Team 10B:
Automatic Lego Sorting Machine

BY:
ERIC PISCIOTTA
AUSTIN SHORR
TRISTIAN VIGUERIA

Project Description

- To design an Automatic Lego Sorting Machine
- Sort Legos by type of brick, plate, rail, and specialized pieces
- Dump N' Go

Client – David Willy

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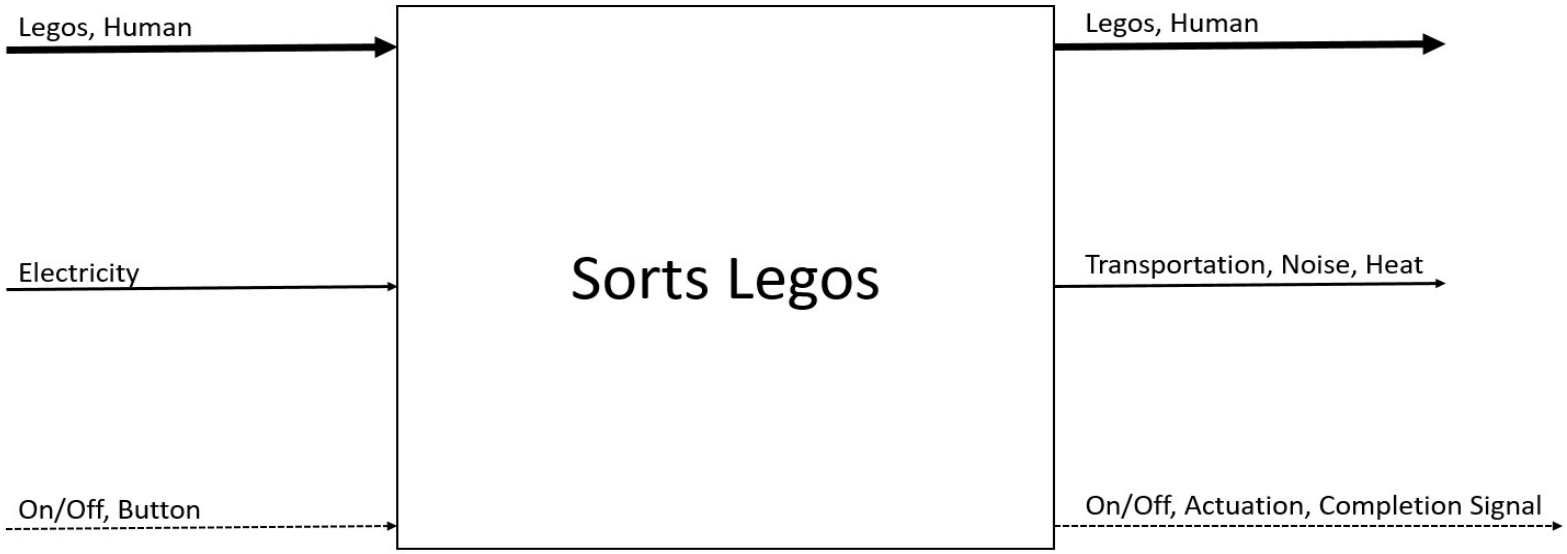
Black Box Model



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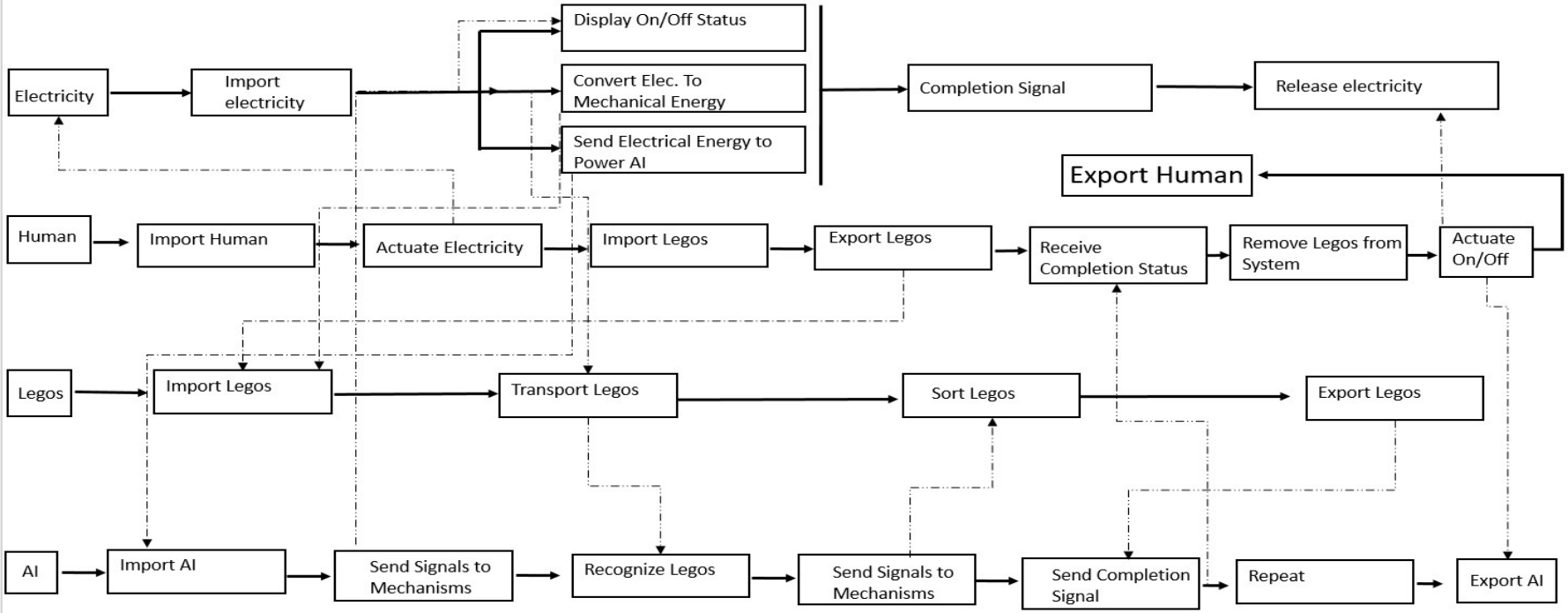
Functional Model



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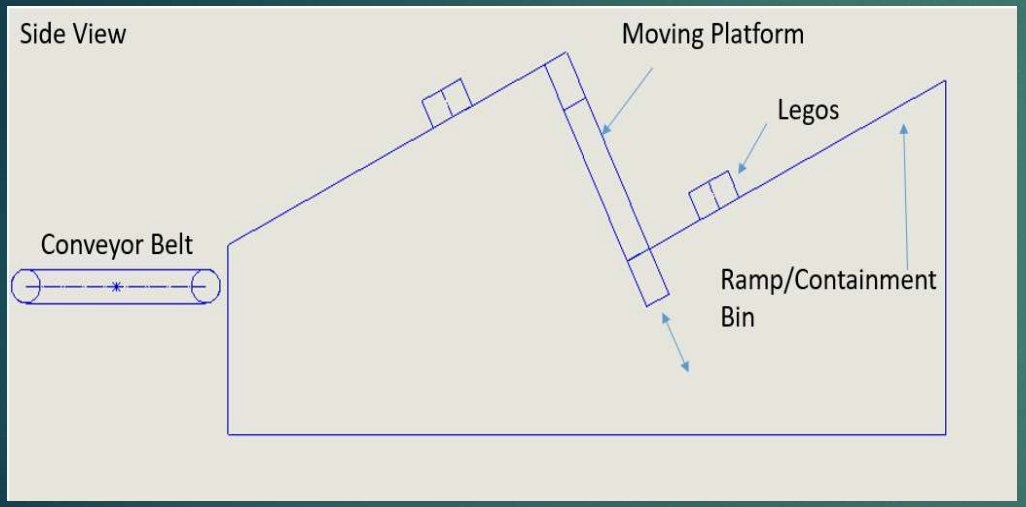
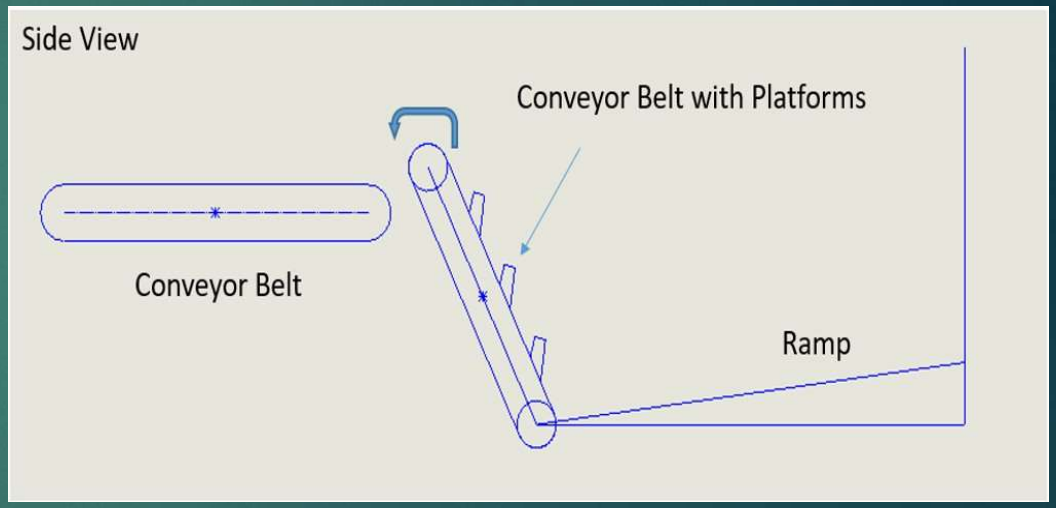
Concept Generation – Inlet Designs

Lift Platform



Conveyor Belt with Platforms



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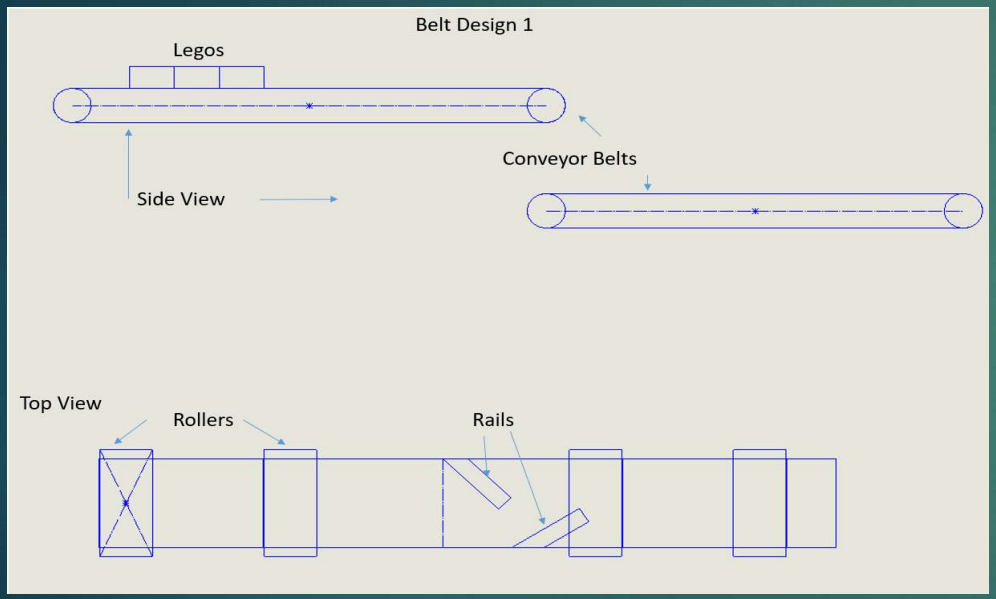
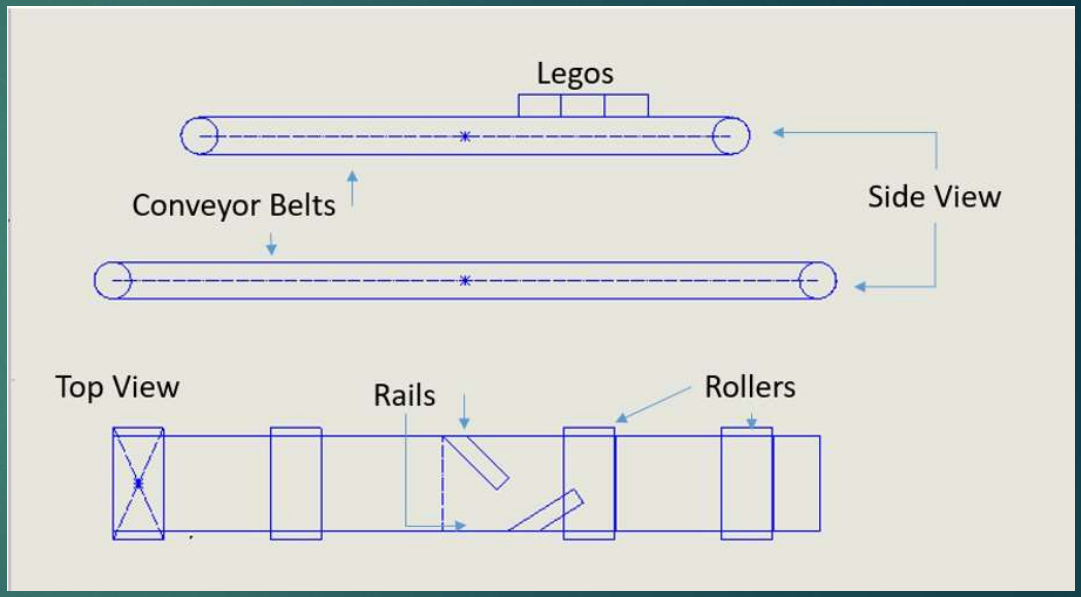
Concept Generation – Belt Designs

Simple Conveyor Belt System



Compact Conveyor Belt Design



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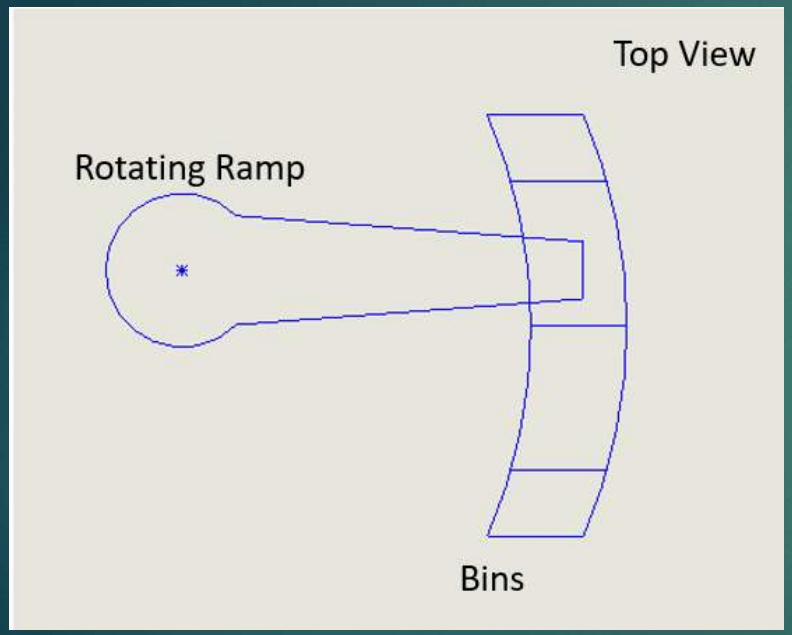
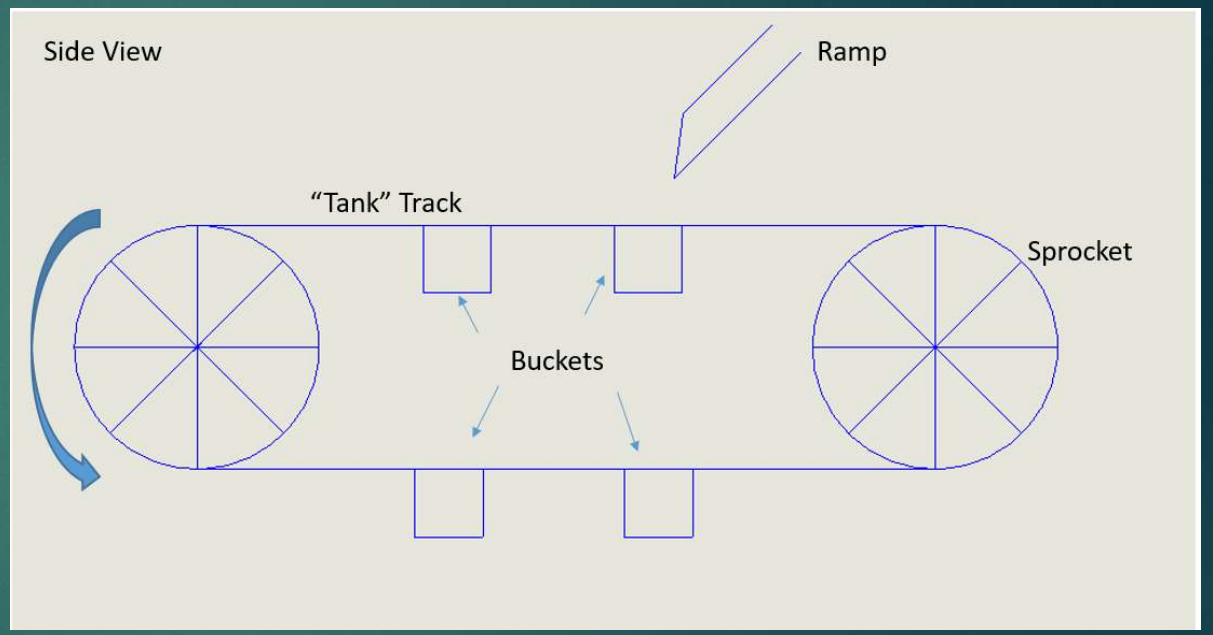
Concept Generation – Bin Designs

Rotating Ramp W/ Stationary Bins



Horizontal Tank Track



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Concept Evaluation – Inlet Designs

Lift Platform

Pros

- Reliable Transfer of Legos

Cons

- Requires a Large Amount of Space to Transfer Legos

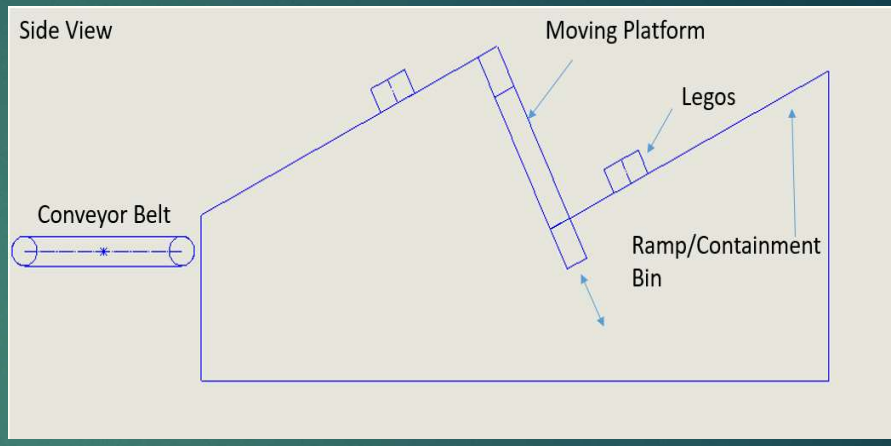
Conveyor with Platforms

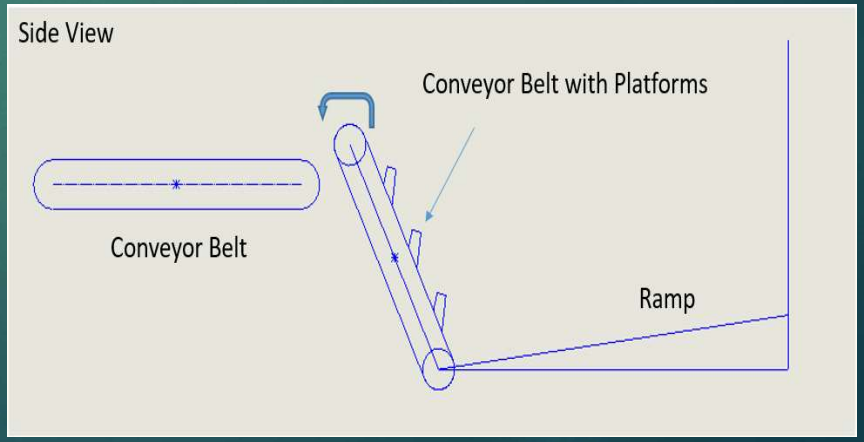
Pros

- Reliable Transfer of Legos
- Requires Less Space than the Lift Platform

Cons

- Rotating Belt Might Cause Legos to Jam





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Concept Evaluation – Belt Designs

Simple Belt Design

Pros

- Easy to Set Up
- Individual Speeds of Belts can be Controlled
- Rails on this System Allow Individual Legos to Spread Out

Cons

- Takes Up a Large Amount of Space

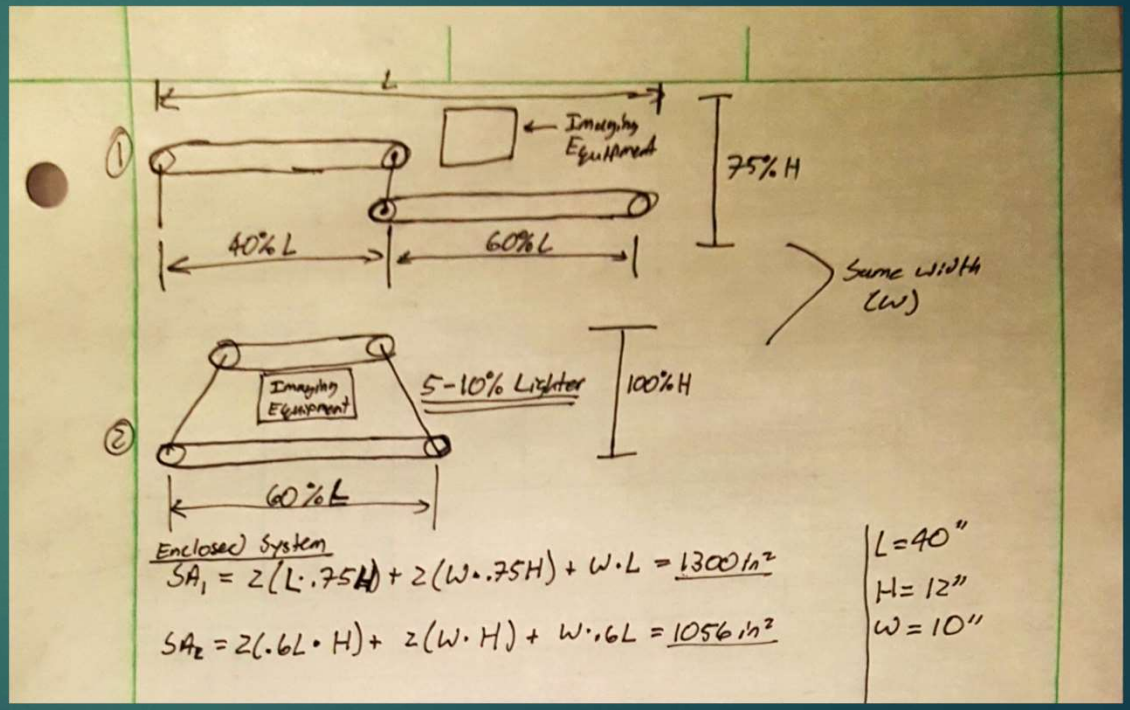
Compact Belt Design

Pros

- More Compact
- Individual Speeds of Belts can be Controlled
- Rails on this System Allow Individual Legos to Spread Out

Cons

- More Difficult to Set up



Eric

Concept Evaluation – Bin Designs

Horizontal Tank Track

Pros

- Compact
- Efficient Way of Locating the Correct bin

Cons

- Many Moving Parts
- Difficult to Design

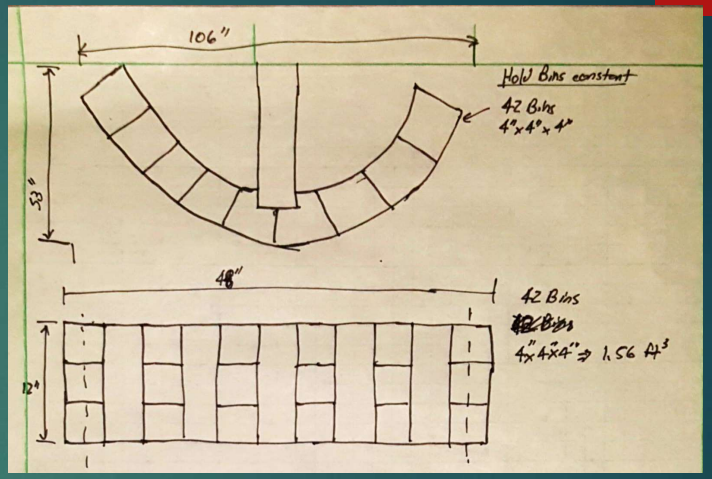
Rotating Ramp

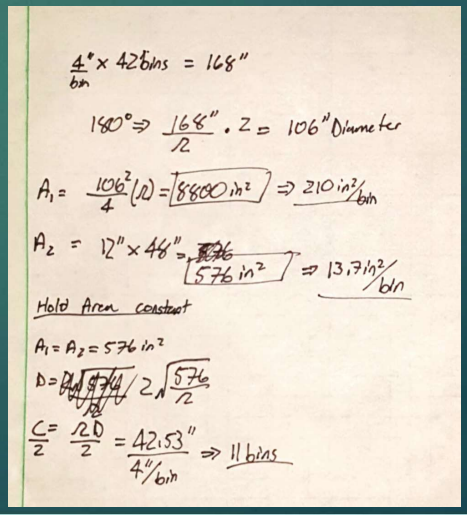
Pros

- Simple Design
- Rotating Ramp is a Reliable Way to Transport Legos into Bins

Cons

- Only Accommodates a small Variety of Legos
- Still Takes up a Considerable Amount of Space





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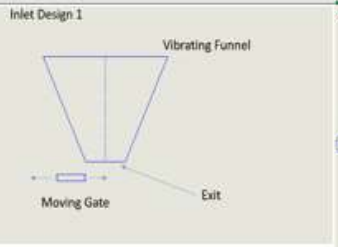
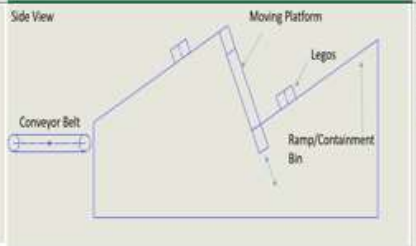
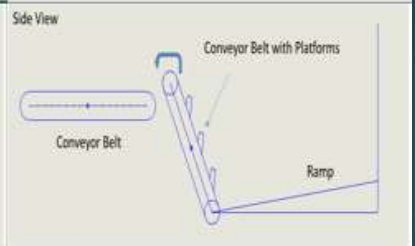
Pugh Chart – Inlet Designs

	Concepts	Inlet Design 1 	Side View 	Side View 
Criteria		D		
Base Area		A	-	-
Mass		T	S	S
Large Input Volume		U	+	+
Durability		M	+	+
$\Sigma +$		0	2	2
$\Sigma -$		0	-1	-1
ΣS		4	1	1
Σ_{total}		0	1	1

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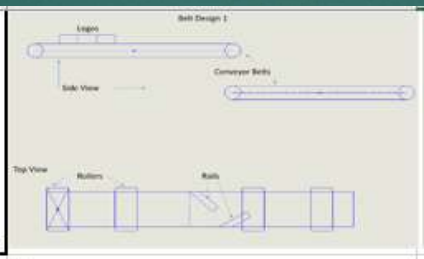
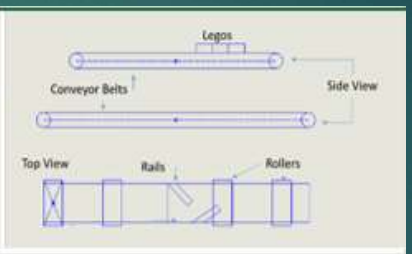
Pugh Chart – Belt Designs

	Concepts		
Criteria		D	
Base Area		A	+
Mass		T	+
Large Input Volume		U	S
Durability		M	S
$\Sigma +$		0	2
$\Sigma -$		0	0
ΣS		4	2
Σ_{total}		0	2

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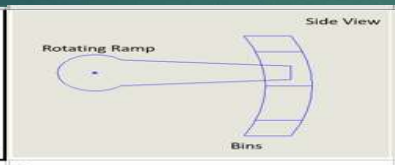
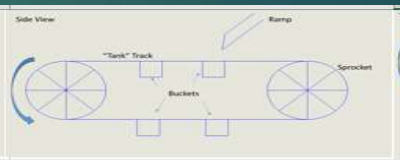
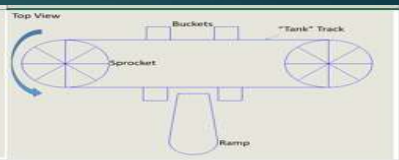
Pugh Chart – Bin Designs

	Concepts				
Criteria		D			
Base Area		A	-	++	-
Mass		T	-	-	-
Large Input Volume		U	S	+	+
Durability		M	S	+	S
$\Sigma +$		0	0	4	1
$\Sigma -$		0	-2	-1	-2
ΣS		4	2	0	1
Σ_{total}		0	-2	3	-1

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Decision Matrix

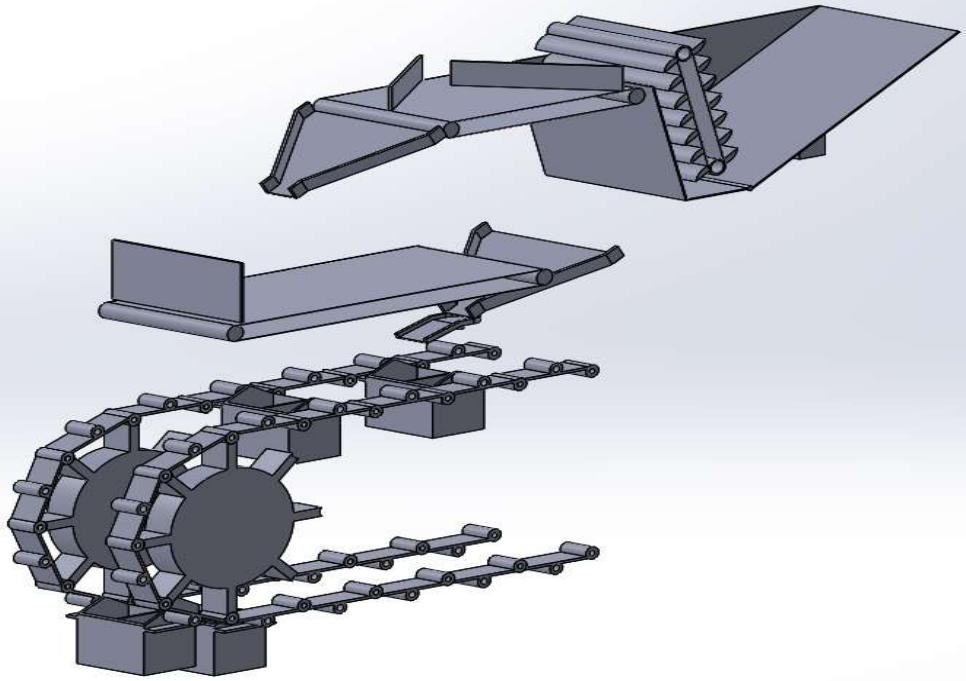
Inlets	Base Area	weight	Mass	weight	Large imput Volume	weight	Durability	weight			outcome
Lift platform	10	0.3	10	0.3	10	0.2	5	0.2			9
conveyorbelt with platforms	10	0.3	8	0.3	10	0.2	10	0.2			9.4

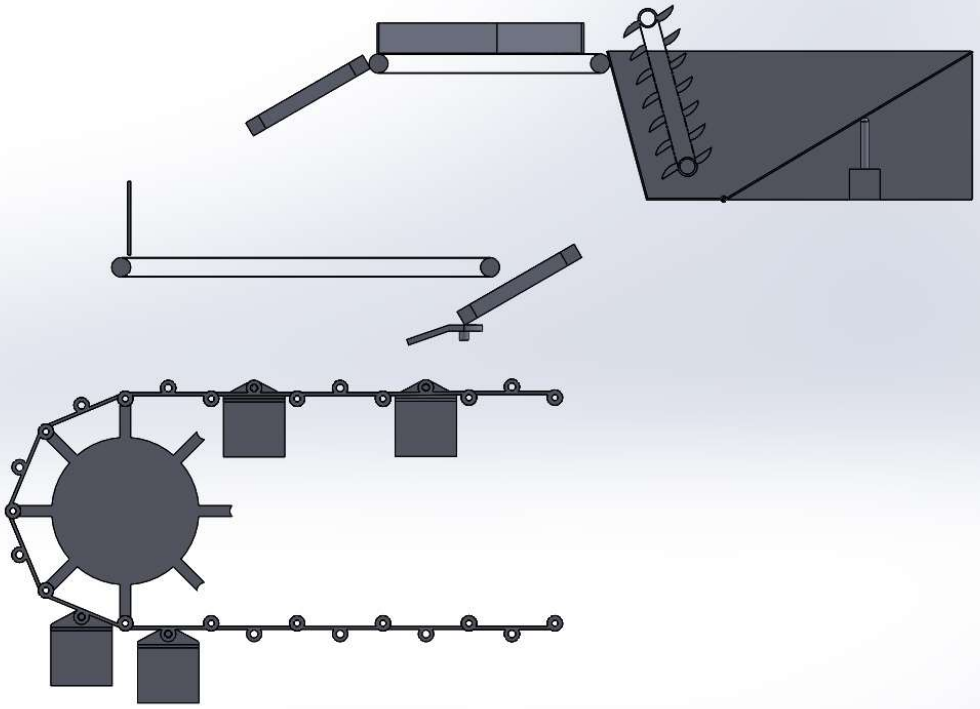
Belts	Base Area	weight	Mass	weight	Enclosed System to Prevent Pinch Points	weight	Cost	weight			outcome
simple conveyor belt system	6	0.3	9.5	0.3	7	0.1	10	0.3			5.4
compact conveyor belt system	10	0.3	10	0.3	10	0.1	5	0.3			7

Bins	Base Area	weight	Mass	weight	Enclosed System to Prevent Pinch Points	weight	Cycle Time	weight	#Types	weight	outcome
rotating ramp with stationary bins	1	0.3	10	0.3	2	0.1	3.3	0.05	2.6	0.15	4.1
horizontal tank track	10	0.3	6	0.3	10	0.1	10	0.05	10	0.15	7.8

Eric

Final Design Selected



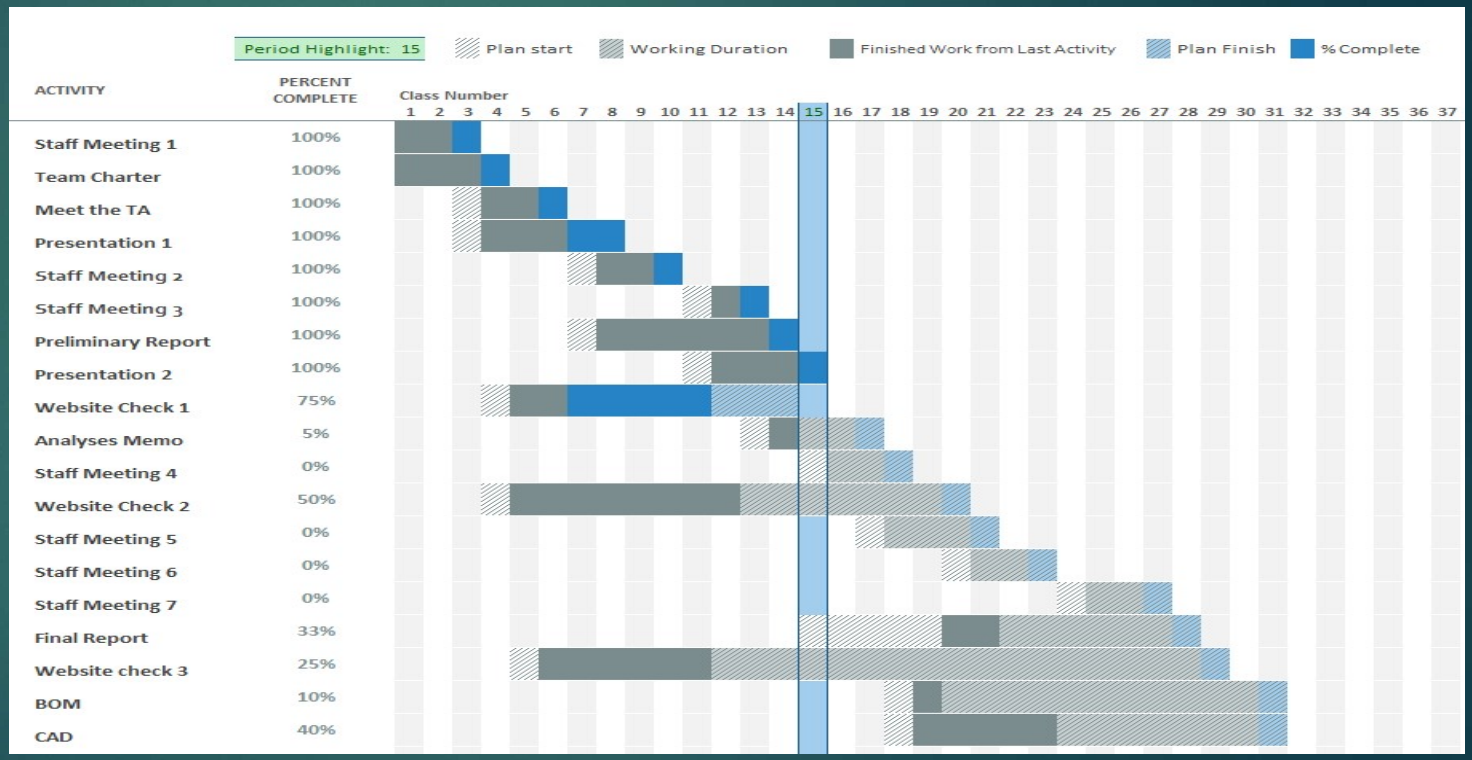


Austin

Schedule

On Schedule
in terms of
class assignments due
and website check

Behind Schedule
in terms of
prototyping and
software development



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Budget

- **Total Budget $500**

- Raspberry Pi $75
- Camera $30
- Servos $22
- Servo Hat $18
- Light Sensors $10
- Unallocated $345

Eric

Questions