



HeartStep

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Mentor:

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Audience Question

How many of you have ever used a heart rate monitor?

Background

Bioinformatics

- Over 2,000 researchers
- Two major conferences
- Field that affects even the NIH
- Can help save lives



J-BHI

Journal of Biomedical
and Health Informatics



IEEE

ISMPB

International Society *for the*
Measurement *of* Physical Behaviour

Our Clients

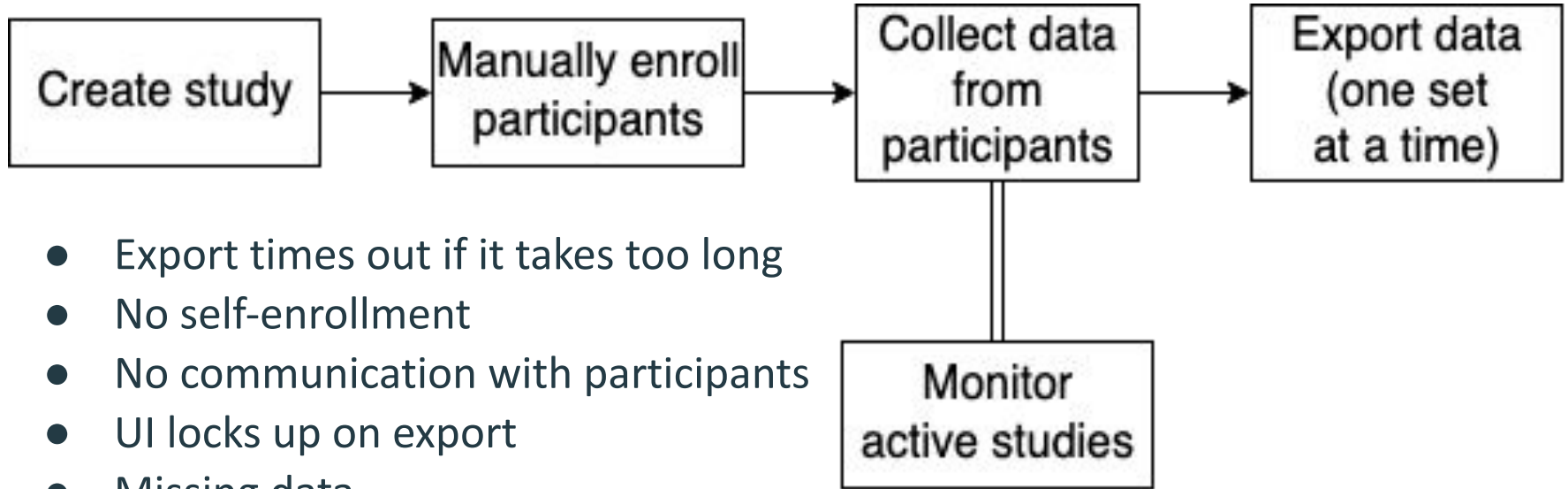


Dr. Kyle Nathan Winfree
Associate Professor
Wearable Informatics Lab



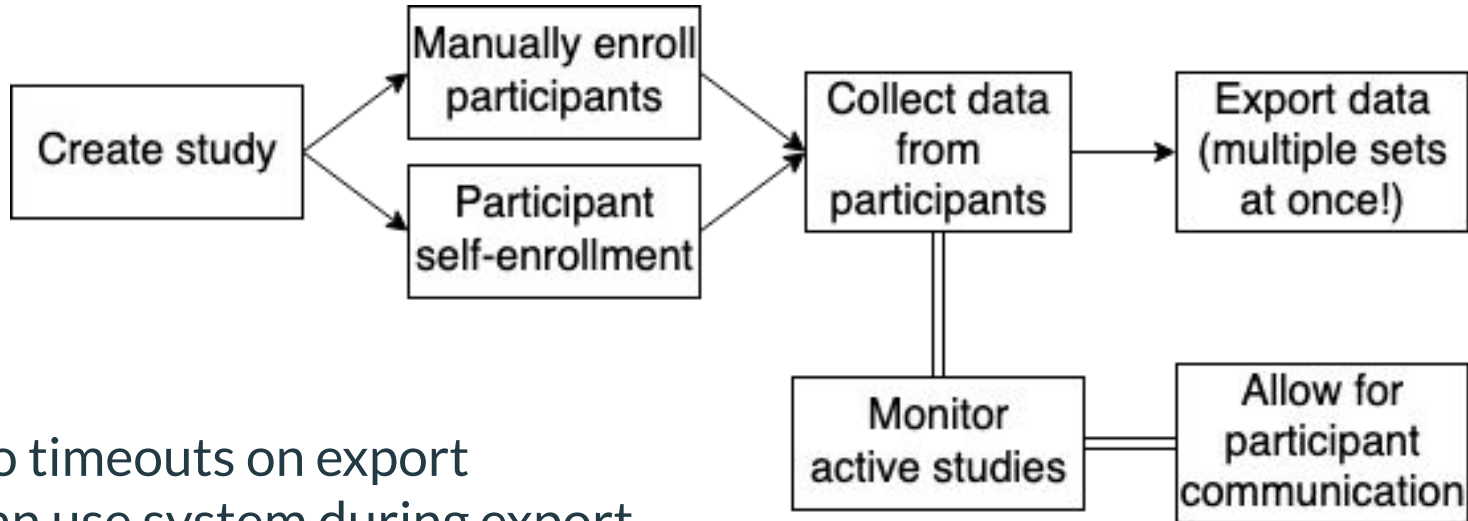
Dr. Eck Doerry
Professor of Computer Science

Problem Statement



- Export times out if it takes too long
- No self-enrollment
- No communication with participants
- UI locks up on export
- Missing data

Our Solution

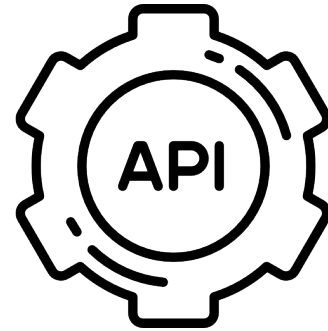


- No timeouts on export
- Can use system during export
- Sleep data collected

Requirements



WEB APP



Requirements

Website domain-level requirements

- Create and manage accounts, studies, and participants
- Export data in csv format, zip file
- Collect participant data using fitbit web api
- Send messages and reminders to participants.

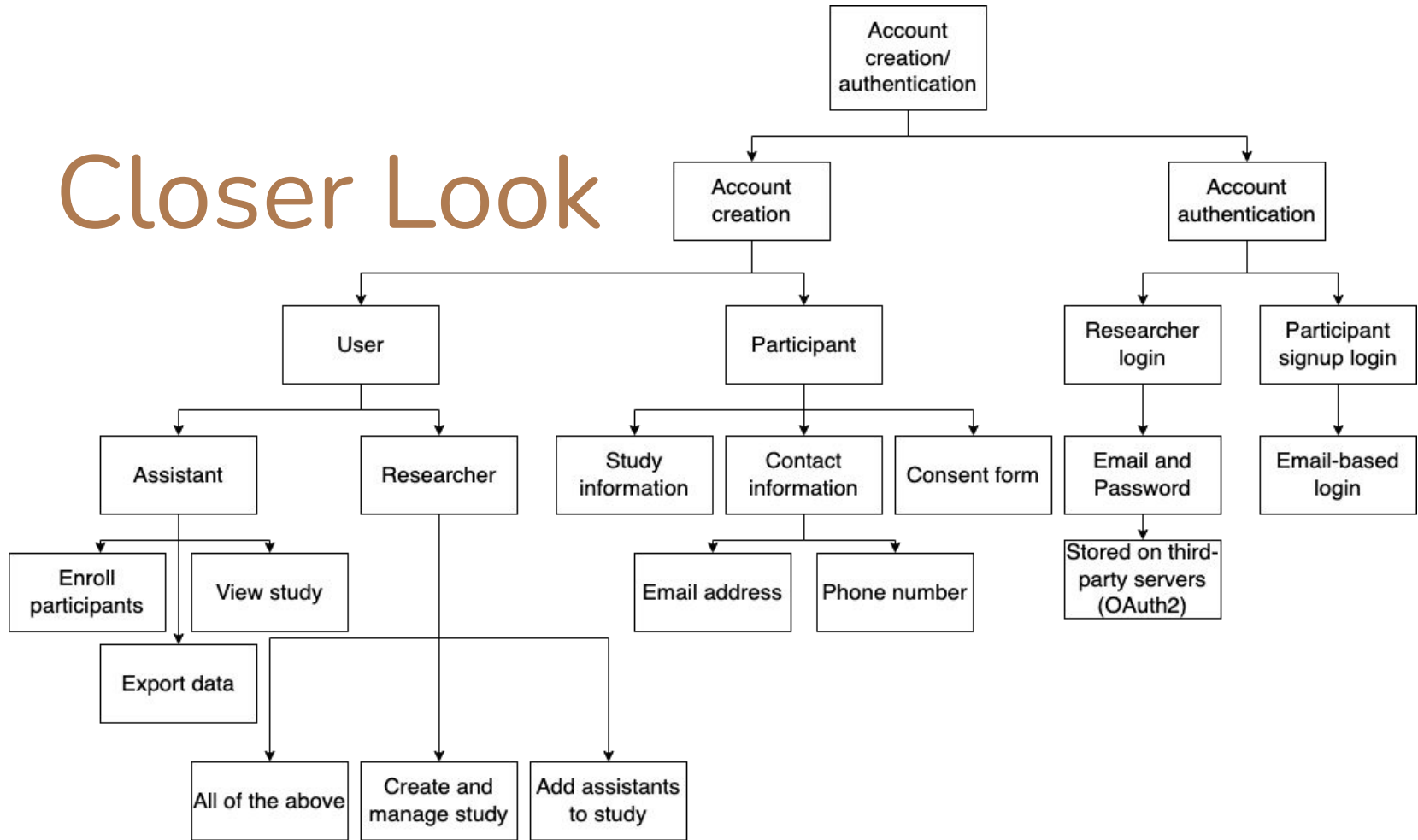
API domain-level requirements

- Authenticate users
- Return desired data to users

Functional Requirements

- Account creation/authentication
- Study creation/management
- Backend database storage
- Participant enrollment/upload
- Fitbit data collection
- Data Export

Closer Look



Performance Requirements

- Exports are no slower than the current website
- Exports avoid timeout errors
- Website is available during export
- Errors are human readable
- Website is navigable from any point

Environmental constraints

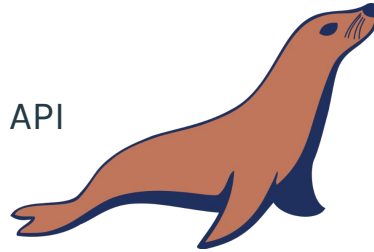
- Hosted on AWS
- Uses Ubuntu 20.04 LTS
- Deleting stored exports
- No collection of names

Challenges

- Fitbit API Access Changes
- Fitbit Company Closure
- AWS Price Changes
- Database issues
 - Multiple data requests making it slow
- Security Failure

Feasibility

- User Interface able to separate from Fitbit API
- Database
 - MariaDB
 - Scalability
 - Parallel queries
- Security
 - OAuth2
 - Secure user accounts using tokens
 - Using third-party servers for username and passwords



MariaDB



Remaining Risks

- Fitbit Company Closure
- AWS Price Changes



Schedule



Today

**Tech demo
website and
database**

Nov 18 - Dec 6

Working website with study creation Jan 10 - Jan 18

Study customization Jan 19 - Jan 27

Simulated participant enrollment Jan 28 - Feb 7

Data exporting Feb 8 - Feb 16

GUI for study monitoring Feb 17 - Feb 25

Permissions and different types of logins Feb 26 - Mar 8

API to connect to the database Mar 9 - Mar 17

Connection to FitBit API Mar 18 - Mar 28

Participant communication tools Mar 29 - Apr 6

Conclusion

- Data collection can help everyone
- Acquisition completed
- Risks assessed
- Up next: tech demo

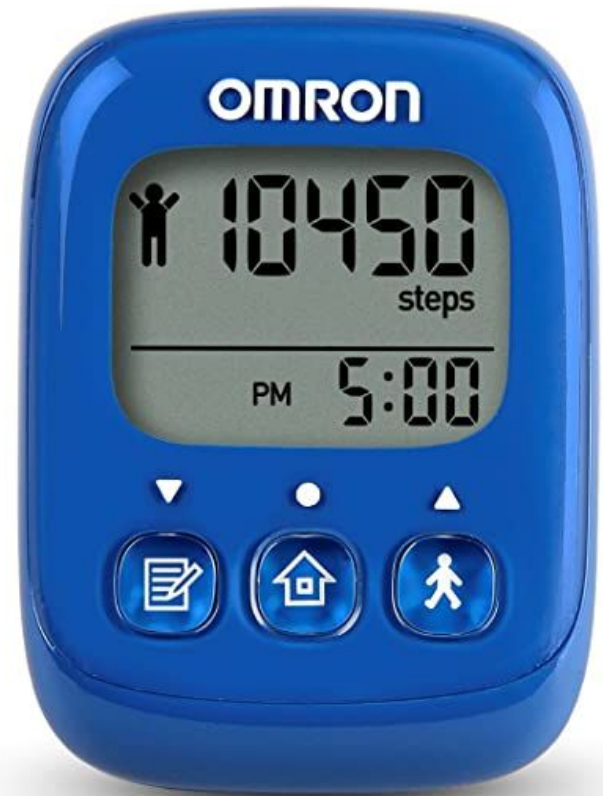
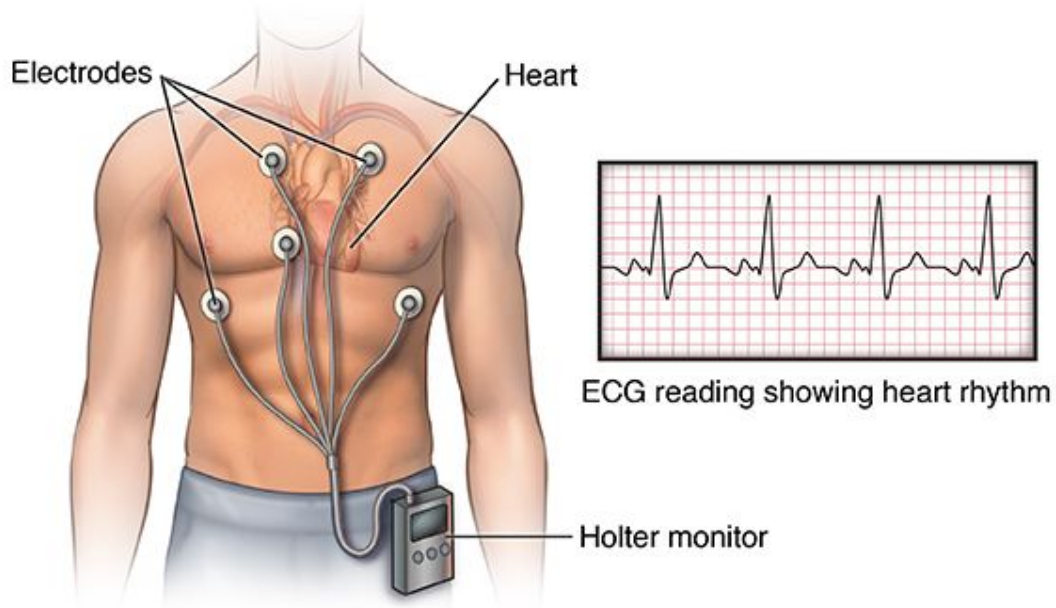
1 in 4 deaths!

Research can help save
these lives



Source: <https://www.cdc.gov/heartdisease/index.htm>

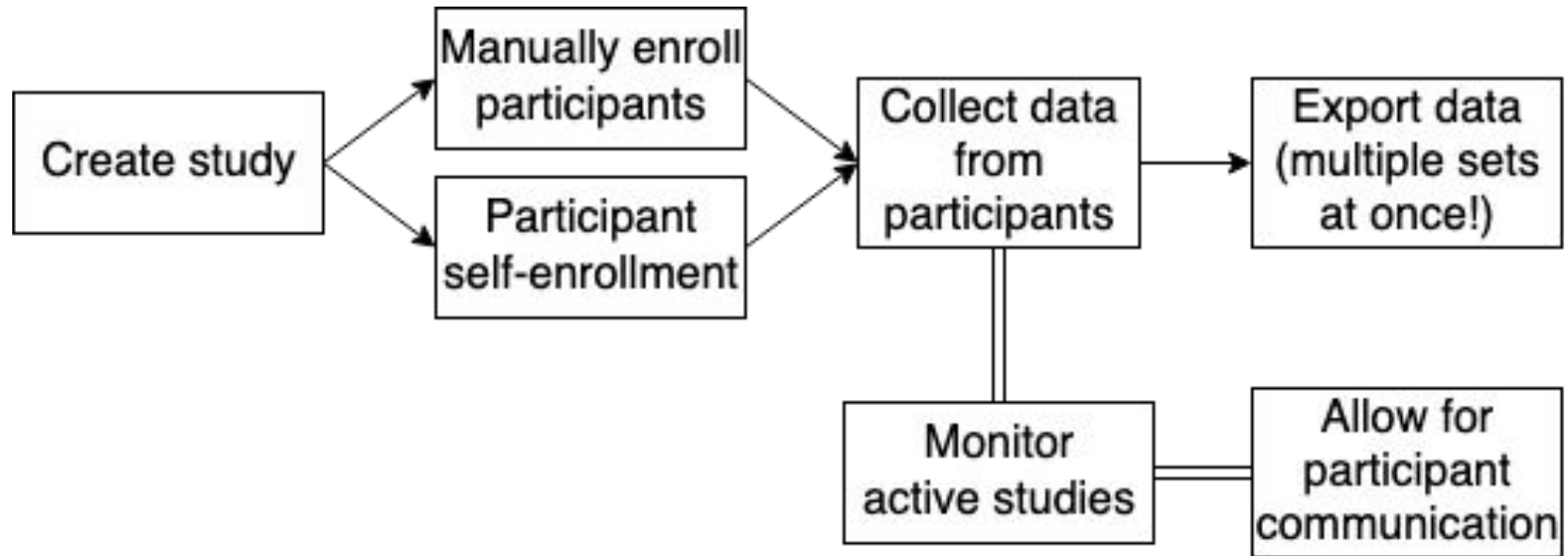
Holter monitor with ECG reading



The solution?



WEB APP



[www.ceias.nau.edu/capstone/
projects/CS/2022/HeartStep/](http://www.ceias.nau.edu/capstone/projects/CS/2022/HeartStep/)