



EECS 373: Design of Microprocessor-Based Systems

Segway

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Motivation

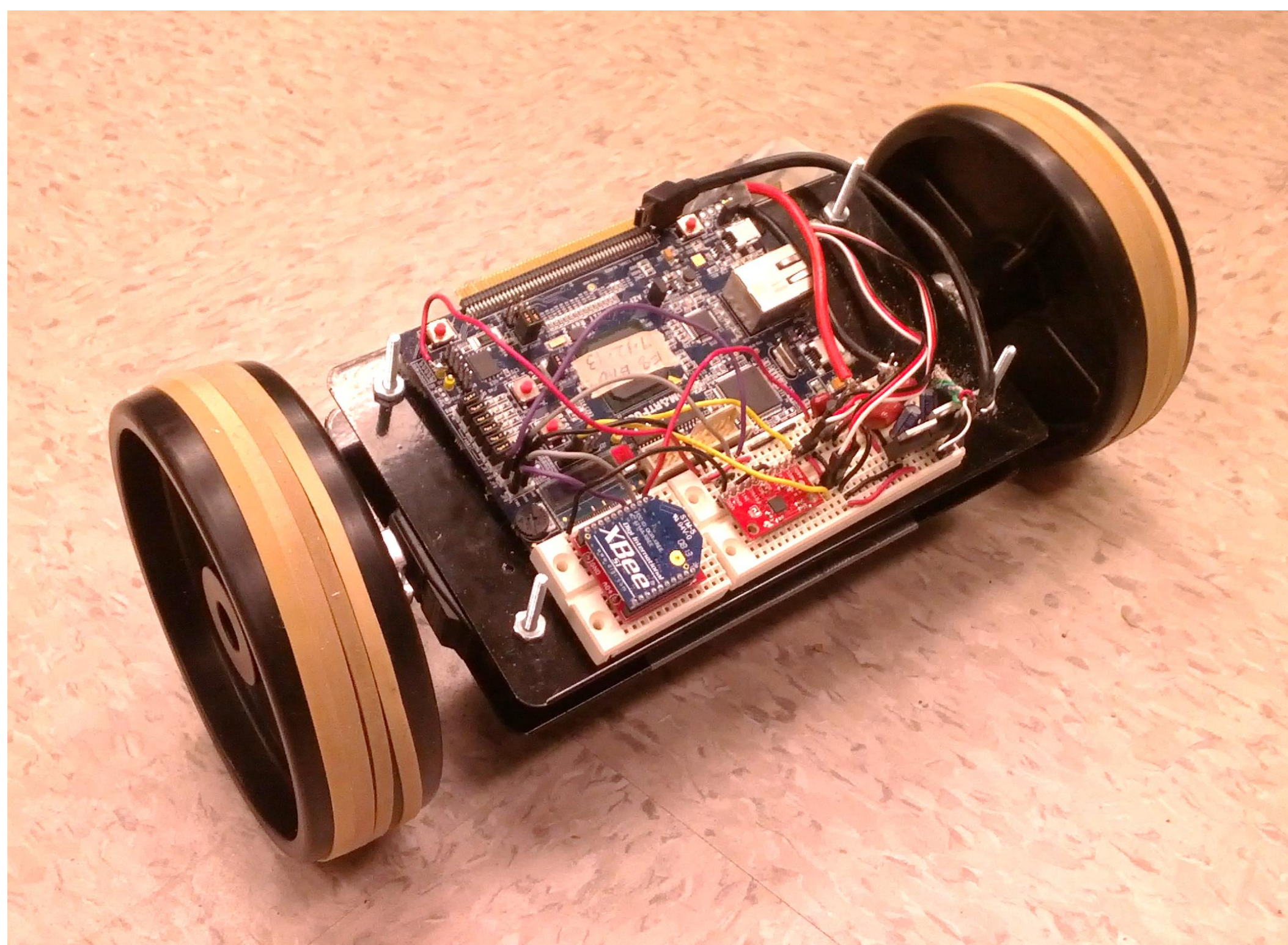
Design a project that interfaces with various embedded devices, while attempting to solve a practical application of control theory.

Problem

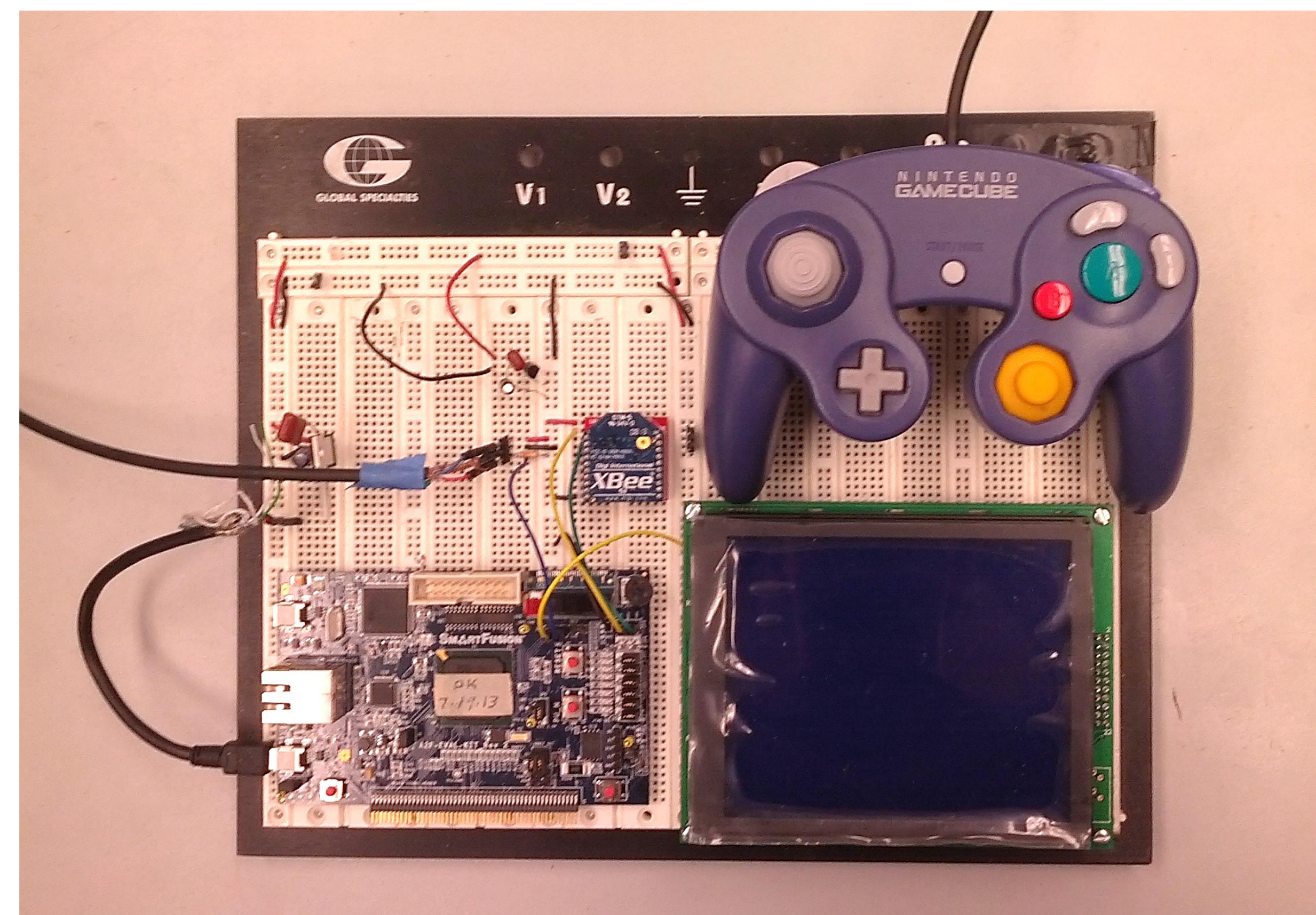
- Build inverted pendulum robot
- Apply knowledge gained throughout course
- Interface with controllers, LCD screens, and servos
- Integrate feedback with Inertial Measurement Unit
- Wirelessly control robot

Design Process

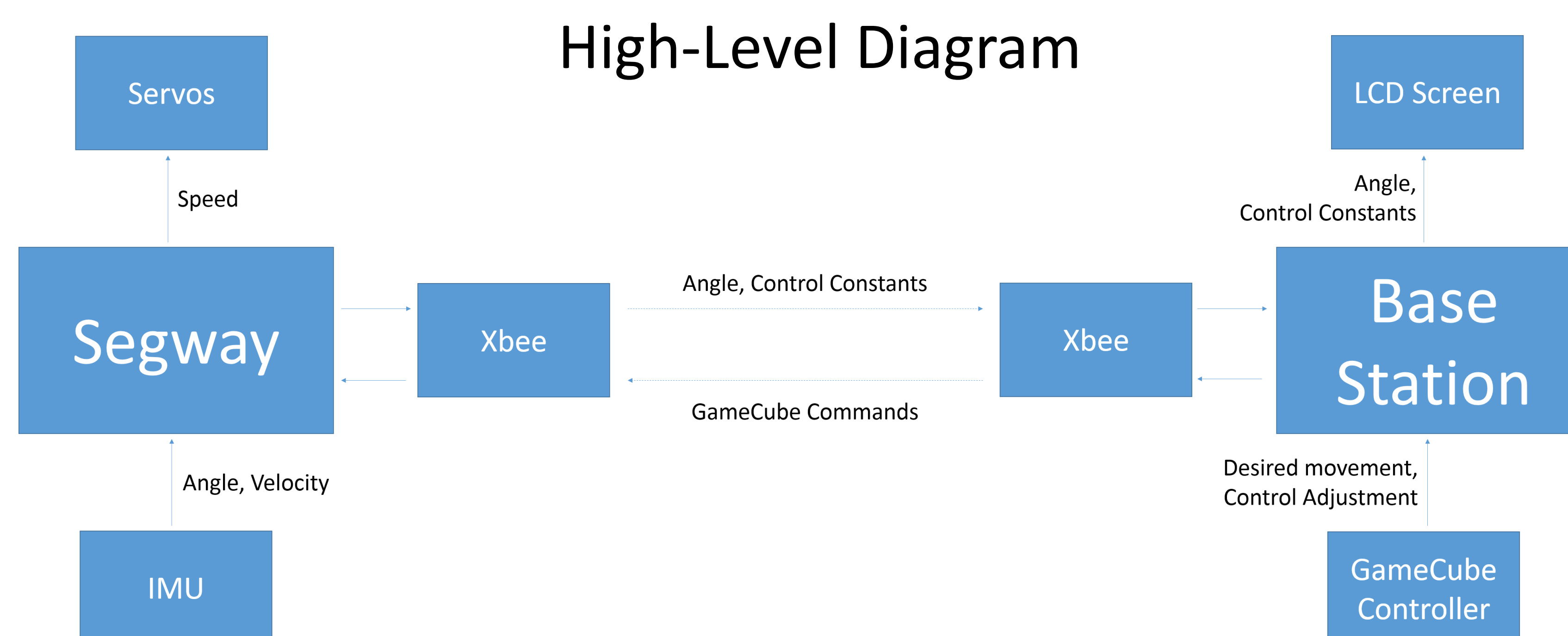
- Calibrating IMU for angle feedback
- GameCube controller interfacing
- Physical construction of robot body
- Circuit prototyping for electrical requirements
- Bidirectional Xbee communication
- LCD Screen refresh rate adjustments
- Tune PID Controller values for balancing



Segway Robot



Base Station



Conclusion

Starting the project, our intuition was that we would be able to build our robot and then design the feedback controller to keep it upright. As the project became fully realized, we found that controller tuning was significantly difficult. Without precise knowledge of the robot, it is difficult to design control algorithms. We also found that the servo speed could not be adjusted as fast as required by the control algorithm, resulting in the robot oscillating about the desired upright position.