Final Project Proposal

Year: \_2021\_ Semester: \_\_Spring Team: \_16\_ Project: \_Smart Conveyor Belt System\_\_\_\_

Creation Date: \_\_\_1/22/2021\_\_\_\_\_ Last Modified: \_1/22/2021\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Team Members (#1 is Team Leader):

Member 1: \_Jason Cao\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Email: \_\_\_\_\_cao216@purdue.edu\_\_\_\_\_

Member 2: \_Zicong Wang\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Email: \_\_\_\_\_wang4166@purdue.edu\_\_

Member 3: \_Ryan Eastman\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Email: \_\_\_\_reastman@purdue.edu\_\_\_

Member 4: \_Jonah Shader\_\_\_\_\_\_\_\_\_\_ Email: \_\_\_\_jshader@purdue.edu\_\_\_\_

1.0 Project Description:

Our project is a conveyor belt system that is capable of rapidly sorting parcels at a much higher speed while also utilizing fewer moving parts. The system uses barcode scanners to read in information about each parcel. This information is relayed to the microcontroller, where programs sort the parcel to a specific sorting compartment based on the value it is given. Once a sorting compartment has been chosen, the microcontroller passes on signals to the motor driver board, which changes the configuration of the sorting flaps to guide the parcel into a specific compartment. The sorting flaps can recess into the side of the conveyor belt barrier to allow parcels to bypass specific sorting locations, allowing this solution to be scalable to any conveyor belt length.

2.0 Roles and Responsibilities:

Jason Cao has been part of numerous different group projects, both within and outside of Purdue University, as a team member and a team leader, with multiple projects being successful. In each of his projects, he takes the initiative in driving the project forward and assists his peers when issues arise, whether it is dealing with erroneous code or clarifying any programming objectives. In the past, he has worked in a biotechnology company where he successfully created software scripts using a custom version of JScript to control lab machinery. These scripts are still in use to assist researchers with their experiments. In addition to having taken a variety of ECE courses ranging from the basics of low-level programming to complex higher level languages, he is able to actively coordinate and lead his teammates to completing project objectives, which makes him qualified as the project leader for this venture.

Zicong Wang has had experience in low level programming with microcontrollers. He has had research experience in developing deep learning algorithms with Professor Allebach. During his time on the project, he modified a pre-existing deep learning program to recognize text from a printed document, and output to a file of optimized resolution that could be compressed to a smaller file size. He has programming training in a multitude of high-level programming languages, like Python, C, and Java. From his prior projects, he has had an abundance of experience prototyping new software, which makes him qualified as a software engineer for this project.

Ryan Eastman has been in charge of low level coding and design in industrial settings in the past and has taken low level coding classes here at purdue. He loves the C language to an unreasonable degree and is very familiar with assembly (see ECE 468 Compilers). In the past he designed a well controller system currently in use at Calportland Cement. These experiences qualify him to be the system engineer for this project.

Jonah Shader has had much experience in Purdue University including motor labs, microcontrollers labs and embedded systems. He has worked designing hardware during internships and clubs and has plenty of experience in hardware. All these make him exceedingly qualified to be the Hardware Engineer.

2.1 Homework Assignment Responsibilities

|  |  |  |  |
| --- | --- | --- | --- |
| *Design Component Homework* | | *Professional Component Homework* | |
| 3-Software Overview | ZW | 9-Legal Analysis | ZW |
| 5-Electrical Overview | JS | 10-Reliability and Safety Analysis | JS |
| 7-Mechanical Overview | RE | 11-Ethical/Environmental Analysis | RE |
| 8-Software Formalization | JC | 12-User Manual | JC |

RE: Ryan Eastman JC: Jason Cao ZW: Zicong Wang

JS: Jonah Shader

3.0 Estimated Budget

|  |  |
| --- | --- |
| MicroController | $20 |
| **Mechanical Components** |  |
| Brushed DC Motors | $125 |
| Servo Motors | $50 |
| **Electrical Components** |  |
| Barcode Scanner (x3) | $90 |
| Conveyer Belt | $50 |
| Misc-wood,metal,plastic | $25 |
| Infrared Proximity Sensor | $14 |
| **Total Budget** | $374 |

The project costs would be distributed equally amongst the 4 team members. Purdue would be expected to cover the cost of the barcode scanner, and brushed DC motors. Each team member is expected to spend $36.25 to advance this project forwards.

4.0 Project Specific Success Criteria

The following project specific success criteria are proposed for the Smart Conveyor Belt System:

1. An ability to interface with a/multiple barcode scanners
2. An ability to control all servo positions using level-shifted pwms of variable duty cycle originating from the mcu.
3. An ability to interface with a motor driver so that our microcontroller can control movement of conveyor belt.
4. An ability to rapidly switch sorting positions to organize packages using microcontroller signals and logic with minimal runtime.
5. An ability to interface with an IR scanner in order to detect a package location

5.0 Sources Cited:

No external works were used to write this report.