



University of Pittsburgh

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# Introducing Entrepreneurship with the Internet-of-Things

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# Why?

## *What problem are you solving?*

- Students interest in entrepreneurship at all-time high but, students lack understanding of what it takes to run a successful startup endeavor
- Little to no room in core Electrical and Computer Engineering curriculum for entrepreneurship, where can it be introduced?
- The Internet-of-Things (IoT) is basis of next industrial revolution....but what is it?!? And how is it different from what we already teach students?

## *What are your education objectives?*

- Teach students the fundamentals of IoT and what makes IoT unique
- Provide students with students with a basic “entrepreneurial literacy” using IoT as the educational platform



# When?

## ***What is the developmental history of your innovation?***

- Fall 2015, transformed elective Computer Networking course to focus on the “Internet-of-Things”
- Revised networking course lecture-based, new focus on IoT but lacked “hands-on” component
- At same time, student desire to transform Capstone Design projects into entrepreneurial ventures strong, but students lack business “know-how”
- New elective course created, inaugural offering in Spring 2017 semester. Primary focus is IoT and technical. Secondary focus is entrepreneurship within the context of IoT
- Students provided with both “hands-on” IoT and entrepreneurial experiences



# Where?

## ***Have you tried this in other institutions?***

- No. Many institutions (including ours) attempt to combine such areas (entrepreneurship education and a specific technical field) by way of extra-curricular programs.
- Accelerator programs are often quite successful however, many engineering students simply do not have the time for such extra-curricular activities.
- At the same time, many students wish to pursue entrepreneurship know, but they don't have a starting point (e.g. a technology). This course aims to solve both problems.

## ***Is this developed for a single class, a full course or a curriculum?***

- Full course, Advanced Technical Elective (3 credits), one semester long
- Junior/Senior Level Electrical and Computer Engineering Students



# What?

## *What learning activities and materials have you developed?*

- **IoT Education Component:**
  - 8 laboratory assignments
  - Labs cover four technical areas central to IoT: Sensors, Embedded Computing, Wireless Networking and Cloud Computing
- **Entrepreneurship Education Component:**
  - Labs #1-#6 heavy emphasis on building IoT technical skills by way of directed laboratory assignments
  - Final two assignments are open-ended, students must apply their learned skills to create their own IoT Innovation

## *What is your theory of change?*

- Internet-of-Things  $\neq$  Embedded Systems
- Use the Lean Launchpad Methodology and Business-Model Canvas to teach fundamentals of entrepreneurship



# Prognosis?

## ***How are you documenting impact?***

- Direct assessment of student work (Particularly in terms of Innovativeness)
- Electrical and Computer Engineering Student involvement in Entrepreneurial activities (post-course and post-graduation)

## ***How do you plan to scale-up?***

- Partition into a sequence of two courses, allowing for more depth in both areas (IoT and Entrepreneurship)

## ***What challenges are you currently facing?***

- IoT is broad, what are the necessary IoT fundamentals? What parts of the Lean Methodology should be included/discarded?

## ***What advice would you like from others at FOEE?***

- An advanced technical elective and basics of entrepreneurship together as one, too ambitious? What topics (in both areas ) would you emphasize?
- Better to leave the “entrepreneurship” assignments as open-ended and student-driven or for educational (and time) purposes provide ideas?