CS342/MED253 Building for Digital Health
Lecture 2a: Introduction to ResearchKit

https://cs342.stanford.edu
cs342-aut1920.slack.com
Overview for today

- Quick Announcements
- What is ResearchKit?
  - Onboarding and Consent

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Interested in biotechnology and health innovation?

Join Stanford Students in Biodesign (SSB), a student organization for those interested in technology for healthcare and biomedicine!

Want a chance to do the following?
- Develop medical device projects with physicians and engineers or work in the wetlab with professors!
- Interact with biotech, pharma, and medical device companies & entrepreneurs in healthcare!
- Learn more about topics such as surgical robotics, regenerative medicine, pediatric medical devices, and engineering for global development!

Then get involved!
1. Come out to our Info Session Wednesday 10/2 from 6-7 p.m. @ Old Union 215
2. Sign up for our mailing list as a general member!
3. Join our officer core to work first-hand on these projects and get to know the cool people that make up SSB!

Perks of joining the officer core!
- Join a diverse community of biotech enthusiasts at Stanford
- Connections to numerous internship/research/job opportunities
- Access to an immense network of incredible alumni within your fields of interest

Fill Out the Interest Form to Join Our Mailing List

Applications for Officer Core due Fri, October 4th:
https://tinyurl.com/ssb1920app

We are open to graduate/med/GSB students!
SHIFT

Stanford Health Innovations in Future Technologies

Interested in...
CS + Medicine?
AI+ML In Healthcare?
Precision Medicine?

Apply @ shift.stanford.edu by 10/6 (Sunday)
Overview

Our Initiatives
In the past, our leaders have organized a diverse suite of programming. Our current initiatives include:

- **health++**: An annual health hackathon bringing together 300 engineering, medical, design, and business students alongside healthcare professionals to tackle challenges in healthcare affordability.
- **Blueprint Datathon**: An annual competition bringing together students from diverse backgrounds to apply big data analytics to challenges in healthcare.
- **SHIFT Expo**: A healthtech demo fair that aims to increase the breadth of SHIFT's engagement with the surrounding health and biotech community and industry.
- **CS522 (AI in Healthcare Seminar Series)**: A student-initiated course featuring prominent researchers, physicians, entrepreneurs, and venture capitalists.
- **TreeHacks Health**: SHIFT helps run the Health vertical of the TreeHacks hackathon.

Who are we?
Our core leadership team comprises Stanford undergraduate students from different backgrounds. Our team collaborates closely with medical and business students to engage with the Stanford graduate student community. SHIFT's advisory board, consisting of Stanford physicians and faculty members deeply involved in the healthtech innovation sector, play an integral role in guiding our group.
Applications Open!
Stanford Deadline: 10/15/19

Speakers
Dr. Richard Klausner, CEO and Cofounder @ Lyell and 11th Director of the National Cancer Institute
Dr. Gabe Aranovich, Chief Clinical @ Mindstrong Health
Dave Engberg, CTO @ Livongo
Dr. George Rutherford, Director of UCSF Global Strategic Institute
Julia Hu, CEO and Cofounder @ Lark Health
Dr. Sherry Wren, Director of Global Surgery

2019 Goals
- 850+ applicants
- 350 attendees
- 40+ mentors
- 75 needs pitched
- 45 finished projects
- $13,000 in prizes

38.9% female attendees
2.1% nonbinary attendees

Participant breakdown:
- 20.6% Business
- 17.6% Clinical
- 26.9% Design
- 34.6% Engineering

2018 Winners

Smile
Grand Prize 1st place
Application to encourage participants to take better care of oral hygiene

Beetle
Grand Prize 2nd place
Platform to more accurately and efficiently identify and prescribe medication for bacterial infections

Hakika
Grand Prize 3rd place
Persistent NeoDesign
Use blockchain to provide a secure way to confirm drug authenticity in third world countries

SkinSpecs
Best Understanding of an Unmet Need
Platform to remotely monitor disease severity and quality of life in patients with chronic skin diseases in order to reduce flares and number of office visits

IasoCoin
Best Use of Intel API 1st place
Use machine learning on cancer patient records to predict mutation category

telYpath
Best Use of Intel API 2nd place
Persistent-NeoDesign
Online tool to provide pathology diagnoses for countries severely lacking in resources and expert pathologists

HiView
Best Use of Intel API 3rd place
Database for patients in Africa to easily look up and share their HIV status with their partner to help prevent the spread of HIV

HappyBaby
Persistent-NeoDesign
A tool for pediatricians to help low-income families track the development of their children

Know Your Heart
Athenahealth+ Redox "Fix What Matters"
Persistent-NeoDesign
Platform that connects underserved communities with mobile clinic to scan patients for cardiovascular disease
Which project would you like to work on? *
We will use your response, and your class application, to form teams for the rest of the quarter.

○ Project 1: Advanced Care Planning (CARE-IT)

○ Project 2: Post-Operative Opioid Use (S-SMART)
Assign a member of your team to be a **Project Manager** — do this soon.

Work towards your **midterm & final deliverables**

**Divide & conquer.**
Assignment #2: Getting Started
Setting up Xcode and running a simple iOS app
Rev. 09.25.2019

Developing on iOS
You will need an Apple ID to test your app on a physical iPhone. You can use your existing Apple ID, or create a new one for free.

You will need a Mac for development.

Xcode
iOS app development.
Please download version 10.3 via developer downloads
(under "more" downloads find Xcode v. 10.3)
Unzip Xcode & copy the .app inside to your Applications folder.

Things to note:
● Install command line tools if prompted.
● Login with your AppleID
● You can use Xcode 11 (released Sep 20) with our sample code, but beware that creating a new project in this version will set you up with SwiftUI, which is a paradigm we will not cover.

Deliverables
● Download & Setup Xcode 10.3 on your machine. If you are new to iOS, follow the Build a Basic UI tutorial.
● Submit a screenshot of your running project via Canvas by our next class (Oct 1st).
● Send us your GitHub username: [link in website]
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  - Onboarding and Consent

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ResearchKit is an open source framework introduced by Apple that allows researchers and developers to create powerful apps for medical research.
Consent
visual templates with best practices and a transparent process

Surveys
collect feedback and patient-reported outcomes

Active Surveys
measure body activity using iPhone sensors
motor activities, fitness, cognition, speech, hearing, hand dexterity, and vision

More
login flows, passcode creation, charts, etc.
## ORKCatalog

### Surveys
- Form Survey Example
- Simple Survey Example

### Survey Questions
- Boolean Question
- Custom Boolean Question
- Date Question
- Date and Time Question
- Height Question
- Weight Question
- Image Choice Question
- Location Question
- Numeric Question
- Scale Question
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More

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What is “Consent” in healthcare?

- Signed document obtained by covered entity for uses and disclosures of **protected health information** for treatment, payment, health care operations or **research**.

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Informed Consent

All medical care requires consent
In research, participants agree to care plan **IN WRITING**

**Consent Form** (study details) + **HIPAA Authorization** (data handling details) [2 FORMS]

**Purpose:** communicate requirements of the study
- Explains **purpose, treatment procedures, schedule, potential risks and benefits, and alternative treatments**.
- Explains your rights as a clinical trial participant
- If you enter the trial you give official consent by signing the document

Consent may not ask you to give up your legal rights or relieve investigator of liability if they are negligent or careless.

- Provide a signed consent document copy to the study subject!
What is Protected Health Information (PHI)?

- 18 identifiers

1. Names
2. All geographical identifiers smaller than a state, except for the initial three digits of a zip code if, according to the current publicly available data from the U.S. Bureau of the Census: the geographic unit formed by combining all zip codes with the same three initial digits contains more than 20,000 people; and the initial three digits of a zip code for all such geographic units containing 20,000 or fewer people is changed to 000
3. Dates (other than year) directly related to an individual
4. Phone Numbers
5. Fax numbers
6. Email addresses
7. Social Security numbers
8. Medical record numbers
9. Health insurance beneficiary numbers
10. Account numbers
11. Certificate/license numbers
12. Vehicle identifiers and serial numbers, including license plate numbers;
13. Device identifiers and serial numbers;
14. Web Uniform Resource Locators (URLs)
15. Internet Protocol (IP) address numbers
16. Biometric identifiers, including finger, retinal and voice prints
17. Full face photographic images and any comparable images
18. Any other unique identifying number, characteristic, or code except the unique code assigned by the investigator to code the data
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motor activities, fitness, cognition, speech, hearing, hand dexterity, and vision
Live Code

a simple onboarding + consent experience
Starter Code on GitHub

https://github.com/cs342

https://github.com/cs342/Lect2A-ResearchKit-Starter
Follow Along
http://exercise.digital/hushed-ocean
The ResearchKit framework comes with some predefined sections that are commonly included in consent documents:

- Overview (ORKConsentSectionTypeOverview)
- Data gathering (ORKConsentSectionTypeDataGathering)
- Privacy (ORKConsentSectionTypePrivacy)
- Data use (ORKConsentSectionTypeDataUse)
- Time commitment (ORKConsentSectionTypeTimeCommitment)
- Surveys (ORKConsentSectionTypeStudySurvey)
- Tasks (ORKConsentSectionTypeStudyTasks)
- Withdrawal (ORKConsentSectionTypeWithdrawing)
Welcome
Lorem ipsum dolor sit amet, consectetur adipiscing elit.
Learn more about the study first

Data Gathering
Lorem ipsum dolor sit amet, consectetur adipiscing elit.
Learn more about how data is gathered

Privacy
Lorem ipsum dolor sit amet, consectetur adipiscing elit.
Learn more about your privacy and identity are protected

Data Use
Lorem ipsum dolor sit amet, consectetur adipiscing elit.
Learn more about how data is used

Time Commitment
Lorem ipsum dolor sit amet, consectetur adipiscing elit.
Learn more about the study’s impact on your time

Study Survey
Lorem ipsum dolor sit amet, consectetur adipiscing elit.
Learn more about the study survey

Consent overview screen
(ORKConsentSectionTypeOverview object)

Data gathering
(ORKConsentSectionTypeDataGathering object)

Privacy
(ORKConsentSectionTypePrivacy object)

Data use disclosure
(ORKConsentSectionTypeDataUse object)

Time commitment
(ORKConsentSectionTypeTimeCommitment object)

Type of study survey
(ORKConsentSectionTypeStudySurvey object)
Task

Step #1

...

Step #N
Task

Step #1

... 

Step #N

Ask about the patient’s day

Question #1

... 

Question #N
Task

Step #1
...
Step #N

Ask about the patient’s day

Actively test the patient’s balance

Question #1
...
Question #N