

Senior Design Project – SDP16

Introduction

10 September 2015

C.V. Hollot
Professor and Head



SDP16 Clock has been Ticking

SDP16 Demo Day

22nd April 2016

~~~356 days~~

~240 days

## Students OWN SDP16

### CSE 14-18

\_\_\_\_\_, \_\_\_\_\_ Date: \_\_\_\_\_

Last Name

First Name

Curriculum Worksheet for the Computer Systems Engineering Classes of 2014 through 2018

| FIRST YEAR                                                          |                                                                              | SECOND YEAR                                                                                                              |                                                                     | THIRD YEAR                                                          |                                                                       | FOURTH YEAR                                                                                     |                                                                                                 |
|---------------------------------------------------------------------|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| Fall [15cr]                                                         | Spring [16cr]                                                                | Fall [18-19cr]                                                                                                           | Spring [19cr]                                                       | Fall [15cr]                                                         | Spring [15cr]                                                         | Fall [12-14cr]                                                                                  | Spring [13-15cr]                                                                                |
| <a href="#">ENGIN 112</a><br>Intro. to ECE<br>[3 cr] [Note 1]       | <a href="#">CMPSCI 121</a><br>Intro. Problem Solving w/Comp (Java)<br>[4 cr] | <a href="#">ECE 211</a><br>Circuit Analysis I<br>[4 cr]                                                                  | <a href="#">ECE 212</a><br>Circuit Analysis II<br>[4 cr]            | <a href="#">ECE 313</a><br>Signals & Systems<br>[4 cr]              | <a href="#">ECE 314</a><br>Intro. Prob. & Random Procs.<br>[4 cr]     | <a href="#">ECE 415</a><br>Senior Design Project I<br>[3 cr] (GenEd-IE)                         | <a href="#">ECE 416</a><br>Senior Design Project II<br>[3 cr]                                   |
| <a href="#">PHYSICS 151</a><br>Gen. Physics I – Mechanics<br>[4 cr] | <a href="#">PHYSICS 152</a><br>Gen. Physics II – Thermo., E&M<br>[4 cr]      | <a href="#">ECE 242</a><br>Data Structures & Algorithms (w/Java)<br>[4 cr]                                               | <a href="#">ECE 232</a><br>Hardware Organization & Design<br>[4 cr] | <a href="#">ECE 323</a><br>Electronics I<br>[4 cr]                  | <a href="#">ECE 374</a><br>Computer Networks & the Internet<br>[3 cr] | <a href="#">CSE</a><br>[3 or 4 cr] [Note 6]                                                     | <a href="#">CSE</a><br>[3 or 4 cr] [Note 6]                                                     |
| <a href="#">MATH 131</a><br>Calculus I<br>[4 cr]                    | <a href="#">MATH 132</a><br>Calculus II<br>[4 cr]                            | <a href="#">MATH 331</a><br>Differential Equations<br>[3 cr]                                                             | <a href="#">MATH 235</a><br>Linear Algebra<br>[3 cr]                | <a href="#">ECE 353</a><br>Computer Systems Lab I<br>[3 cr]         | <a href="#">ECE 354</a><br>Computer Systems Lab II<br>[4 cr]          | <a href="#">CSE Elective</a><br>[3 or 4 cr] [Note 6]                                            | <a href="#">CSE Elective</a><br>[3 or 4 cr] [Note 6]                                            |
| <a href="#">Social World Elective</a><br>[4 cr] [Note 2]            | <a href="#">ENGLWRIT 112</a><br>College Writing<br>[3cr]                     | <a href="#">Social World Elective</a><br>[4 cr] [Note 2]                                                                 | <a href="#">CMPSCI 250</a><br>Intro. Computaton<br>[4 cr]           | <a href="#">ECE 373</a><br>Software Intensive Engineering<br>[4 cr] | <a href="#">ECE 303</a><br>Junior Seminar<br>[1 cr]                   | <a href="#">Social World Elective</a><br>[4 cr] [Note 2]                                        | <a href="#">Social World Elective</a><br>[4 cr] [Note 2]                                        |
|                                                                     |                                                                              | <a href="#">Thematic Elective</a><br>[3 or 4 cr] [Note 3]                                                                | <a href="#">BIOLOGY 110</a><br>[4 cr] [Note 5]                      |                                                                     | <a href="#">ENGIN 351</a><br>Writing in Engineering<br>[3 cr]         |                                                                                                 |                                                                                                 |
|                                                                     |                                                                              | (Take <a href="#">ECE 221</a> , Digital Systems, unless ENGIN 112 was taken in Fall 2014 or earlier.<br>[4 cr] [Note 4]) |                                                                     |                                                                     |                                                                       | 5-yr B.S. / M.S. Graduate Course<br>[3 or 4 cr]<br>(Cannot be used for B.S. degree)<br>[Note 7] | 5-yr B.S. / M.S. Graduate Course<br>[3 or 4 cr]<br>(Cannot be used for B.S. degree)<br>[Note 7] |

The curriculum notes can be found on the reverse side of this worksheet.

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<http://ece.umass.edu/>

Updated March 2015

## Students Empowered

- Select your own team
- Select your own project
- Select your own advisor
- Empowerment
- Responsibility

**CSE 14-18**

Date: \_\_\_\_\_

Last Name \_\_\_\_\_ First Name \_\_\_\_\_

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| FIRST YEAR                                                 |                                                                     | SECOND YEAR                                                                                                    |                                                            | THIRD YEAR                                                 |                                                              | FOURTH YEAR                                                                                      |                                                                                                  |
|------------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
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|                                                            |                                                                     | <u>Thematic Elective</u><br>[3 or 4 cr] [Note 3]                                                               | <u>BIOLOGY 110</u><br>[4 cr] [Note 5]                      |                                                            | <u>ENGIN 351</u><br>Writing in Engineering<br>[3 cr]         |                                                                                                  |                                                                                                  |
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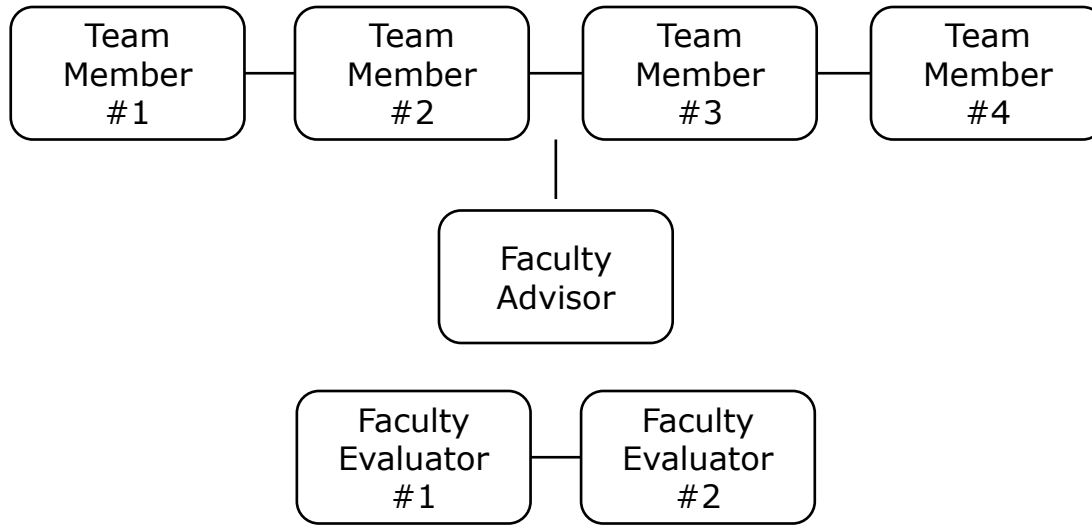
Updated March 2015

## Course attributes

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- Idea → prototype (year-long hackathon)
- Ideas self-generated
- Teams self-form
- Self-learning opportunities
- Impact on society
- Pre-professional experience in engineering design
- Minimal classroom interactions
  - Weekly team/advisor meetings
  - Reviews before faculty evaluators

# Takes a Department to do SDP



# SDP16 Reviews (the drumbeat)

- Problem statement
- System specifications
- Design alternatives
- Block diagram

Preliminary Design Review (PDR)  
**Oct**

- Subsystem prototyping

Midway Design Review (MDR)  
**Nov**

- System Integration

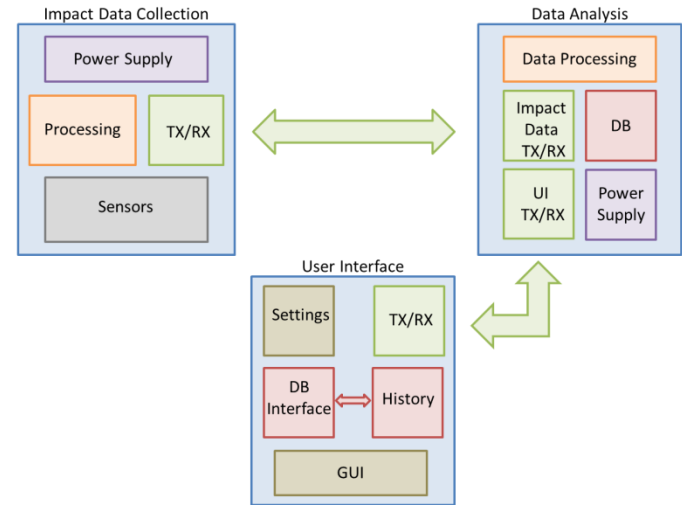
Comprehensive Design Review (CDR)  
**Feb**

Final Product

- Functionality
- Specifications
- Integration

Final Project Review (FPR)  
**April**

## Block Diagram



SDP Day  
**22<sup>th</sup> April**

ECE Projects Showcase  
**23rd April**

# SDP16 Course Deliverables

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- Review Presentations  
(PDR/MDR/CDR/FPR slide decks)
- Project Website
- Written report
- Demo Poster
- System Prototype



## Projects

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- What do you want to learn?
- Choose an area – become an expert
- Explore past SDP projects
  - UMass
  - Other ECE departments
- SDP projects are:
  - differentiators at job interviews
  - not PhD dissertations

# Must contain a “Hardware Design Component”

## Good

- Raspberry Pi
- Smart sensor board (custom, PCB)

## Bad

- Arduino
  - + Wi-fi shield
  - + plug-in sensor

# SDP15 Process

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- Teams of 4 students
  - Choose one team manager
- Advisor
  - Each team chooses its own ECE faculty advisor
- Meetings
  - Weekly team meetings
  - Weekly advisor meetings
  - Course meetings
- Project budget: \$500
  - Some parts available in SDP lab or M5

# Review and Grading Process

- Review panels (PDR, MDR, CDR, FPR)
  - Panels consist of several professors from our department
  - 20/30 min presentation by team + 20 min Q&A
- The final grade for ECE 415 (and ECE 416):
  - Advisor grade (50%): Given at the discretion of the advisor
  - Review Board grade (30%): Average of review panel grades
  - Course Coordinator grade (20%): Based on attendance, project documents and performance
  - Each team member graded individually.

SDP16 website <http://www.ecs.umass.edu/ece/sdp/sdp16/>

## Senior Design Project - SDP16

|                      |                       |                          |                          |                          |                          |
|----------------------|-----------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <a href="#">Home</a> | <a href="#">Teams</a> | <a href="#">Syllabus</a> | <a href="#">Schedule</a> | <a href="#">Lectures</a> | <a href="#">Examples</a> |
|----------------------|-----------------------|--------------------------|--------------------------|--------------------------|--------------------------|



### Welcome to Senior Design Project 2016 (SDP16)

#### Course Overview

The Senior Design Project provides a capstone experience for undergraduate students in the Department of Electrical and Computer Engineering. Students work in teams of 3-4 students in this year long course sequence to design and prototype a system of their choice. Past projects have included a variety of topics ranging from home automation systems to ultra wide band wireless links, assistive robots, and wireless drumsticks. Each team is advised by a faculty member in the department and projects undergo several formal reviews. The learning goals for the senior design project include technical design, team work, presentation skills, an understanding of realistic constraints, economics, and ethics.

#### NEWS

- First Lecture: 4pm, Thursday, 10th September'15, Elab II, Room 119
- Advisors due: 16 September'15.

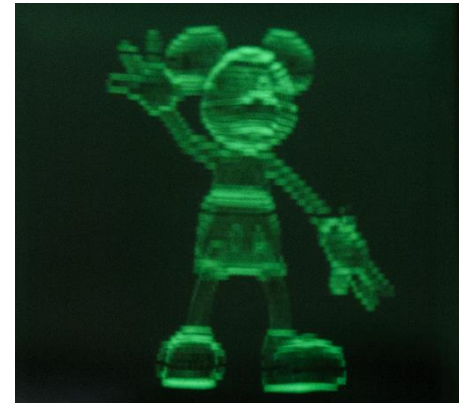
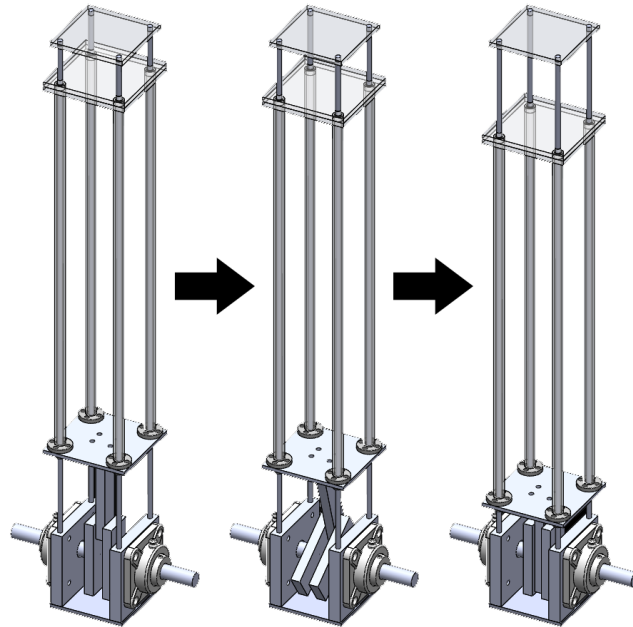
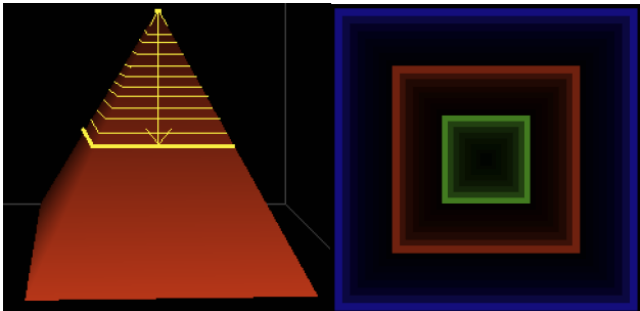
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<http://www.ecs.umass.edu/ece/sdp/sdpxx/>

# Real-Time Concussion Analyzer (SDP13)

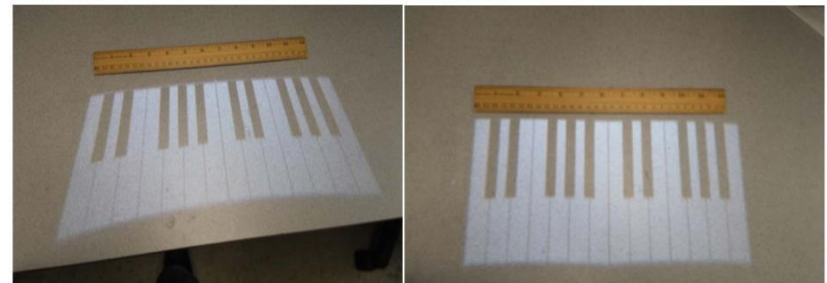
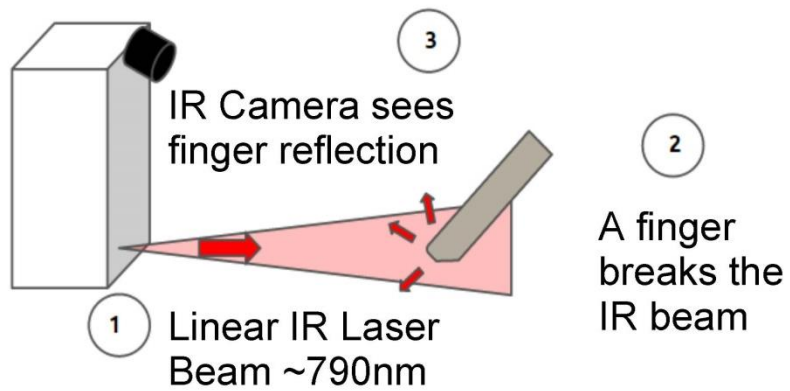


# Hologram Machine (SDP14)



# Viano (SDP15)

## Finger Tracking



Before

After



## Assignment

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- Project concept/ develop problem statement (elevator pitch, abstract)
- Confirm faculty adviser by Tuesday, 22<sup>nd</sup> September'15

## Career planning

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- Engineering Career Center (Cheryl Brooks), Marston 114
- Resume & Career Fair Prep Workshop 15<sup>th</sup> & 21<sup>st</sup> September'15
- Career Fair, 30<sup>th</sup> September'15