Senior Design Plans for Next Semester
Project: Wolf Eye

As a team, we learned a lot about teamwork and accomplishing tasks this semester. Throughout the semester our team was cohesive and motivated, however a few things could have been improved, and we plan to change a few things for next semester. First, we did not realize the amount of time we needed to spend on putting together documents for the class. The time spent on documents took away time from project design and testing. Next semester we will be more aware of the work involved. We plan to spend more time at Wolf Robotics, as we felt that during this first semester we were much more productive during an extended time period at Wolf, than several short meetings at CSU. Also, Kevin Ball will be taking on more responsibility for writing the papers and documents that are due. This will free up more team project work time to develop our calibration routine. A few other changes for next semester include not waiting till the last second to accomplish tasks and more communication between team members throughout the week.

For next semester, Wolf Eye is ready to enter the implementation phase of the project. During the past few months, we have researched the industry need present at Wolf Robotics, assessed the systems and components available to us, designed a detailed algorithm for completing our goal, and finally initiated testing of our components and methods. We have completed the design stage of the project, and in the next semester we will build our calibration system. Up to this point, we have been writing short, temporary code snippets to learn about the robot setup and run simple tests on our system. Our next step is to develop a full program in the RAPID language to automatically calibrate the laser sensor. This program will be based on the calibration algorithm we have designed. We will configure our code to accept analogue distance data from any single-dimensional distance sensor. In addition, our code will be written for use on any ABB 6-axis robot. By accommodating generic distance data and multiple robot types, our system will have the capability to be used in any robotic setup, not exclusively for our specific ABB robot and the Keyence IL-300 laser sensor. This way, Wolf Robotics can use our calibration routine in future systems. If we create a successful calibration routine, our design may be implemented on a robotic system Wolf is designing in April 2015. We will test our code using both the Robot Studio virtual environment as well as the physical robot.

If the implementation and testing of the calibration routine is completed earlier than expected, next semester remaining time will be used to develop feature sensing routines using the calibrated laser sensor. Our goal will be to use the sensor to scan simple types of weld joints and identify points of interest, such as points at the beginning and end of a weld. Wolf Robotics' long term goal is to use the laser sensor in tandem with a welding arm in order to accurately identify weld joint topography and produce accurate welds. By beginning the process of creating weld joint sensing routines, we will increase the long-term utility of our system.
There will be 4 phases of project work next semester. The first phase will be finishing the tests we started this semester, mainly the edge detection at variable speed test and the midpoint calculation test. I expect this phase to last until February 7th. The second phase will be writing and debugging a calibration routine. This will be the most design intensive phase and will require a lot of effort and time. This phase should last until around March 1st. The third phase is routine optimization. In this phase we will be improving the accuracy and efficiency of our method. This phase will last until around March 25th. The final phase will be feature detection on weld joints using the laser. Specifically we plan to find points of interest on T-joints, Groove joints and Corner Joints. This phase will last till the end of the semester.

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<tr>
<th>Dates</th>
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| January 20th - February 7th | 1. Complete Testing | Kevin: Edge Detection at Variable Speeds Test  
Kaden: Midpoint Calculation Test  
Asa: Assist with both tests |
| February 8th - March 1st | 2. Program Calibration | Kevin: Write Edge Detect Method  
Kaden: Write Midpoint Calculation Method  
Asa: Write Work-Object Method |
| March 2nd - March 25th  | 3. Optimize Routine | Kevin: Increase Efficiency (time)  
Kaden: Increase Accuracy (TCP accuracy)  
Asa: Clean-up Code and Variable Storage |
| March 26th - End of Semester | 4. Feature Detection | Kevin: T-Joint Features  
Kaden: Corner Joint Features  
Asa: Groove Joint Features |