Syllabus

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Industrial Design
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1. Course contents and the relevance to ID education Structure

The students in this class will learn ways to design and implement one highly-finished interactive prototype per a team by going through the iterative prototyping process of the design concepts they have generated. During the course, students will discuss and practice how to apply technologies from the perspective of design; specifically, they will learn essential engineering skills comprising physical computing skills, and programming skills (using Arduino & Processing) for the hardware and software development of their prototypes. Along with this, students will conduct ideation of their designs from the initial phase of the course until finalization, in order to generate one novel and creative interactive product idea. Ideation will be done based on engineering skill practice, technology trend research and user needs exploration.

2. Study goals

The major goals of this course are:
- Focus on designing one highly-finished interactive prototype per a team
- Learn ways to integrate and finalize their design concepts with technology
- Practice and learn HW and SW prototyping skills to implement their ideas
- Acquire systematic ways to generate novel and creative interactive product ideas
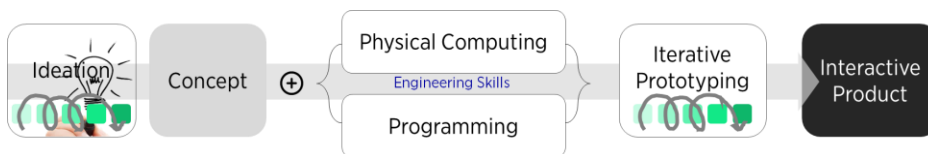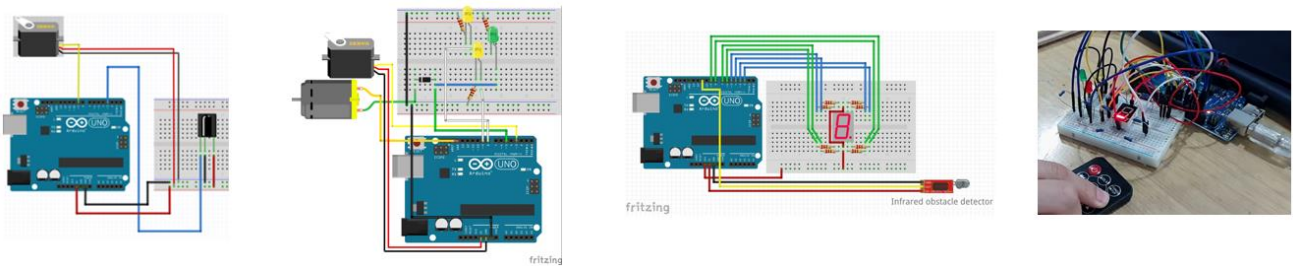

3. Education method

Week 1 ~ 8: Lecture and Practice (Learning and practicing technical knowledge and skills)
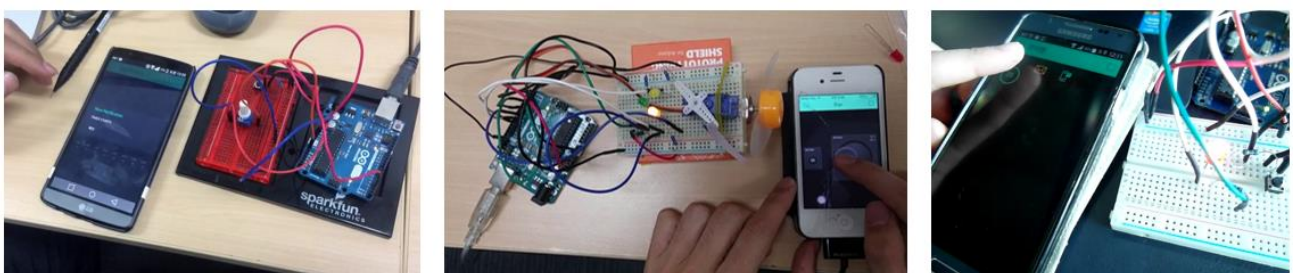Week 9 ~16: Practice, Tutorial and Critics (Iterative Prototyping)

4. Deliverables

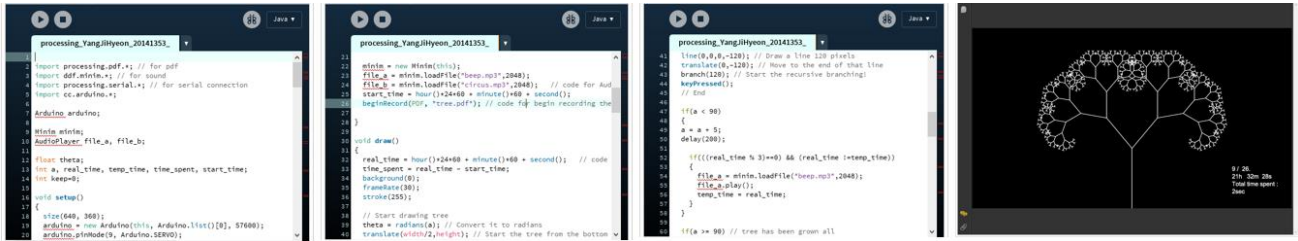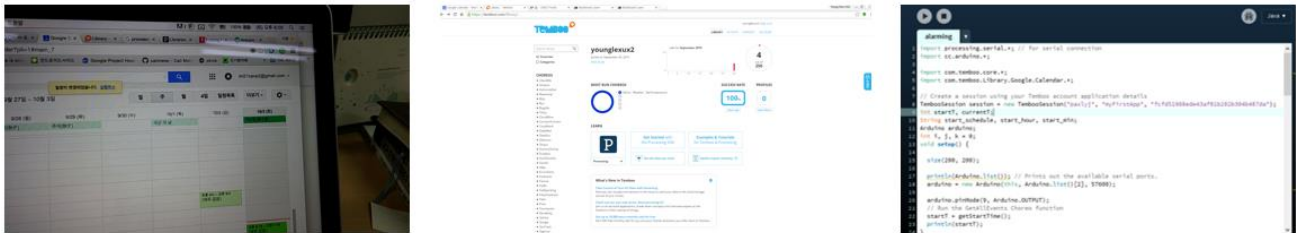A. Programming & Physical Computing Exercises
- Input & Output
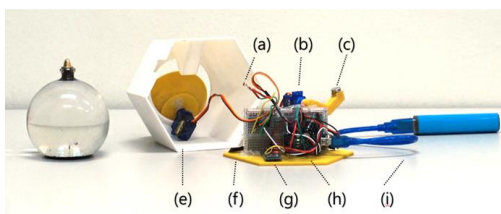

- Phone & Arduino

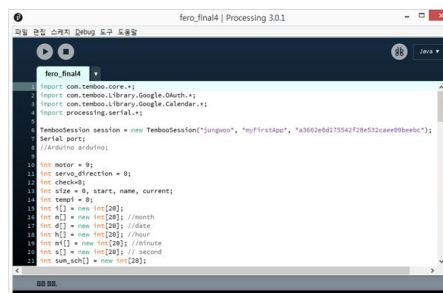- Advanced Programming Exercise

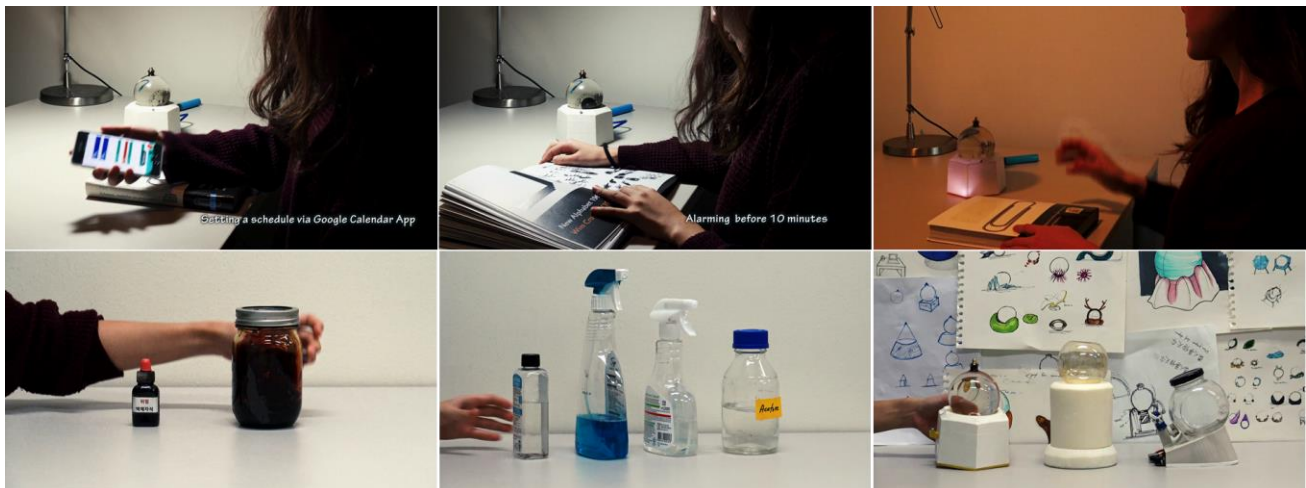- Temboo & Processing (SNS Data Communication)

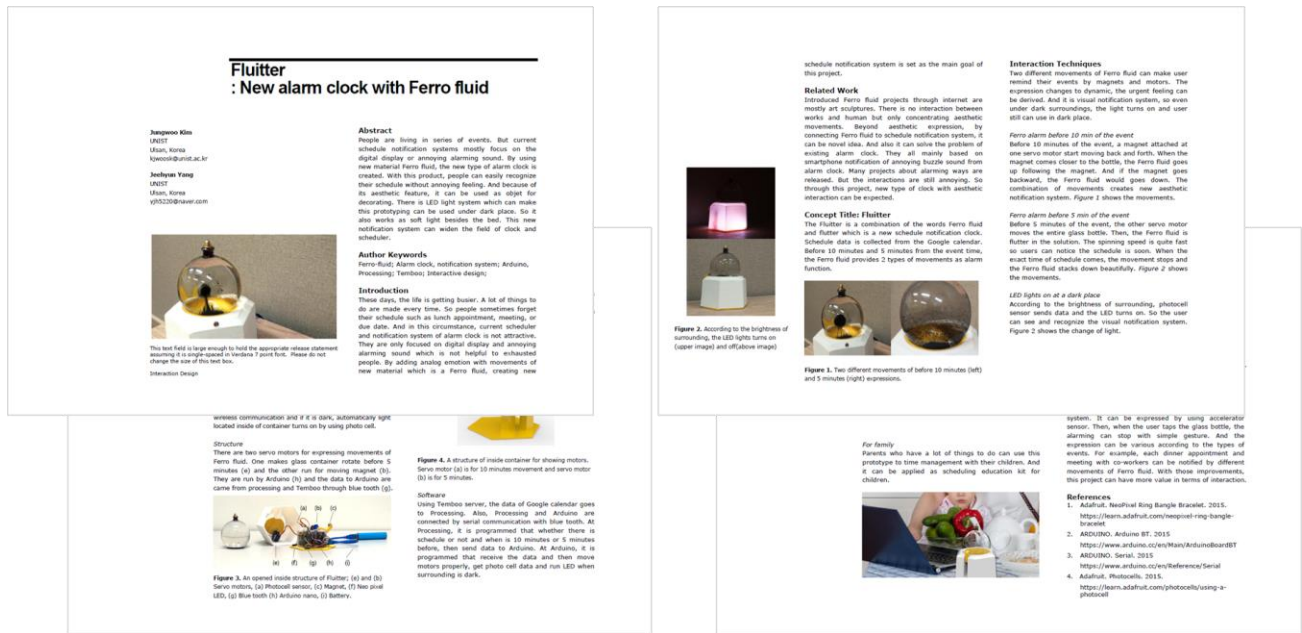- Midterm and Final Presentations
- Concept & Working Prototype

An opened inside structure of Fluitter; (e) and (b) Servo motors, (a)
Photocell sensor, (c) Magnet, (f) Neo pixel LED, (g) Bluetooth (h) Arduino
nano, (i) Battery.

- Video (Interaction & Scenario & Iterative Prototyping)

• Document

5. Assessment
Attendance and Participation: 20%
Assignments: 20%
Midterm Outcome: 20% (Concept: 10%, Prototype: 10%)
1. Concept Presentation (15 min): 10%
   • Novelty of Concept: 30
   • Interactivity: 30 (Creativity and Value of Input & Output)
   • Aesthetic Representation (Detail Plan): 30 (Shape and Material)
   • Use Scenario: 10

2. Prototype (10 min): 10%
   • Electronics: 30
   • Programming: 30
   • Representation Level of Proposed Concept: 40

Final Project: 40% (Concept: 10%, Prototype: 20%, Video: 5%, Document: 5%)
1. Working Prototype: 50% (Interactivity, Hardware, Software, Appearance (Shape, Material))
2. Concept: 20% (Novelty, Scenario)
3. Demo Video: 20% (Less than 2 mins)
   (One Key Interaction → Iterative Prototyping Process → Overall Interactions with Scenarios)
4. Document: 10% (4 pages with CHI Work-In-Progress Format)

6. Schedule and organisation

Week	Date	Teaching contents/teaching method	Homework / Project
1	1st class	Course Introduction and Trends in Interaction Design / Lecture	
	2nd class	Electronics Basics Warm-up (Step by Step Arduino Exercise) / Lecture + Practice	Completion of Class Exercise
2	1st class	Communication between Arduino and Processing (I/O) / Lecture + Practice	Simple Sensor to Actuator Exercise
	2nd class	Smart Electrical Materials & Concept Card Introduction / Lecture + Practice	Concept Generation & Technology Search
3	1st class	Concept Presentations and Discussions for Improvement / Lecture + Practice	Concept Revision and Brainstorming
	2nd class	Controlling Arduino through Mobile Phones / Lecture + Practice	Simple Actuator Control through Mobile Phones

4	*1st class*	Advanced Arduino+Processing 1 / Lecture + Practice	
	2nd class	Advanced Arduino+Processing 2 / Lecture + Practice	Completion of Class Exercise
5	*1st class*	Novel Sensors and Actuators Exercises (Arduino+Processing 3) / Lecture + Practice	
	2nd class	Related Work Reviews of using I/O in Interactive Product Design / Lecture	
6	*1st class*	Introduction to Fritzing (Designing PCBs) / Lecture + Practice	Fritzing Exercise
	2nd class	Trends and Ways of Interactive Prototype Fabrication / Lecture + Practice	Prototype Fabrication Planning and Exercise
7	*1st class*	Concept Development Tutorial 1	Concept Finalization and Technical Implementation
	2nd class	Concept Development Tutorial 2	
8	*1st class*	Midterm Outcome Presentation (Concept and Prototype)	Presentation & Demo
	2nd class		
9	*1st class*	Review of Lessons Learned / Lecture	
	2nd class	Wireless Communication / Lecture + Practice	Concept Revision & Prototyping Planning
10	*1st class*	Hardware Integration (Appearance, Electronics) / Practice	Integration Planning
	2nd class	Hardware Design and Prototyping / Practice + Tutorial	Breadboard Wiring Completion
11	*1st class*	Appearance Design 1 / Practice	
	2nd class	Appearance Design 2 / Practice + Tutorial	Work-in-progress presentation & Critics
12	*1st class*	PCB Design / Practice	PCB design using Fritzing
	2nd class	PCB Review and Revision / Tutorial	Prototyping Planning & Concept Refinement & Critics
13	*1st class*	SW Programming through Final Breadboard Wiring / Practice	Completion of Hardware Integration & Critics
	2nd class	PCB handout and Hardware Integration / Practice + Tutorial	
14	*1st class*	Test and Prototype Development Iteration 1 / Practice + Tutorial	Work-in-progress presentation & Critics
	2nd class		
15	*1st class*	Prototype Development Iteration 2 / Practice + Tutorial	Work-in-progress presentation & Critics
	2nd class		
16	*1st class*	Final Working Prototype Demo Presentation	Final presentation & Demo (Open)
	2nd class		

7. Literature and study materials
Major References
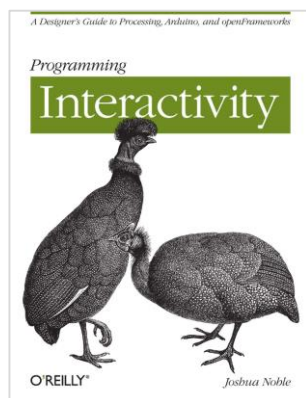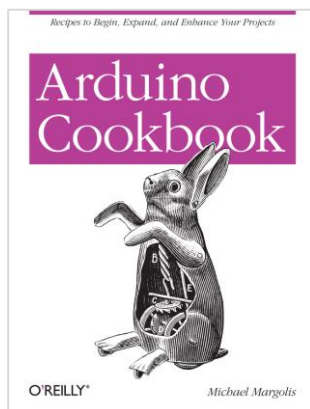
- Margolis, M. (2011). Arduino cookbook. O'Reilly Media, Inc.
- Noble, J. (2009). Programming Interactivity: A Designer's Guide to Processing, Arduino, and Openframeworks. O'Reilly Media, Inc.

Other References
- McRoberts, M. (2010). Beginning Arduino. New York. Apress.
- Igoe, T. (2011). Making Things Talk: Using Sensors, Networks, and Arduino to see, hear, and feel your world. O'Reilly Media, Inc.
- O'Sullivan, D., & Igoe, T. (2004). Physical computing: sensing and controlling the physical world with computers. Course Technology Press.
- Greenberg, I. (2007). Processing: creative coding and computational art. Apress.

Major Tools