Executive Project Summary

The main objective of our project is to design and assemble a SpyderCam, which moves a payload suspended by three or more wires attached to pylons along a horizontal plane. It has to move at least 4 inches per second, draw a 10 inch straight line accurate to 0.25 inches, inexpensive (~ $100), and use a G-Code command interface to control it. Our team also included two other requirements the final product must satisfy: an auto-center feature and a draw-square subroutine. The former simply returns the SpyderCam payload to the center of its moveable area, which is meant to be the area of an 8.5" x 11" piece of paper. The draw-square subroutine is designed to draw a square of length 4 inches about the center of the paper.

At the onset of this project, our group agreed to use stepper motors to control the wires, four pylons to represent a cartesian coordinate system on the paper, and to also include joystick functionality if time allows. As we began working on our assigned blocks, we ran into many issues pertaining to moving the motors correctly and smoothly without compromising the structural integrity of the frame. During our first block checkoff, our mentor Dr. Shuman highlighted these issues and suggested we use a three-pylon system instead. After heavily revising our original design, we decided to proceed with a three-pylon system, using a MATLAB GUI that not only allows the user to input G-Code, but also converts G-Code into the number of steps each motor needs to move to reach the desired location. While the GUI was being designed, the various parts were ordered, the PCB was designed and printed, and an enclosure along with motor spools for the threads were 3D printed. Once everything was assembled, our group spent the rest of the time testing, debugging, and compiling the documentation.

This project taught our group numerous important lessons about working as a team, including:

1. Communication is key, especially when group members are isolated from each other.
2. *Always* make sure the team, including yourself, knows your responsibilities during the project.
3. While a predetermined plan is helpful, do not be afraid to deviate from it if needed.
4. Creating a schedule with meetup times and deadlines is incredibly valuable when working with a time limit.

ECE 342 Final Project Timeline

Project Title:	Spydercam	Team 23
Names:	Sawyer Brundage, Camden Robustelli, Mikhail Burlachenko, Ali Alfadala	

WBS NUMBER	TASK TITLE	START DATE	DUE DATE
1	**Conceptualization**		
1.1	Discuss Project with Mentor	1/11/21	1/11/21
1.2	Create Overall Block Diagram (Rough Draft)	1/11/21	1/15/21
1.3	Create a Bill of Materials	1/15/21	1/22/21
2	**Design Individual Blocks**		
2.1	Discuss General Layout	1/15/21	1/19/21
2.2	Create Rough Drafts of Wiring Diagrams/Pseudocode for each Block	1/15/21	1/22/21
2.3	Decide First Block to Create	1/22/21	1/22/21
2.4	Finalize First Blocks	1/22/21	1/29/21
2.5	Evaluate/Revise First Blocks after Checkoff	1/29/21	2/5/21
2.6	Design Second Blocks	2/5/21	2/19/21
3	**Building the Spydercam**		
3.1	3D Print Motor Spools	2/8/21	2/15/21
3.2	Design and Print PCB	2/15/21	3/1/21
3.3	3D Print Payload	2/1/21	2/15/21
3.4	Assembling Foundation/Pylons	2/22/21	3/1/21
3.5	Assembling Circuit with PCB	3/2/21	3/4/21
3.6	Testing/Debugging	2/26/21	3/4/21
4	**Presenting the Spydercam**		
4.1	Populating Project Showcase	2/26/21	3/5/21
4.2	Practicing Presentation	3/1/21	3/3/21
4.3	Record Video	3/4/21	3/4/21
4.4	Edit and Publish Video	3/5/21	3/5/21