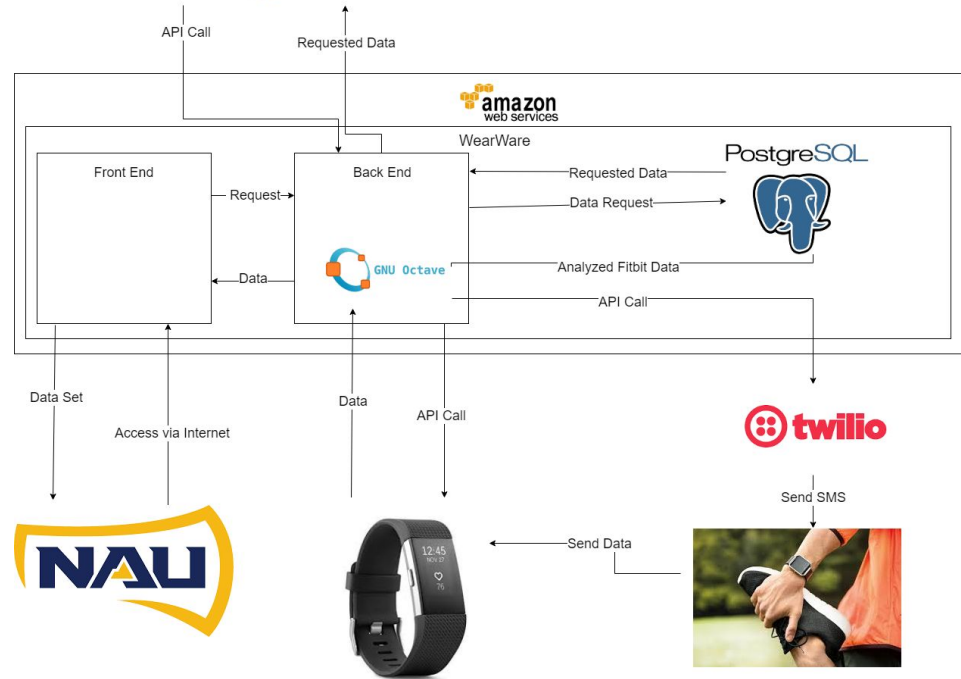
- Collecting and processing Fitbit data
  - Previous Solution
- Messaging functionality
- Study collaboration
- API data transfer
- User friendly application



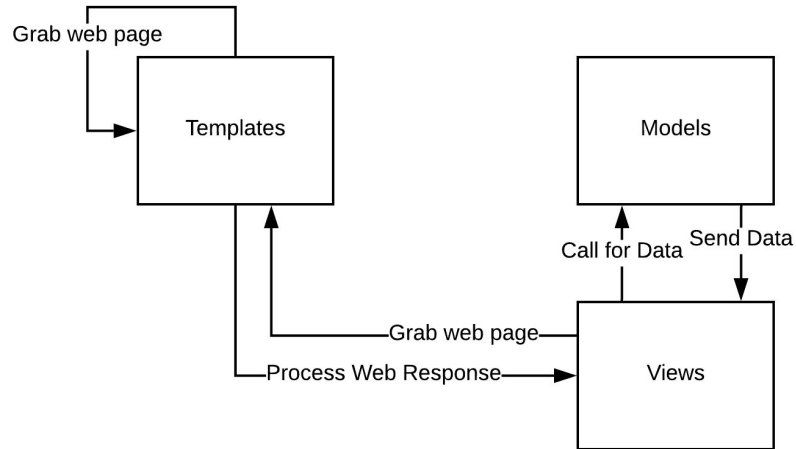
# Implementation Overview

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



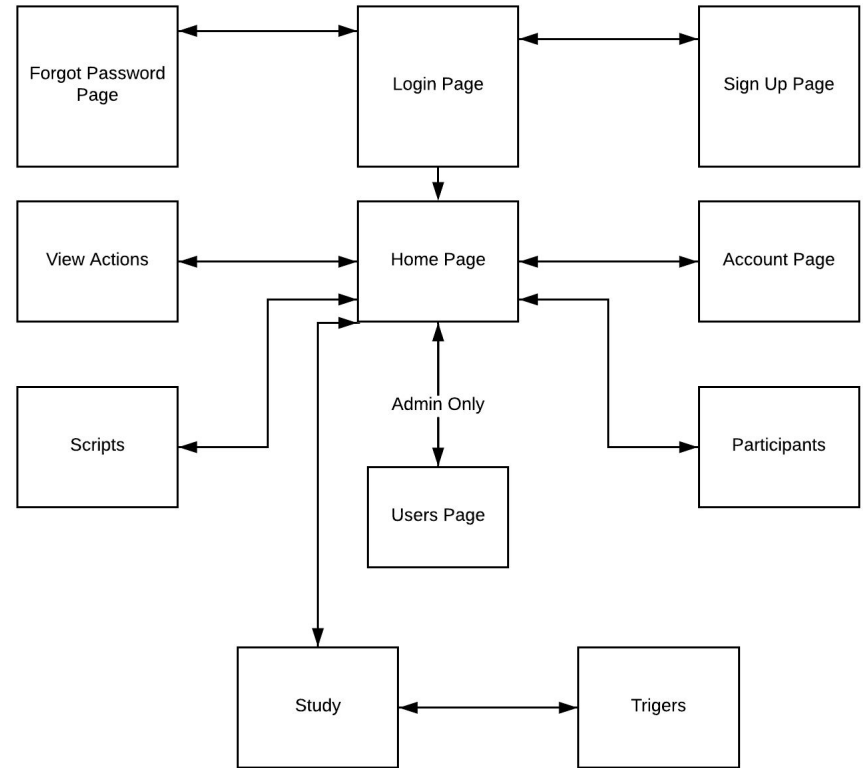


# Flow of Django





# Navigation Structure



# Localized



# API Access

Django REST framework

Api Root / Participant List

## Participant List

OPTIONS

GET

GET /api/participants/

HTTP 200 OK

Allow: GET, POST, HEAD, OPTIONS

Content-Type: application/json

Vary: Accept

```
[
  {
    "pk": 1,
    "email": "bvance@vancefridge.com",
    "sex": "M",
    "gender": "M",
    "phone": "+13603175065"
  },
  {
    "pk": 12,
    "email": "mscott@dmifflin.com",
    "sex": "M",
    "gender": "M",
    "phone": "+13603175065"
  },
  {
    "pk": 13,
    "email": "hflax@dmifflin.com",
    "sex": "M",
    "gender": "M",
    "phone": "+13603175065"
  }
]
```



# Poor UI



# Updated WebApp

jakefarrar Log Out

WearWare

Participants

Scripts

Administrator

WearWare

User Info

**Jake Farrar**

April 25, 2019

voteablemango@gmail.com

Announcements: Welcome to WearWare

Edit Announcements

Add Study

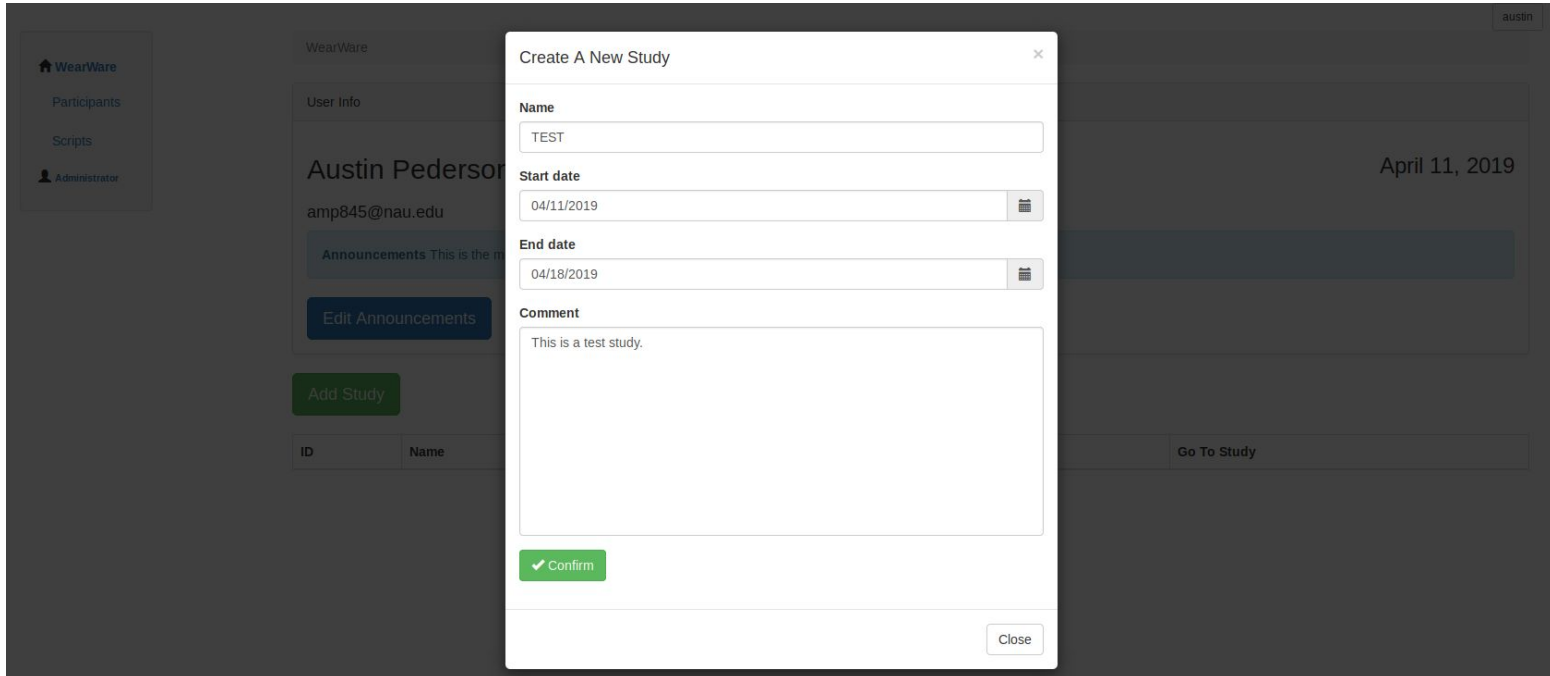
ID	Name	Start Date	End Date	Go To Study
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Poor UI



Updated WebApp



The screenshot displays a web application interface. On the left, a sidebar contains navigation links: 'WearWare', 'Participants', 'Scripts', and 'Administrator'. The main content area shows a user profile for 'Austin Pederson' with email 'amp845@nau.edu'. A modal window titled 'Create A New Study' is open, containing the following fields:

- Name:** A text input field containing '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 '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 an 'Add Study' button, an 'Announcements' section with an 'Edit Announcements' button, and a 'Go To Study' button. The date 'April 11, 2019' is visible in the top right corner of the main content area.

# Poor UI



# Updated WebApp

The screenshot shows a web application interface for 'WearWare'. At the top right, there are user controls for 'jakefarrar' and 'Log Out'. A navigation sidebar on the left contains links for 'WearWare', 'Participants', 'Scripts', and 'Administrator'. The main content area features a 'User Info' section for 'Jake Farrar' with the date 'April 25, 2019' and email 'voteablemango@gmail.com'. A blue announcement bar reads 'Announcements: Welcome to WearWare' with an 'Edit Announcements' button. Below this is a green 'Add Study' button. At the bottom, a table lists study details.

ID	Name	Start Date	End Date	Go To Study
1	Test	April 20, 2019	April 25, 2019	<a href="#">CLICK ME</a>

# Poor UI



# Updated WebApp

- WearWare
- Participants
- Scripts
- Administrator

WearWare / Study: 1 jakefarrar Log Out

Back to Dash  
View Triggers

### Study Info

**Study: Test**  
Start Date: April 20, 2019  
End Date: April 25, 2019  
Description: Test Study for Demo

**Owner: Jake Farrar**  
Email: voteablemango@gmail.com  
Creation Time: April 25, 2019, 2:55 p.m.

Notify Participants Deactivate Participants Add Participant Invite User to Study

Enter Message Here  Email  Text

#### Participants

Identifier	First Name	Last Name	Email	Phone	Fitbit Account	Active	Mark
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# No Contact



# Contact Tool

WearWare / Participants jakefarrar Log Out

Back to Dash

## Participants

Import

Export

Test

Email  Text  Notify Participant

Identifier	First Name	Last Name	Email	Phone	Fitbit Account	Active	Mark
1	Jake	Farrar	voteablemango@grr	+16026287095	REGISTER	✓	<input type="checkbox"/>
2	Jake	Farrar	jkf76@nau.edu	+16026287095	REGISTER	✓	<input checked="" type="checkbox"/>
3	Jake	Farrar	jkf76@gmail.com	+16026287095	REGISTER	✓	<input type="checkbox"/>
4	Jake	Farrar	jkf7@gmail.com	+16026287095	REGISTER	✓	<input type="checkbox"/>

Test

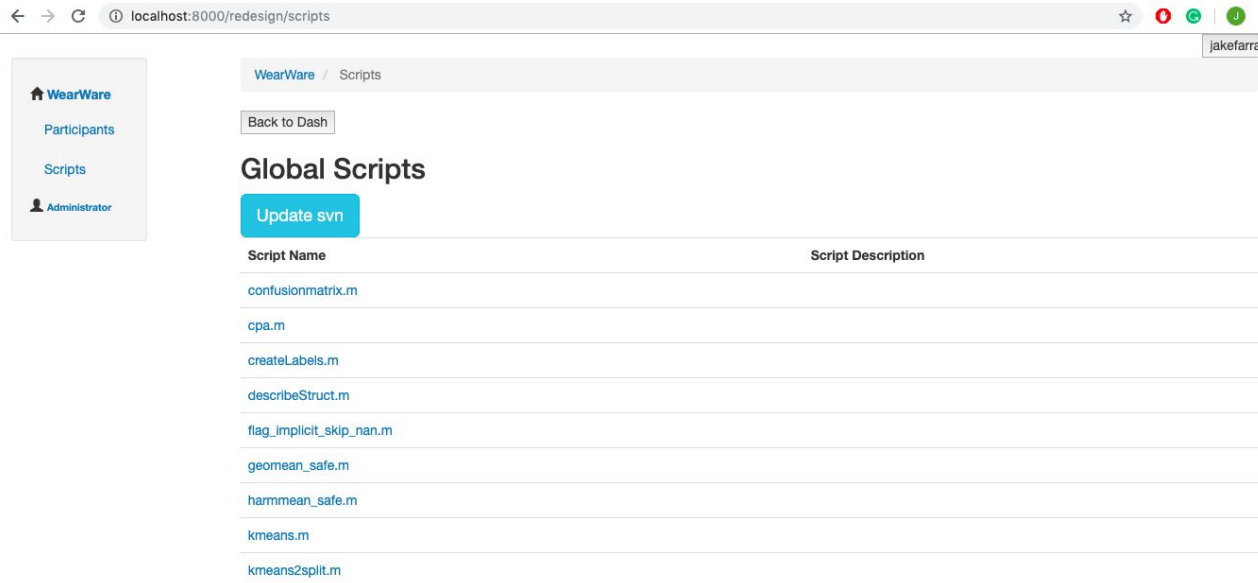
Text Message



# Customization



# Analysis Software



localhost:8000/redesign/scripts

WearWare / Scripts

Back to Dash

Update svn

Script Name	Script Description
confusionmatrix.m	
cpa.m	
createLabels.m	
describeStruct.m	
flag_implicit_skip_nan.m	
geomean_safe.m	
harmmean_safe.m	
kmeans.m	
kmeans2split.m	



# Challenges

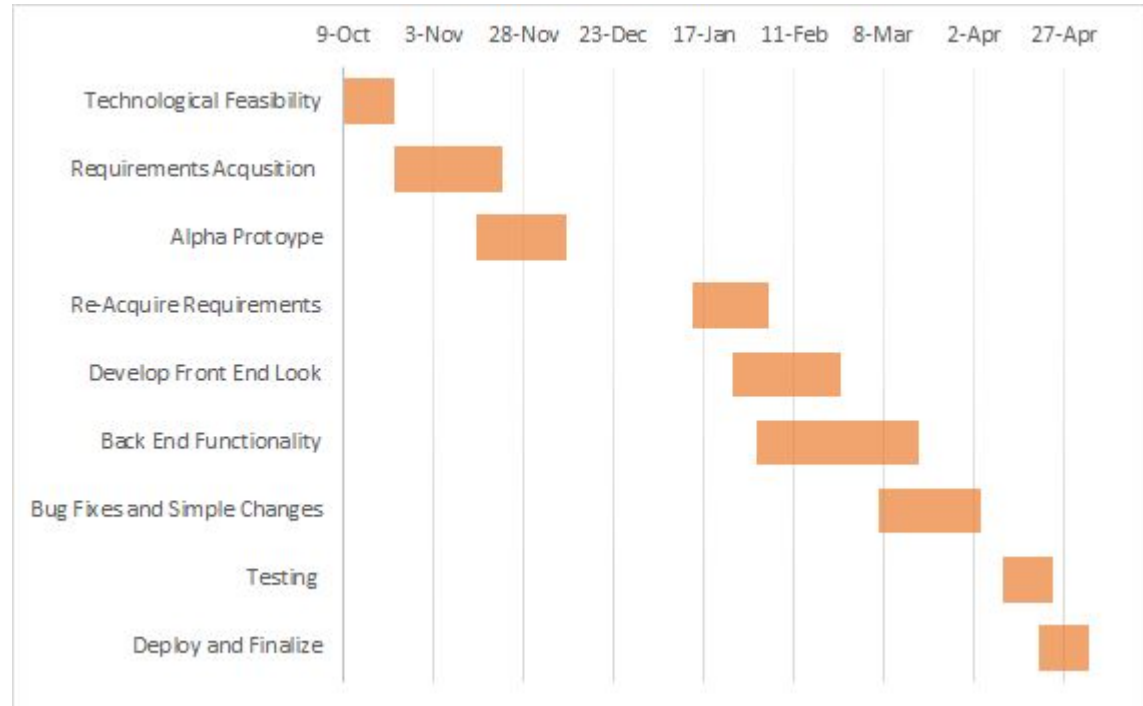
1. Large number of participants in the database
2. Potential Security Flaws



# 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?**