ICTD Capstone
Software Design for
Underserved Populations

CSE 482b
Projects!  April 1, 2021
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Schedule

• Today
  • Project Assignment
  • Capstone Process
  • Break into groups

• Next Week
  • Covid-19 vaccine background
  • Cold chain information system
  • Group meetings with course staff
Projects

1. Vaccine Stock Tracker
   - Ali Byott, XY Lim, Elijah Greisz, Young Bin Cho, Michael Wiem

2. Vaccine Passport
   - Corbin Phipps, Eric Fan, Tevin Stanley, Bethany Kassala

3. Immunization Campaign Planning System
   - Simplicio DeLeon, George Zhang, Linda Do, Mayki Hu

4. Notification / Registration tool
   - Kaytlin Melvin, Livia Kong, Tianao Shi, Emily O’Neill

5. Vaccine Impact Modelling tool
   - Joseph Ammatelli, Joely Nelson, Kenny Krivanek, Tevin Stanley
1. Vaccine Stock Tracker

• Problem: A country needs to keep track of vaccines as they are used in immunization campaigns
  • This is going to be particularly important for Covid vaccines as they are expensive, limited in availability, and are likely to supplied irregularly
  • Tracking vaccines needed for initial allocation as well as collecting unused vaccines after a campaign

• This project could be integrated into our existing Cold-Chain Information System
  • Mobile application for vaccine logisticians
  • Dashboard for ministry of health
  • Deployment in Uganda underway
2. Vaccine Passport

- Allow verification of vaccination status
- Basic model allows established authorities to enter vaccine information and others to verify credentials
- Should have some basis in cryptography or digital signatures
- Could involve mobile apps for vaccinated and/or verifiers
- Need to consider multiple different components of the system
- Topical and controversial!
3. Immunization Campaign Planning Tool

• Developing countries will likely rely on campaigns for Covid immunization
  • Identify population group and locations
  • Plan for campaign with supplies and schedule
  • Required data: demographics and health system information
• Create various web based planning tools
• Will require some background research and domain knowledge
• Possible applications of Algorithms or AI
4. Notification and registration tool

• Tool to support tracking of individuals for immunization
• Possibly target needs of a developing country (such as Uganda)
• Multi-dose vaccines complicate this problem
• Integrate across multiple messaging technologies
5. Vaccine impact modelling tool

• Develop framework for modeling impact of Covid vaccination
• Framework would allow various different models to be used
  • Fairly naïve models could be implemented initially with a mechanism for domain experts to add models later
• Scenario: tracking progress of global immunization and predicting impacts of different immunization approaches and coverages
• Variables to consider: Vaccine type, populations, coverage by dose, efficacy on different strains
• Possibly set up as a global modelling tool
CSE Capstone courses

• **Capstone Goals**
  • Projects must be large enough to require teams of several students to work on over one quarter.
  • Students must apply concepts from more than one sub-area of CSE (at the 300-level and above).
  • The work must involve a substantial design effort.
  • Students must present their work using formal oral presentations and written reports.
  • Efforts must culminate in an interesting, working artifact.
What we expect in a capstone

• Group projects
  • About five people
  • Different roles
• Design and Implementation
• Multiple check points and expert review
• Working, useful software
• Reasonable software process
• Presentation of results
# Schedule

## Schedule (Dates tentative)

<table>
<thead>
<tr>
<th>Event</th>
<th>Dates</th>
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<tbody>
<tr>
<td>Project Pitch</td>
<td>April 13</td>
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<tr>
<td>Progress Report and Prototype</td>
<td>May 11 / May 13</td>
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<tr>
<td>Final Presentations</td>
<td>June 1 / June 3</td>
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<tr>
<td>Deliverables due: Code, Write up</td>
<td>June 11</td>
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Course Mechanics

• Group development of projects
• Lectures/class meetings for first few weeks
• Regular group meetings with course staff
• Later class sessions for presentations and demos
• Specific deliverables will be specified during the quarter
• Final turn in will include code and a paper (~10 pages)
Deliverables

• Weekly progress reports
  • Templates will be provided
• Specific artifacts
  • E.g., key use cases, architectural diagram, minimum viable product definition
• Codebase
• Working prototype / demo
• Paper
  • 10-page paper, conference format, LaTeX (overleaf)

• Turn in (and comments) through Gradescope
Project Teams

• Select a PM (Project Manager)
  • Manage schedule
  • Track tasks
  • Organize meetings

• Document plans and tasks

• Divide work based on rolls
  • Allow some specialization

• Set up mechanism for communication

• Regular meetings
Software Process

• “Good Process”
  • Practice what you learned in Software Engineering
  • Software tests, code reviews, etc.

• Version control (probably Git)

• Documentation

• Early prototype and minimum viable product

• Bug and task tracking
Architecture and Software Choices

• Flexibility in choice of design, languages, and tools
• Vaccine stock tracker should be based on CCIS
• Several Android phones will be available for groups choosing a mobile component
• Scope technology choices
Design Choices

• There is lots of flexibility in the projects
• You will need to choose what to emphasize
• Choose scenarios / use cases early
• Some projects can apply to developed world (and it is fine to focus on developed world)
• Discuss ideas with course staff
Course grading

• Composite grade for project and adjustment by individual
• Not curved
• Multiple aspects will contribute to the grade
  • Domain research
  • Quality of the solution
  • Software quality
  • Documentation
  • Supporting artifacts
  • Presentations
  • Paper
• Teams will have input on weighting of criteria
Goals for course projects

• Develop realistic prototypes of systems that could have significant social impact
• Gain understanding of global covid vaccination efforts
• Build a working system
  • Robust enough to show off to others
  • Prototype that could be refined to a real system for at scale deployment
Advice for successful projects

• Start work on design and scoping immediately
• Plan to work as a team
  • Schedule and roles
  • Determine supporting technologies
  • Communicate with the course staff
  • Share responsibilities on components
• Identify a minimum viable product
  • Implement a “narrow path”
  • Extend a working system
• Presentations, Documentation, Write up and Communication about project is very important
  • There is much more to technology projects than coding