Mechanical Overview

Year: _2021_ **Semester:** _Spring__ **Team:** _16__ **Project:**_Smart Conveyor Belt System___
Creation Date: ___2/18/2021_____   **Last Modified:** 2/19/2021
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Assignment Evaluation:

Item	Score (0-5)	Weight	Points	Notes
Assignment-Specific Items				
Commercial Packaging Analysis 1	5	x2		
Commercial Packaging Analysis 2	5	x2		
CAD Model Illustrations	5	x4		
Project Packaging Specifications	5	x2		
PCB Footprint Layout	3	x2		
Writing-Specific Items				
Spelling and Grammar	5	x2		
Formatting and Citations	2	x1		Submit as word
Figures and Graphs	5	x2		
Technical Writing Style	5	x3		
Total Score	93			

5: Excellent   4: Good   3: Acceptable   2: Poor   1: Very Poor   0: Not attempted

Comments:
Comments from the grader will be inserted here.

Nicely done.

See my comments below.

Submit as word document next time.

1.0 Commercial Product Packaging

1.1 Product #1

EZ Flats Pro by Engineering Innovation is a solution created here in Lafayette. This is a mail and parcel sorting system using rollers to move the packages. It's designed so the package gets scanned as it's coming along the system. The operator is then meant to pick the package up by hand and sort it. The design is meant to assist humans not fully automate the package sorting. It relies on rollers which have minimal maintenance. Our system will use barcode scanners as well but instead of rollers we're using a conveyor belt for speed and instead of relying on human intervention ours will direct the packages to the correct placements.

1.2 Product #2
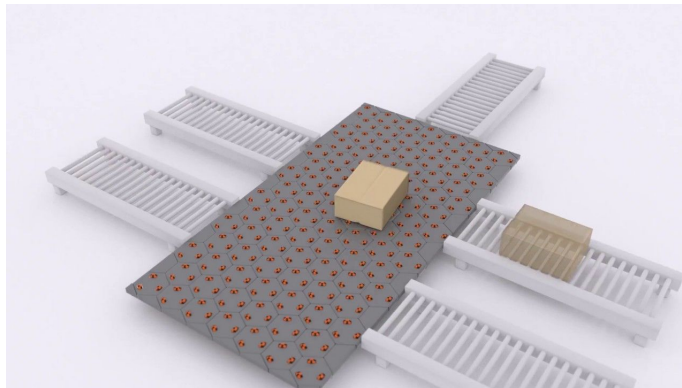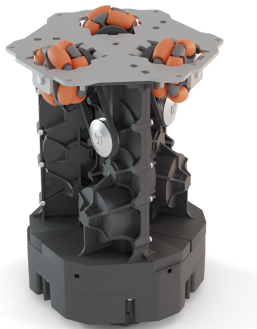
Celluvayor by Cellumation is a package movement solution that uses a cell based design to be expandable to whatever needs. It moves the packages wherever they need to by moving along motorized wheels until the package goes where it needs to. This has several advantages, it's expandable, it's omnidirectional and it does not rely on gravity. This design does have some downsides, maintenance effort can be high due to the large number of moving parts and pieces. Cost can be very high as well as it takes many cells for large package platforms. Our system includes a way to retrieve information from the packages as well as moving them. In addition ours will move packages quicker as each wheel on the celluvayor has a relatively small motor.

Our design has another advantage over the complex cell design in that if a part fails it's easy to identify and replace without more than a little disruption to the machine. Maintenance such as oil and inspections is easier to perform on our design as well. And finally our design is much cheaper with no proprietary materials.

3.0 Sources Cited

Throughout this and other papers, use of the IEEE citation style should be used. Use of embedded hyperlinks for all web-based sources is required. A reference to the IEEE citation style format is provided here.

[4] cellumation. 2020. *Celluveyor - Cellumation*. [Online] Available at: https://cellumation.com/celluveyor/ [Accessed 23 December 2020].

Appendix 1: CAD Model Illustrations

Provide relevant screenshots of your product packaging CAD model. Be sure to include relevant dimensions as well as units/scale
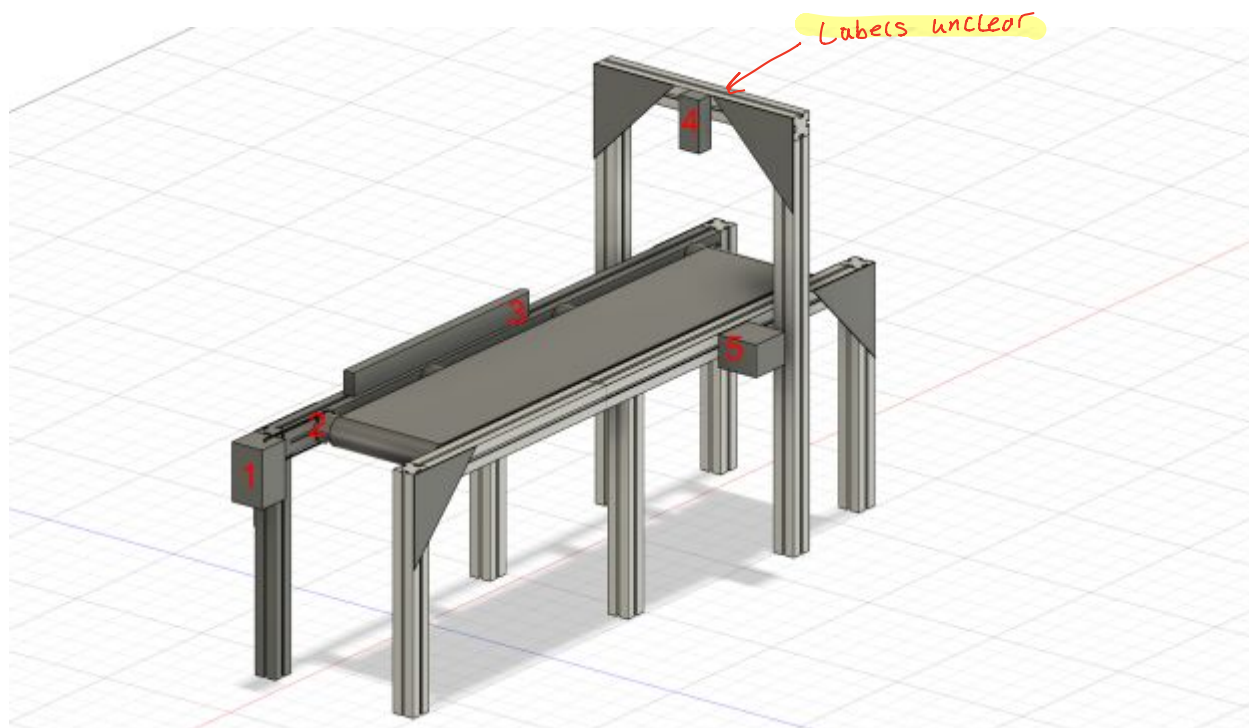
1) Motor plus belt
2) Sprocket connecting belt to roller
3) Servo + Bumper
4) Barcode Scanner
5) Microcontroller and PCB case

Appendix 2: Project Packaging Specifications

Include a table of project packaging specifications here. Include a materials list, tooling requirements, estimated weight, estimated unit cost, and other relevant specifications.

Height: 1.3 m
Length 1.2 m
Weight ~57 Kg (Very rough guess based on Fusion 360 weight estimates)
Belt Width ~20.32 cm
Belt Length 1m
Roller Diameter 4.83cm
Estimated Unit Price: $375

Barcode Scanner Module, 1D/2D Codes Reader	1	5 V		Waveshare	Barcode Scanner Module	Waveshare	14810
Belting for Slider-Bed Conveyors	1	0.135''		McMaster-Carr	6001K2	McMaster-Carr	N/A
Reversible Electric Gear Motor	1	12 V		Makermotor	PN01007-10038	Amazon	N/A
Power Supply	1	12 V 10 A		BINZET	FBA_LTC0487	Amazon	N/A
Servo Motor	1	55g		Deegoo-FPV	N/A	Amazon	N/A
Voltage Regulator	2	12V/24V		Bankee	N/A	Amazon	B08NZTJ9GF
T-Slotted Frame Double Layers Conveyors (4' Long) [W: 40 mm]	2			McMaster-Carr	5537T112	McMaster-Carr	N/A
Tee Surface bracket for Double and Quad rails [Ht. 40mm]	2			McMaster-Carr	5537T975	McMaster-Carr	N/A
Diagonal Brace for Single Rails	8			McMaster-Carr	47065T12	McMaster-Carr	N/A
T-Slotted Frame Double Layers Conveyors (short) [2' cut to 12 7/8'']	2			McMaster-Carr	5537T112	McMaster-Carr	N/A
Open Extended Gusset for Double and Quad Rails [H: 80mm]	8			McMaster-Carr	5537T6	McMaster-Carr	N/A
T-Slotted Framing Conveyor Roller Mounting Bracket [HEX]	14			McMaster-Carr	3136N108	McMaster-Carr	N/A
Corner Brackets for Single Rails	1			uxcell	A19042300ux	Amazon	N/A

		2				0192		
Made-to-Order sprocketed Conveyor Rollers [12'', 1.25''*2]		1			McMaster-Carr	1322N602	McMaster-Carr	N/A
Made to Order 1.9'' Diameter Conveyor Rollers [1' 7/8'']		1			McMaster-Carr	1318N33	McMaster-Carr	N/A
T-slotted Framing fasteners [Single nut With Button Head] [40x80]		3			McMaster-Carr	5537T162	McMaster-Carr	N/A
Logic-level shifter		1			IS	709804	Amazon	N/A

Should have footprints for individual components and where they will be placed at scale (as opposed to the block diagram depicted)

Appendix 3: PCB Footprint Layout

Provide a "rough sketch" of your PCB layout, including board dimensions, component footprint choices, and relative location of major components chosen; include relevant dimensions and area estimates for your PCB.
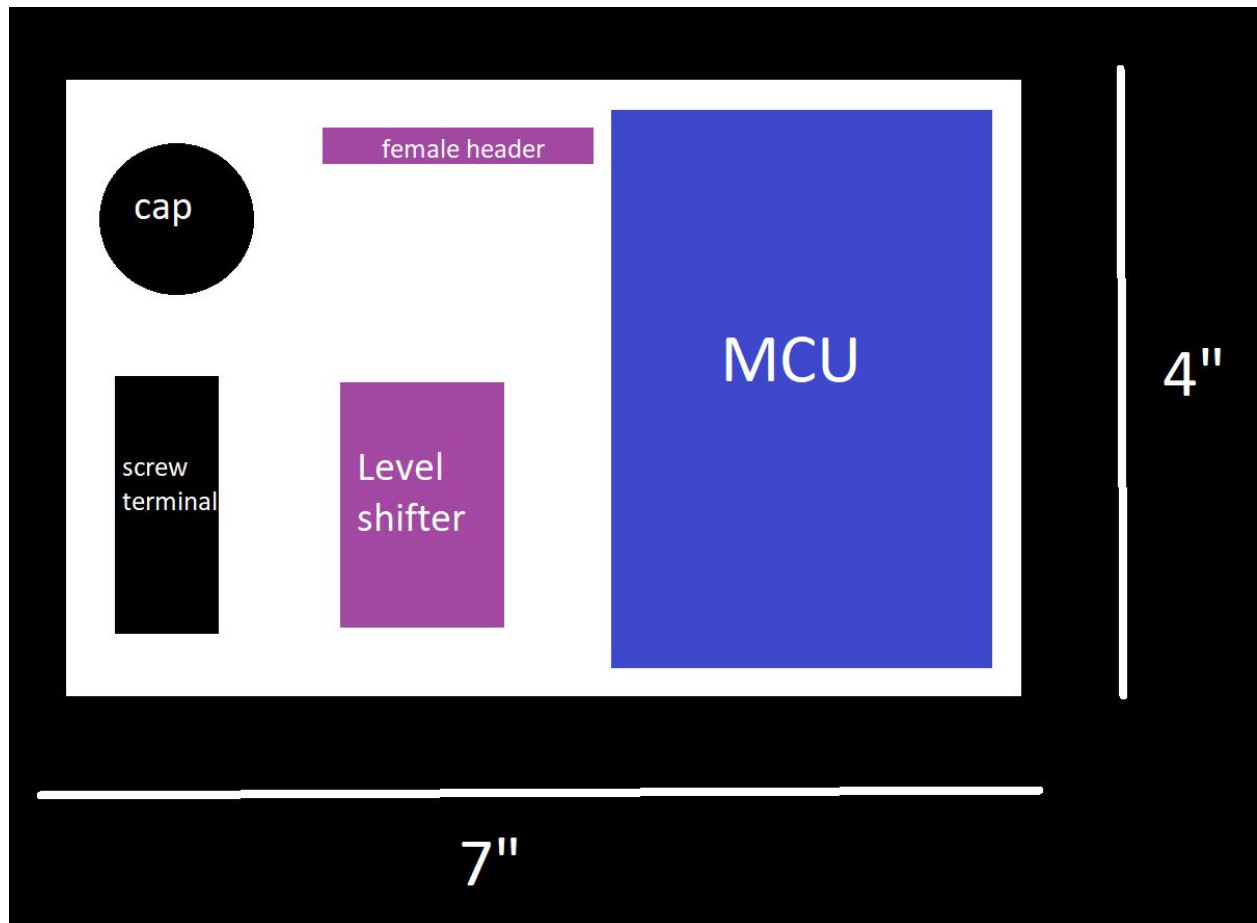
Cap: Decoupling capacitor
Screw terminal: Connecting external power routes to the pcb
Female header: Allows the signals from the Level Shifter to connect to external servo motors.