**SEPTEMBER**

**Week of 9/7-9/13**

Monday 9/8/14: Group Meeting- 2 hours

* Went over guidelines given for project.
* Decided first goal should be to figure out line following/movement/the base of the robot.
* Discussed what sort of questions we should ask Dr. Harvey
* Decided another initial goal should be to figure out the budget for at least the toys and supplies to build a course.
* Have games bought by next week.
* Assigned positions. Lorenzo – project manager, Chelsea – secretary, Louis – treasurer, Ivan – programmer, Evan – programmer.
* Looked up robot parts at robotshop.com to get an idea of costs
* Code of conduct must be made by Friday

Tuesday 9/9/14: Meeting with Dr. Harvey - 1 hour

* Determined that Dr. Harvey will be building a practice course.
* Websites to look for mechanical parts (pololu.com, robotshop.com, robotmesh.com, grainger.com, mcmaster.com, batteryspace.com, ti, Arduino.cc, motioncontrolonline.org, hobby town, radioshack)
* The line will be the width of painters tape
* The course may change but the game order will always be the same
* We don’t have to start from scratch – can use lego Vex, for example.
* Discussed movement options – treads vs. wheels, 4 wheels with 4 motors, or two wheels and a caster

Friday 9/12/14: Group Meeting - 1 hour 30 minutes

 - Discussed ideas for getting sponsors. Create a template for proposing sponsorship by 9/14

 - Finalized the code of conduct

 - Determined that the budget is around 700$, discussed the viability of creating a robot within this range.

 - Assigned work for weekend/next week: figure out requirements and specifications, research sensors for lights/color and research robot arms.

**Total for the week:** 3 hours and 30 minutes

**Week of 9/14-9/19**

Monday 9/15: Group meeting 2 hrs

* Discussed research – everyone presented what sensors/arms they found.
* Little gripper kits may be used in the final arm design
* Found an array of line following sensors
* Discussed design ideas – might be best to handle Simon not with a color sensor, but by using a microphone to pick up the different frequencies.
* Idea for separate arms for Etch-A-Sketch to save time and to add simplicity
* Arms will require servos and a way to control them
* Discussion of next milestone – ensuring that everyone is working on the report
* Worked on Milestone 1 report
* Discussion of schedule

Tuesday 9/16: Meeting Cancelled- Engineering Day
Friday 9/19: Meeting Cancelled- Class Presentations

**Total for the week:** 2 hrs

**Week of 9/20-9/27**

Sunday 9/21: Group meeting 2 hrs

* Discussion of Milestone 1 Presentation: All members arrived with notes about each of the sections they wrote in the Milestone 1 report.
* Decided on a slide format/coloring
* Worked on powerpoint slides as a group – everyone will write their own parts separately and then give them to Lorenzo to compile

**Monday 9/22**: Group meeting 1 hr

* Discussion of powerpoint slides: went over what is currently on the slides, discussed what should be added/removed
* Did a mock presentation of what is currently on the slides

Meeting with Dr. Frank 1 hr

* In order to be reimbursed we must provide Donna in office 341 will information about purchase
* Receipt must have a group member’s name on it or your credit card number
* There are university purchase forms that we can use to make large purchases without using out of pocket money
* Discussion of presentation expectations
* Put the name of the speaker on each slide
* Watch for speaking ticks
* Add a lot of diagrams, figures, pictures, etc.

Tuesday 9/23**:** Group Presentation of Milestone 1

* Briefly discussed performance with Dr. Harvey after presentation
* We should have distinguished between function requirements/capabilities better
* There should start to be more of a clear idea of who is in charge of different tasks for the robot
* Next time practice more in a group before the presentation

Friday 9/26: Group meeting 2 hrs

* Discussion of Milestone 1 Presentation – what went well, how we could improve. Discussed speaking ticks – touching face, hair, hands in pocket
* Ivan and Evan assigned to look into the MCU we will use – Arduino Mega is currently an idea
* Discussion of drive system – probably going with two powered wheels and a caster. How will they be interfaced? Chelsea to do research on drive system.
* Lorenzo assigned to do research on batteries/wires for the robot
* Louis assigned to do research on mechanical arms: pricing, interfacing, parts.
* Ivan and Evan assigned to research on sensors for line following and distance
* General discussion of ideas on how to handle each of the toys – distance detection in order to locate the games, use a microphone for simon.

**Total for the week**: 6 hrs

**OCTOBER**

**Week of 9/28-10/5**
Monday 9/29: Group meeting 1 hr

* Discussion of everyone’s research
* Louis showed the group some servos and brackets for the arms, pitched ideas about how the arms will connect and be powered
* Group did some rough sketches of ideas based on this
* Ivan presented different microcontroller options – no final decision made yet, still looking at the Mega
* Chelsea presented motor options – DC gearbox motors, probably from pololu
* Lorenzo recommended use of lithium ion batteries
* Discussion of potential questions to ask Dr. Harvey in next meeting – will try to get previous reports from other teams

Tuesday 9/30: Meeting with Dr. Harvey 1 hr

* General update of ideas and information
* Could use cone shaped custom end pieces for the Etch-a-Sketch arms, with continuous rotation servos, ends would slide into place and be grooved to grip onto the knobs
* Potentially could use whisker sensors to detect games – but robot might be going too fast by the time they hit
* Simple is better for the design
* Could use IR sensors for distance detection – good for short range, may need AD converters
* Asked about caster wheel in front vs. caster wheel in back – should make no real difference, just make sure the weight is balanced
* Discussion of task delegation
* Asked/received previous years teams reports to get an idea of what they did

Friday 10/3: Group meeting 2 hrs

* Discussion of design options
* Decided that caster wheel should be in the front of the design in order to maximize room for the arms (still up in the air, not a final decision). Majority of the meeting was spent debating this.
* Decided on using long metal “tongs” for grippers with servo to close them
* All arms at the front of the robot
* Grippers on bottom layer
* Chelsea and Evan worked on sketches

**Total for the week:** 4 hrs

**Week of 10/6-10/12**

Tuesday 10/7: Group meeting 1 hr

* General discussion of current ideas
* Discussion of upcoming major due dates – when milestone 2 is due
* Discussion of robot’s size requirements – current arm configuration may not fit within size restraints
* Louis presented two arm redesigns with the arms moved more towards the back of the chassis to make room
* Chelsea assigned to make 2D sketches in photoshop of current design

Thursday 10/9: Meeting with Dr. Frank 15 mins

* Update on current status – doing well
* Asked for feedback on Milestone 1 Presentation – try not to change speakers as much
* Watch out for speaking ticks
* Schedule was difficult to see
* More contrast on slides

Friday 10/10: Group meeting 2 hrs

* Discussion of drive system – finalized decision on the motors. Showed calculations from society of robots website, including necessary torque for rough weight estimate.
* Went with DC brushed 50:1 gearbox motors from pololu
* Purchased two motors
* Discussed sensors for line following
* Purchased sensors for line following
* Discussion of MCU – Arduino Mega will not work, alternative – Arduino Due
* Discussed pros/cons of Due
* Assigned tasks: everyone must write resumes, pros and cons of components for subsystems, choice for each system and good description of why it was made

**Total for the week:** 3 hrs 15 mins

Week of 10/13-10/19
Monday 10/13: Group meeting 1 hr

* Delegation of tasks for Milestone 2 – each team member is responsible for their own systems conceptual design sections, remaining sections are divided up evenly.

Tuesday 10/14 - Meeting with Dr. Harvey -30 mins, group meeting- 1 hr

* Go into the room for the presentation and make sure the projector works
* It’s a good idea to have a 3D model that rotates for the conceptual design in the presentation
* Change tenses in next report – don’t just update it with additional things we are doing, change things that are done to “have done” or it “was decided”
* Group tasks in the schedule for the presentation, leave the details for the report
* Have weeks rather than days in the schedule
* Risk analysis – realize that tasks in the schedule may have to be abandoned
* Popsicle sticks could be used to bolter arms in design
* For the starting LED it may be a good idea to shield out ambient light around the LED
* Come up with a plan for what happens when the robot misses a turn – don’t want to end up playing the wrong toy
* Make sure that Arduino purchased has PWMs build in (Due does), will be necessary to control servos for the arms and the motors for the drive system
* Make sure that the line following sensors are close to the wheels that drive the robot
* Pushing a caster wheel is harder than pulling one, don’t put too much weight on it
* Email the reports (milestones) to each professor for their convenience.

Thursday 10/16 - Group meeting 3 hrs

* The majority of this time was spent working as a group on the Milestone 2 report.
* Additionally, Justin, a mechatronics student, discussed our current design with us. He liked the idea of separate arms for the Etch-A-Sketch knobs, using a suction cup to pick up the playing card.

Sunday 10/19 - Group meeting 1 hr

* Discussion of handling of Milestone 2 workload – what could we have done better?
* Decided for Milestone 3 there should be more obvious tasks and due dates for each member in order to ensure that everything gets done on time
* Assigned slides for Milestone 2 Presentation
* Began work on Milestone 2 Presentation

Total: 4 hrs 30 mins

**Week of 10/20-10/26**

Monday 10/20 - Group meeting 1 hr 30 mins

* Going over Milestone 2 Presentation
* Went through slides, asked each other questions about various systems
* Made additions to slides
* Ensured that all slides have necessary information and are able to be seen
* Ensured that each team member had enough slides to speak on

Meeting with Dr. Frank 15 mins

* Discussed expectations in presentation
* Discussed current status
* Asked questions about milestone 3

Second group meeting 2 hours

* Finalized all slides and coloring for Milestone 3 Presentation
* Practice run of presentation
* Frequently interrupted each other with questions about systems

Tuesday 10/21 - Group presentation 1 hr

* Milestone 2 Presentation

Wednesday 10/23 - Group meeting 2 hrs

* Discussion of upcoming major purchases: batteries, servos for arms, sensors
* Arm configuration discussion: Louis presented two options for the arm configuration. The team discussed the options and made additional suggestions. The team voted on the options. The option picked includes a major arm for simon/rubik’s cube, two small arms for etch-a-sketch, and grippers to hold games in place.
* Power discussion: team members reported the power requirements of the various components of their subsystem (thus far)

Thursday 10/24 - Group meeting 1 hr

* Milestone 3 Report Discussion: The tasks for Milestone 3 were (partially) delegated.
Milestone 2 was read over, and improvements to be made over the last report in the current report were discussed.
* The options to be placed in Milestone 3 were finalized.
* Individual work/research

Saturday 10/26 – 2 hrs and 30 mins

* Motor tests with wheels attached: 0 – 11.5V applied (positive and negative). Discovered motors begin to spin at 0.3V.
* Discussion of motor mounting options – decided to buy motor mounts from Pololu.
* Chassis design options discussion. Team is fairly set on having a multi-layered chassis, currently at 2 levels. Decided on hard plastic for the material of the chassis.
* Decided that the prototype designs will feature solderless boards for the circuitry
* Discussion of what items need to be brought to the senior design lab – electronics kits, current sensors purchased, screws, etc.
* Discussion of current budget – updated with recent purchases

**Total for the week: 7 hrs**

**Week of 10/27-11/3**

Monday 10/27 - Group meeting 2 hrs

* Exploration of senior design lab – took note of what is available for use (ie: soldering irons, power supplies, oscilloscopes), searched for anything that may be of use in our project
* Discussion of line following system – how code for sensors integrates with code for motors, discussion of testing design and prototype for line following. A simple piece of wood with the motors, sensors, MCU and power will be used for now, test on white surfaces with black electrical tape as line.
* Line following to begin soon – within next two weeks
* Prototype design of chassis/robot by November 3rd
* Delegation of tasks in preparation for Milestone 3. All members must have respective subsystems updated. Each team member was assigned pseudocode to write for the major systems of the project. Decision was made to clean up the Milestone 2 report as a base for the writing of Milestone 3.

Tuesday 10/28 - Group meeting, meeting with Dr. Harvey 1 hr

* Asked Dr. Harvey for feedback on Milestone 2 report, asked for what changes should be made going into Milestone 3.
* Caster wheel design needs to be updated – the plastic 1” wheel will probably not be able to handle the weight of the robot.
* For the Simon Says game, tight bandpass filters should be used in order to detect the sound. No lowpass or highpass like previously discussed, because that increases the chances of getting a false positive.
* Check Arduino/power supply specs: find out if the Arduino and the motors need to be placed on separate power supplies.
* Options for power: Place Arduino on separate supply to motors, have separate wires for pwr/gnd, or place a capacitor in front of the Arduino. Check the nominal voltage on the batteries.

Thursday 10/30 - Group meeting 3 hrs

* Line following work with Evan, Ivan and Chelsea
* Code was found/edited for the line following sensors
* Research on motor driver options
* Attempted to build an H-bridge to power motors forwards/backwards with Arduino
* A large portion of the meeting time was spent altering custom H-bridge, attempting to get it to work
* Custom H-bridge testing was a failure.

Friday 10/31 - Group meeting 1 hr

* Motor driver options presented to group, decided on A4490 from Pololu, ordered
* Servo motor testing: all but one servo is operational
* Discussion of chassis – 3D modelling, final shape and design of top and bottom layers were discussed.
* Power system re-evaluation with Harvey’s suggestions and team member contribution. Motors and Arduino will be on one battery, with everything else on the other.
* Testing plans were discussed for various systems, potentially will be added to Milestone 3 as an additional section.
* Discussion of current schedule – discussed if current tasks are being completed on time, if everyone has enough/too much to do, etc. Determined that current schedule/workload is fine.

 **Total for the week: 7 hrs**

**NOVEMBER**

11/2 - 11/8
Sunday 11/2 - 10:30 am - 2 pm Group Meeting/Work

* Review of the current schedule – pushed back line following and chassis design to account for not having parts necessary to complete the drive system on time (motor driver)
* Discussion of website design
* Website should have photos of the design
* Website should have work in progress videos and pictures, as well as all reports
* Assigned task of thinking about pin connections
* Everyone must do pin connections for their respective systems (Ivan – top level, Lorenzo – power, Chelsea – drive, Louis – arms, Evan – sensors) and provide a brief explanation along with diagrams on the google drive
* Discussion of meeting with Dr. Frank – ask questions about next Milestone expectations, improvements that could be made over previous milestone

Monday 11/3 - 9:00 am - 10:00 am Group Meeting, 10:00 am - 10:30 am Meeting with Dr. Frank

* Milestone 3 should be an update of Milestone 2 with options that are no longer being considered taken out
* Milestone 3 should have more a more detailed review of the robot’s systems and how they will be interfaced
* Asked for Milestone 2 Presentation feedback
* In next presentation there needs to be less of an introduction – they know who we are already
* Block diagrams shouldn’t have any diagonal lines
* The schedule must feature actual dates for major tasks
* Flow charts should be standardized
* The code for the robot is already a state machine, there doesn’t need to be a counter to keep track of what toy it’s on
* Milestone 3 should feature a total power analysis
* Milestone 3 needs more schematics
* We need to ensure the robot’s center of gravity is low enough

Thursday 11/6 - 2:00 - 3:30 Group Meeting with ME

* Spoke with Justin, a mechatronics student about current robot design
* Presented power analysis
* Presented current arm configuration, with single arm for Rubik’s cube/Simon and two arms for Etch-A-Sketch, he agreed that the current configuration works fine
* Determined a larger caster wheel is still necessary, did some testing with smaller caster wheels (applying pressure, rolling across table) and it seems that the robot load will cause too much friction for it to work properly.
* Discussed previous mechatronics class projects

Friday 11/7 - 10:00 - 11:00 Group Meeting

* Discussion of tasks for Milestone 3
* Psuedocode should have been completed – was not completed
* New due date for pseudo code 11/10
* Top level block diagrams for each system should be completed by 11/10
* Discussed formatting of Milestone 3
* Discussed sections in Milestone 3 that do not need to be changed from Milestone 2
* Worked on Milestone 3 Sections

Total for week : 7 hrs 30 mins

11/9 - 11/15

Thursday 11/13 - 2:00 pm - 3:00 pm Group Meeting, 6:00 pm - 12:00 am Group Meeting/Work

* Discussed what Milestone 3 sections still need to be updated with new information
* This time was used for compiling/editing the Milestone 3 report
* The report was in a google drive document and the group worked together simultaneously to ensure that it was ready for the deadline.

Friday 11/14 - 9:00 am - 10:00 am Meeting with Dr. Harvey

* Milestone 3 presentation should feature a simplified schedule
* Don’t include a detailed Gannt chart
* The intro should include a reminder of the basic needs of the project, a refresher of what the course looks like, and a concept sketch of the robot.
* After the intro, each team member should present their technical area along with the risks for that technical area, so that speakers don’t change too much
* Scheduling/budget risks should be at the end
* Organize technical areas based on dependencies
* Read the rubric for the presentation – check that all requirements are met
* Later for testing – there should be test plan forms with clear requirements for passing/failing

                     10:00 am - 1:00 pm Group Meeting/Work

* Motor driver shield tests – successfully powered each motor forward and backwards
* Final edits made to Milestone 3 report, final read through

Total for the week: 10 hrs

11/16-11/23

Sunday 11/16 – 9 am to 12 pm Line following tests

* Line following tests were done during this time. A prototype chassis was assembled, all the necessary connections were made.
* The code was not successful in following a line before the battery died as it was not fully charged
* Using a stationary power supply, the code eventually allowed the robots wheels to respond to the movement of a line the way they would if it were a turn.

Monday 11/17 - 10:00 am - 10:20 am Meeting with Dr. Frank

* Milestone 3 presentation should include videos of any working parts of the robot that we have.
* Website should include logs of team activity
* The rubric for the website is online

Thursday 11/20 - 5:30 pm - 7:30 pm Group Work/Line Following Tests

* Arms/servo bracket demonstration
* Discussion of line following code
* Line following tests, the majority of this time was spent changing the code and trying to get the robot to follow a line.
* Eventually successfully followed course that we made perfectly.
* Slide assignments for next presentation: in depth discussion of what will be on each slide, slides due at 8 am on

Thursday 11/20 - 9:00 pm - 11:00 pm Group Meeting via Google Hangouts (going over presentation)

* The group looked over the slides via google hangouts and a google doc of the presentation
* Each group member talked about their slides, why the information that was included was included, why any information wasn’t included
* Each team member responded to questions about their slides from other team members

Friday 11/21 - 11:00 am - 1:00 pm Group Meeting/Presentation Practice

* The group went over the presentation again, first reading through the slides to make sure that the presentation was visually pleasing and had all necessary information
* Each member then presented their respective slides
* The team tried to think of potential questions reviewers could ask, and what responses would be.

 **Week total: 9 hrs 20 min**