EC601 Product Design in ECE

Engineers influence their community, society and the world. Engineers build products and services that can enhance people’s lives. The product starts with an idea and delivered through research (technical and societal), design, implementation, testing and support. During this class, you will experience all of this.

This course provides design and practical insights into building products that involve WEB and mobile app development, data simulation, analysis and modeling, cloud computing, signal processing and/or computer vision. In the class, we will work on how to take an idea and concept and translate it into product requirements. Afterwards, we will translate the product requirements into system and engineering requirements. We will also discuss solution selection techniques. We will then work on implementing our ideas into systems and verify that they address the product requirements and fulfill the concept we started with.

During the class, we will go over how to choose solutions to build our products. We will also discuss real product realization, implementations and tradeoffs.

The class is taught via an example product and the class sessions are interactive. Students will be divided into groups where they will be working in parallel on their projects during class sessions and hackathons. Teams will define their target audience, product mission, requirements and features.

The class adopts agile software development based on a two-week sprint. Students present their sprint results to the class.

Prerequisites

- Python
- C/C++ or Java strong software skills are required (EC327 or equivalent)
- Nice to have:
  - Knowledge of cloud computing
  - Digital signal/image/video processing

Goals

To provide students with the ability to:

- Analyze Product Concepts.
- Define product requirements.
- Define system requirements.
- Appreciate design tradeoffs (speed vs. accuracy, or cost vs. features)
- Design software products and services.
Class Topics

- Part 1: Product Definition: This includes Product Mission, Product Users, Product Description and User Stories
- Part 2: Agile Development
- Part 3: Product Design
- Part 4: Introduction to Concepts
  - Cloud Computing (use of cloud services)
  - Open Source and Data
  - Defining Interfaces (design APIs and use of public APIs)
  - Data Processing (computer vision examples)
  - Data Learning
- Part 5: Product Testing

Class Plan

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<th>Topics</th>
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<td>1</td>
<td>Agile SW Development + Cloud Services</td>
<td>Mini Project 1 Defined</td>
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<td>2, 3</td>
<td>Product Definition (including User Stories)</td>
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<td>Modular System Design</td>
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<td>APIs and Open Source</td>
<td>Mini Project 2 Defined</td>
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<td>Product Quality</td>
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<td>Data analysis and Learning Examples</td>
<td>Mini Project 4 Define</td>
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<td>Study of an Open Source Project</td>
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Assignments and Grading

- Team project: 40%
  - Four Sprint evaluations
  - Final Project evaluation
- Individual Assignments: 60%
  - 5 mini-Projects: 30%
  - Code Reviews: 15%
  - Peer-Project Reviews: 15%
Invitation
If you like to experience a startup environment or a fast-pace leading software-based company environment and learn how to develop concepts and products from A-to-Z, you will enjoy the class!