**Robotics 2014-2015 Planning Notes**

**Why Robotics? – What is the purpose of our robotics program?**

In an environment where knowledge is a constantly changing, free commodity, our purpose is to teach students to innovate, work collaboratively, learn by failure, pursue in solving problems and to use this knowledge effectively in persevering in the process of manifesting their ideas into a physical reality.

**Our Vision – What do our students leave our course having learned and accomplished?**

Students will have integrated the processes of design, computer programming, mechanical engineering and electrical engineering and undergone the cyclic engineering process in order to create a working prototype of an autonomous robot that solves a student defined problem.

**Robotics Projects, Competitions and Symposium for 2014-2015 School Year**

First Semester Competition (Friday December 12th) - Minesweeping robot uses a variety of sensors to autonomously navigate and make decisions within a complex environment that involves detecting and detonating mines.

**End of year Robotics Symposium** (Friday May 29th) - See our vision

**Teaching Creativity – How do we teach our students to be problem solvers and think outside of the box?**

Explicitly teach and identify conceptual blocks

Routine Creative Exercises (Open ended problems/brainstorming/model the process)

Keeping a visual thought journal with reflection (reevaluate prior designs)

**Keeping a Visual Journal and an Engineering Notebook**

Visual Journal - Bound grid notebook for keeping daily thoughts and ideas in a visual and written form.  Students will respond to our routine creative exercises in this notebook. (Note a notebook!)

**Engineering Notebook** - One notebook per team (electronic or paper based) that details the progressive steps taken to complete the project which includes visuals diagrams, problems encountered with developed solutions.  There are two projects for the course which require an engineering notebook: minesweeping and Second Semester autonomous robot build.

**Robotics Content – What aspects of programming, electrical engineering, mechanical engineering and fabrication do we explicitly teach to our students?**

**Programming Content**

* The microcontroller
* DEBUG, DEBUGIN, DEBUG CR Command
* END Command
* PAUSE Command
* DO...LOOP Command
* HIGH/LOW PIN
* Defining pins
* PULSOUT Command
* VAR Definitions
* FOR...NEXT...RETURN  Command
* GOSUB (subroutines) Command
* IF...ELSEIF...THEN Command
* DO/WHILE/UNTIL (conditions) Command
* FREQOUT Command
* Continuous Rotation

**Sensors Content**

* Tactile Sensor (aka whisker)
* Infrared Object Detection (Using IR LED with Receiver)
* Infrared Reflective Switch

**Additional Sensor Possibilities**

* Ping Ultrasonic Sensors
* Photo detectors (aka photo resistor)

**Electrical Engineering Content**

* Using a breadboard
* Reading a resistor
* How to solder
* Understanding Vdd, Vss and Vin
* Understanding I/O Pins
* Interpret schematic drawings
* Identifying short circuits
* Wire IR reflective switch sensor
* Wire an infrared led in conjunction with an infrared receiver
* Wire a transistor combined with an optoisolator to act as an electric switch
* Motor Control - transistor, h-bridge, H25 Motor Control
* Wire a touch switch to act a touch sensor

**Mechanical Engineering Content**

* Using Bearings
* Using gears
* Pulleys, sprockets, belts, and chains
* Couplers

**Fabrication Content:** Plywood, Aluminum and Plastic

* Safety Procedures and Contracts Overview
* Use of clamps and vises
* Use of hand tools
* Use of Drill Press
* Use of Scroll Saw
* Use of Dremel
* Molding Techniques (Instamorph plastic and Epoxy Putty)