ICTD Capstone
Software Design for Underserved Populations

CSE 482b
Course Overview, March 27, 2023
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Today

• Capstone Courses
• Project Ideas
Development Engineering

• Technological interventions to improve human and economic conditions in low-resource settings

• An engineering discipline aimed at addressing global inequity

• Develop principles for design, introduction, scaling, and sustainability of Global Good technology
What are the challenges


• Resource constraints: Finance, Infrastructure, Distance, Education and literacy, Governance

• Shocks: Climate Change, Global Pandemics
Setting

• Rapid, global economic and technological change
  • Many technologies are globally accessible

• Not just a split between “Developed” and “Developing Countries”, but within countries between “Urban-Affluent” and “Rural/Urban-Poor”

• In many ways, the world is getting better
  • Increasing literacy rates
  • Decline in maternal mortality rates
  • Near elimination of diseases such as polio
ICTD, Information and Computing Technologies for Development

• Technology with global impact
• Appropriate for `low resource’ settings
• Target development domains
  • Health, Education, Livelihood, Agriculture, Disaster Relief
• This quarter, computing and global health
Previous ICTD Capstone Projects

Vaccine Cold Chain Visualization System

eKichabi Mobile Application
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 I expect in a capstone

• Group projects
  • Four or five people per team
  • Different roles
• Design and Implementation
• Multiple check points and expert review
• Working, useful software
• Reasonable software process
• Presentation of results
Learning goals

• Working in a team to deliver software
  • Developing a specification and solution idea
  • Choosing technologies and an architecture
  • Working in a team

• Domain expertise
  • General knowledge of problem area
  • Appropriate applications of technology

• Independent acquisition of knowledge
The capstone challenge

• Too much stuff to fit into nine or ten weeks in the spring
• Focus on Design, Development & Implementation
• Choose at start of course from a set of project ideas
Schedule

- Today (March 27) – present project ideas
- Wednesday (March 29)– establish project groups
- Domain Presentation (April 3) :
- Domain Presentation (April 5) :

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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)
Domain – Global Health

• Target health care in low resource settings

• Key challenges
  • Lack of trained doctors
  • Poor infrastructure
mHealth

• Low-cost mobile devices (smart phones and tablets) to assist health care providers

• Feasible in many settings (device availability, connectivity)

• Many different types of interventions have been developed
Project Ideas

• This part of the slide deck needs to be worked on. We will begin with a description of the target environment – remote health centers in developing countries. These are under resourced and infrastructure constrained.

• The hope is that mobile devices can be utilized to help with service delivery – this will be the main focus of the course

• We have two domains planned – cardiology and pulmonology (hearts and lungs)
  • Leading health concerns
Projects

Cardiovascular Disease
• Can a personal EKG be integrated health care in low income settings
  • Likely setting – triage tool by nurses

• Project 1
  • Explainable AI to explain diagnosis

• Project 2
  • Training tools to support Community Health workers

Pediatric Pulmonology
• IMCI integrated management of Childhood Illness mobile app
  • Step through a diagnosis protocol

• Alrite project has been prototyping and Android App in Uganda which we will extend

• Project 1
  • Develop the app to allow customization by non-programmers

• Project 2
  • Integrate App into health work flows including a medical record system
Project: Technical Domains

• Cardio-AI Explainability
  • Technical AI, Training data sets and models available

• Cardio-Health Worker Training
  • HCI/Usability – Recommend some type of Tablet/Smartphone training app
  • Recommended setting – Indian CHWs

• ALRITE Extensibility
  • Design challenge – Framework for “decision tree” protocol apps

• ALRITE Workflow
  • Medical Record Systems – Global Goods Software (OpenMRS or DHIS2)