DPM Design Group 11:

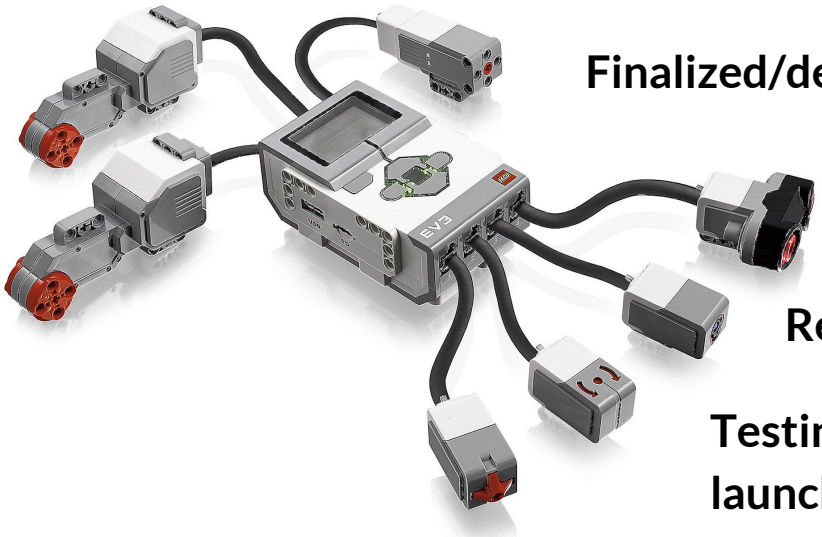
Alex Durham
Ethan Ian John

ECSE-211: Design Principles & Methods

Design Project

Tasks Completed:

March 17 - March 24



Finalized/debugged odometry correction & navigation

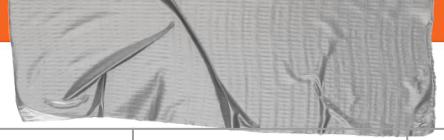
Added offensive capability (move with/shoot ball)

Refined mechanical design

Testing of navigation, odometry correction, ball launching

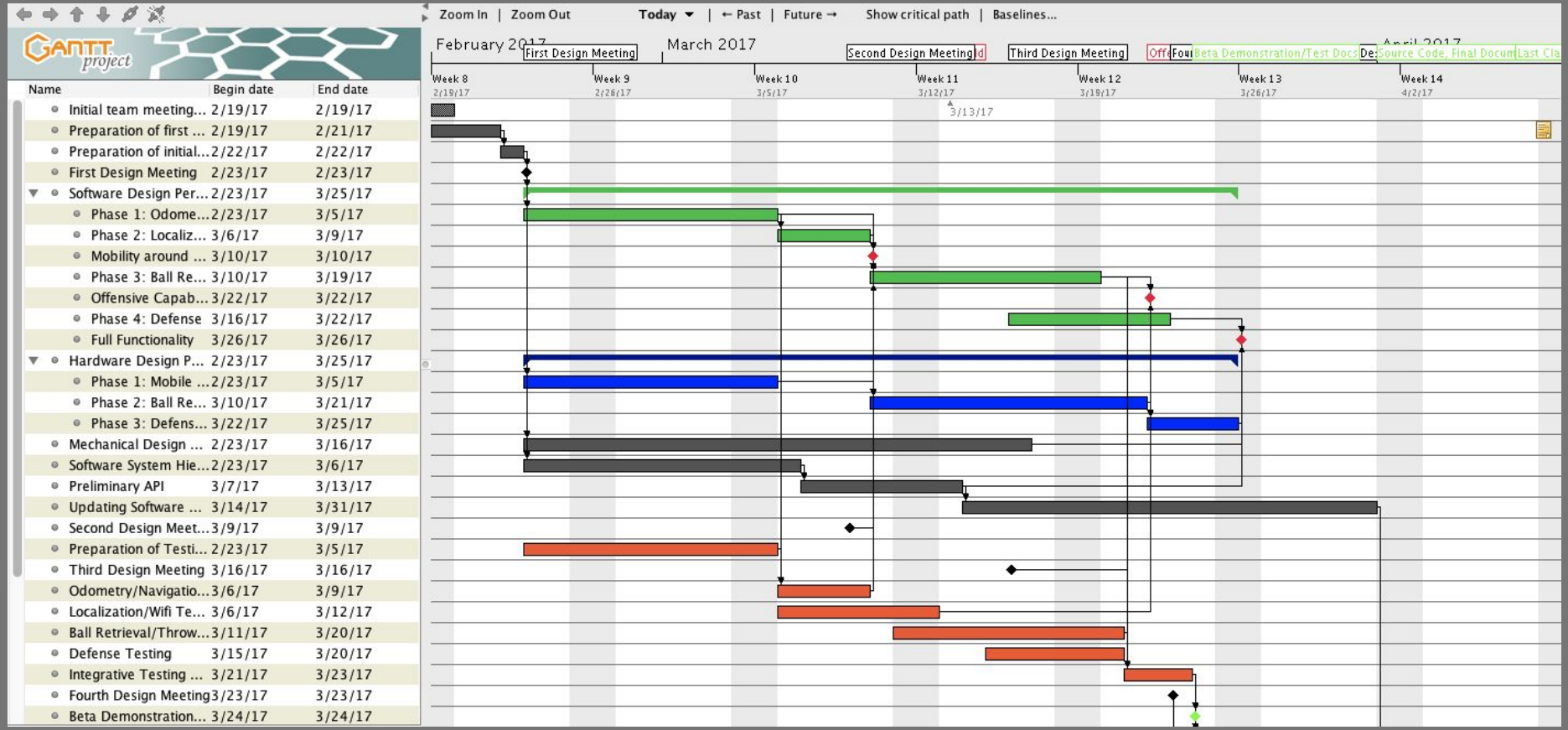
Calibration of sensors (light/ultrasonic)

Recent Tasks:

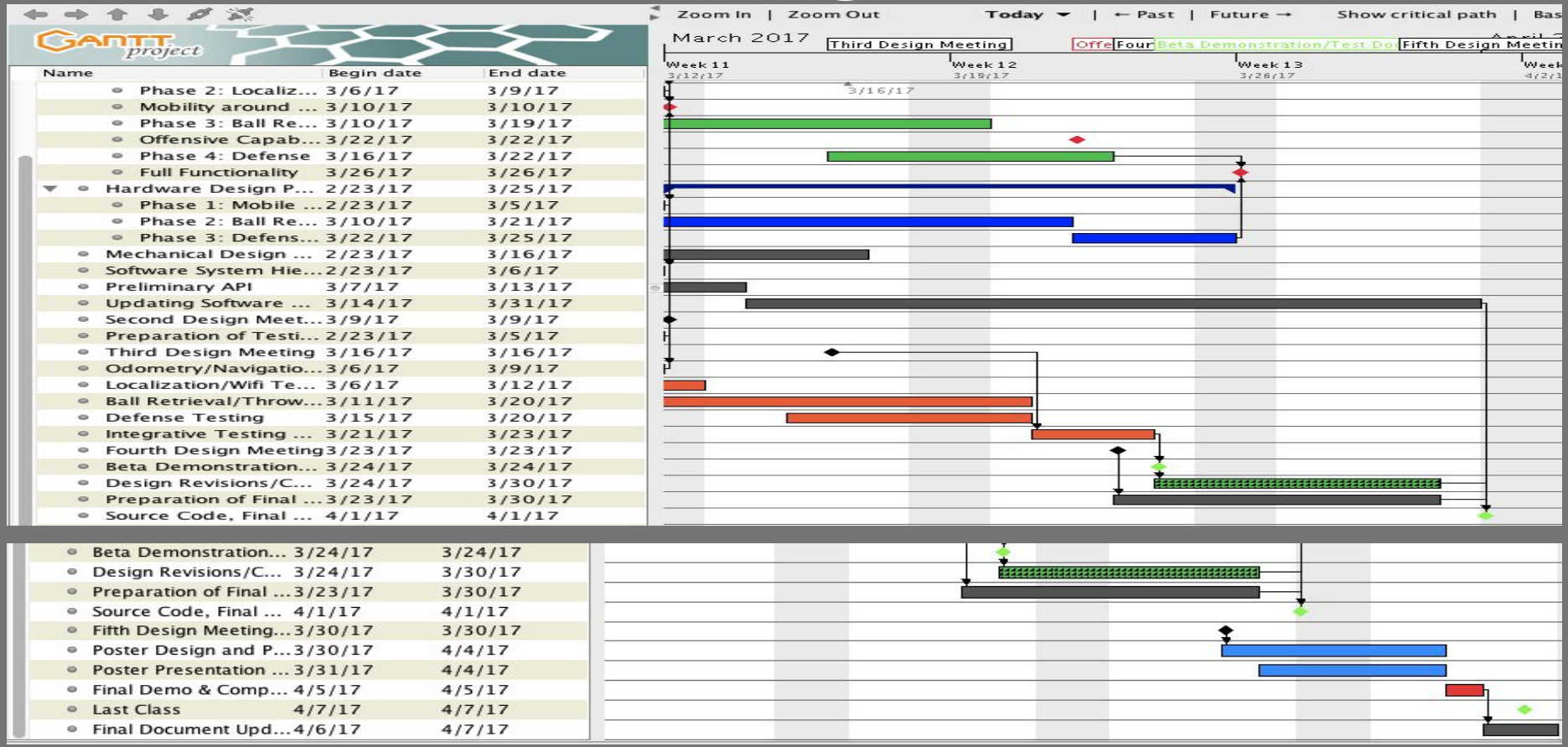


Task:	Gantt Due Date:	Completed?	Incomplete?	On Schedule?
Mechanical Design	3/16/17	X		Yes
Software Hierarchy	3/6/17	X		Yes
Preliminary API	3/13/17	X		Yes
Ball launching software design	3/12/17	X		Yes
Testing ball launching mechanical component	3/20/17	X		Yes
Integrative Testing	3/24/17		X	Yes
Obstacle Avoidance Software	3/23/17		X	No
Design of Obstacle Avoidance	3/16/17	X		Yes
Ball Retrieval	3/19/17		X	No

Gantt Chart V3.0



Gantt Chart V3.0 (current)



Budget Update:

Team Member:	Week 1	Reading Week (Overtime)	Week 2	Week 3	Week 4	Week 5	Total:
Alex	7	5	3	6			21
Durham	8	2	4	8			22
Ethan	2	4	7	8			21
Ian	5	4	3	6			18
John	8	6	2	6			21
						Team Total:	104

- **Currently under budget: 38.5% of budget consumed approx. 50% through the project**
  - Saves budget for integrative testing
  - Saves budget for final documentation
  - Saves budget for poster design and presentation practice
  - Saved budget for potential setbacks

Localization Testing Results:

Table 1: Localization Timing and Orientation

Trial	Start theta degrees	End theta(Position) degrees	End theta(Odo) degrees	Time - seconds
1	0	358	0.13	15.07
2	270	NA	NA	18.72
3	90	358	0.13	18.06
4	180	0	0.13	35.03
5	45	10	0.00	15.87
6	315	10	0.13	11.90
7	135	0	0.00	19.05
8	180	12	0.00	20.37
9	270	14	0.26	23.49
10	315	1	0.13	22.4
11	0	1	0.00	14.57
12	45	358	0.00	16.26
13	90	0	0.26	17.88
14	135	0	0.13	19.64
15	180	0	0.39	20.12
16	225	358	0.26	22.24
17	270	1	0.26	24.18
18	315	3	0.00	12.50

Mean time: 18.87s

Mean End theta (Position): 0.22 degrees

Design Details

Updates from March 11- March 17:

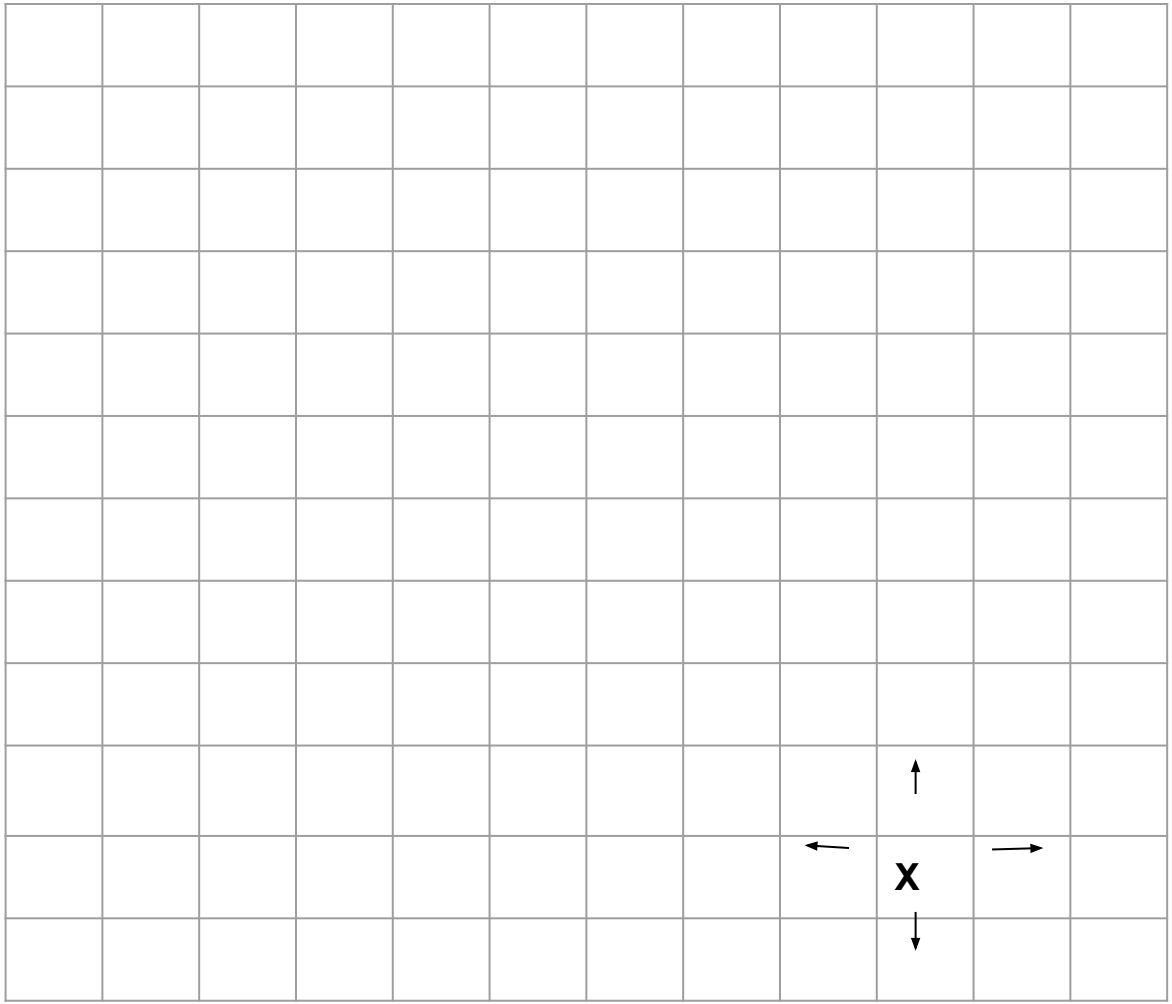
-Mapping

-Odometry Correction

-Launching Mechanism

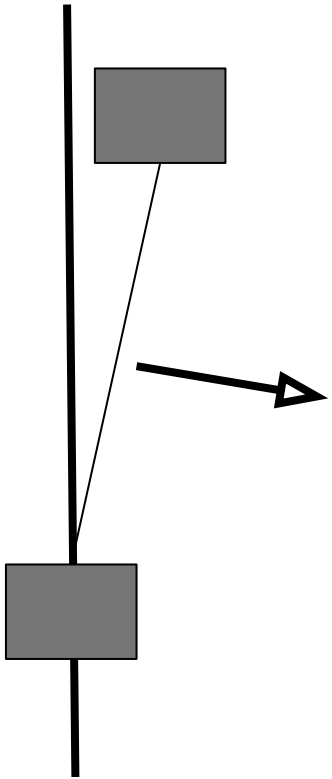
Mapping

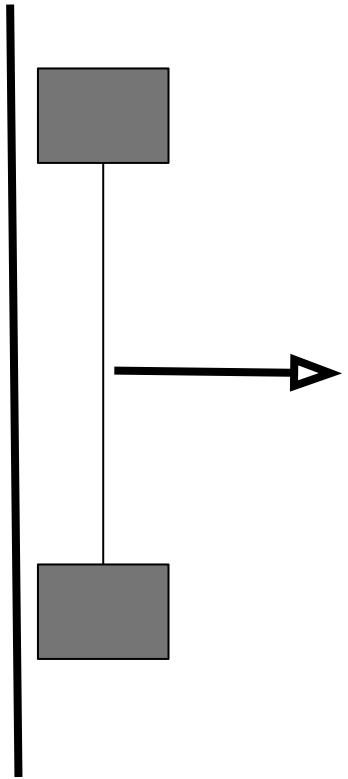
- Robot tracks its location (a certain square)
- Stores this in 2-D Array
- Features:
  - Knows adjacent locations (moves)
  - Integrated with odometry correction
- To be added:
  - Mapping obstacle locations (machine learning)



Odometry Correction

- Corrects at every grid line
  - Aligns wheels in cardinal direction
  - Corrects x or y position
- Pros:
  - Very accurate
  - Navigates well
- Cons:
  - Slow (stop & start)





Launching Mechanism

- Updates from original design:
  - Reduced weight
  - Reinforced near pivot
  - Calibrated release point
  - Rubber bands (store extra energy)
  - Rotated 90 degrees
- Ability:
  - Score at distance of 7 tiles away

Initial Design (for comparison)

Next Week

Ball Retrieval

Write Software to retrieve ball (position + beep)

Test Ball Retrieval

Test software to travel to and retrieve ball

3 Days: Design

4 Days: Integrative Tests

Obstacle Avoidance

Write software to detect, map, avoid obstacles

Testing Functionality

Test Software to travel, avoid obstacles, position and throw ball

Questions?