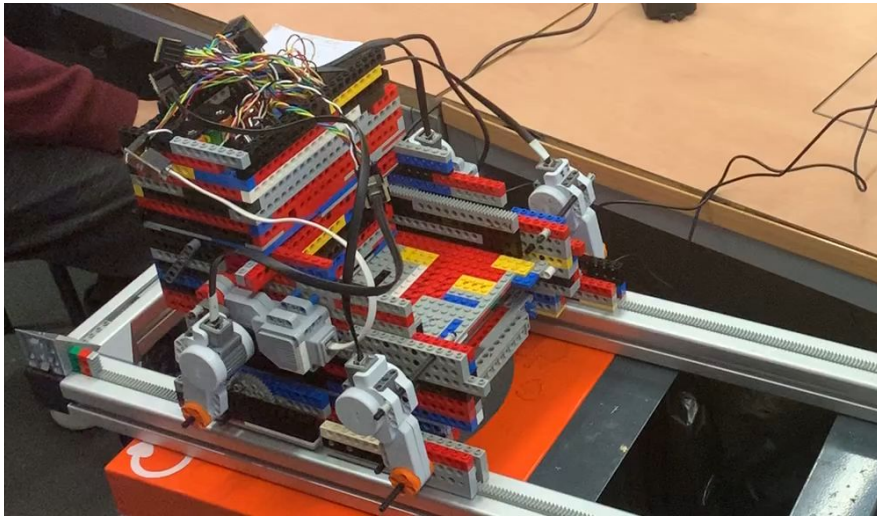
Recyclotron

The bin that recycles for you

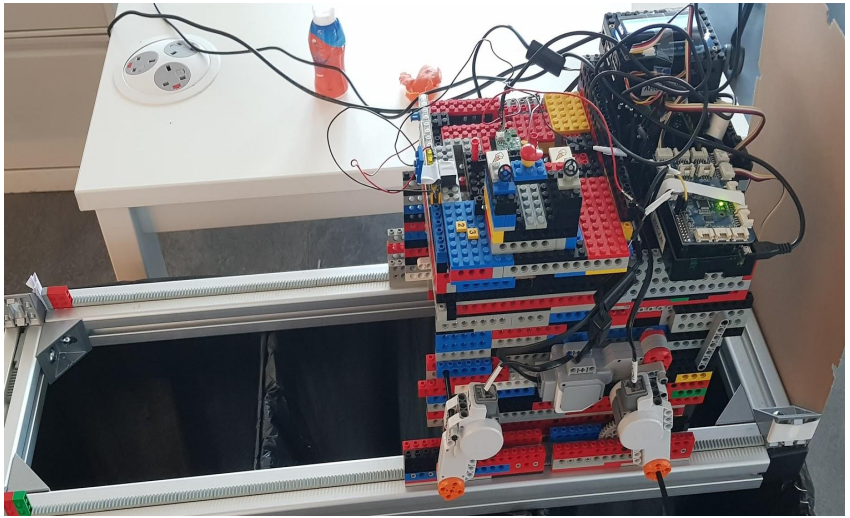
What is Recyclotron?

Recyclotron is a smart-bin that detects, identifies and sorts rubbish, reducing user interaction to one bin.

DEMO 1

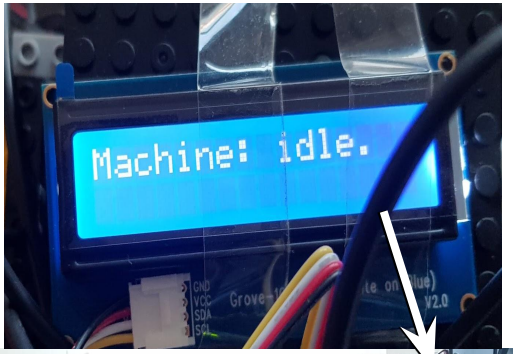


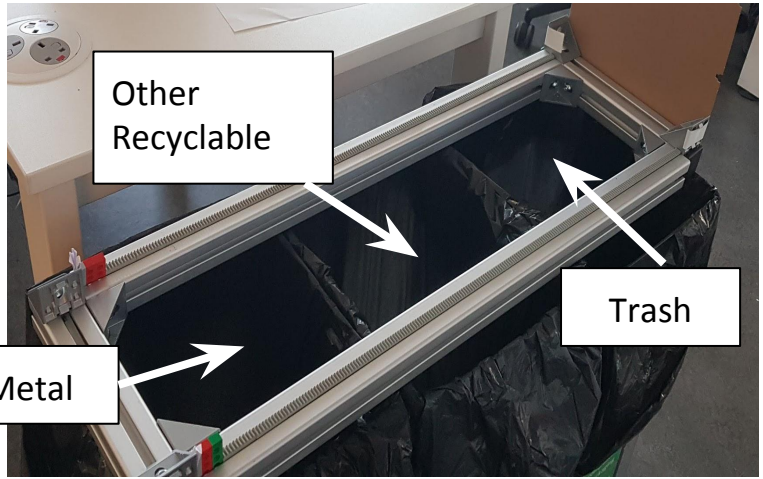
DEMO 2

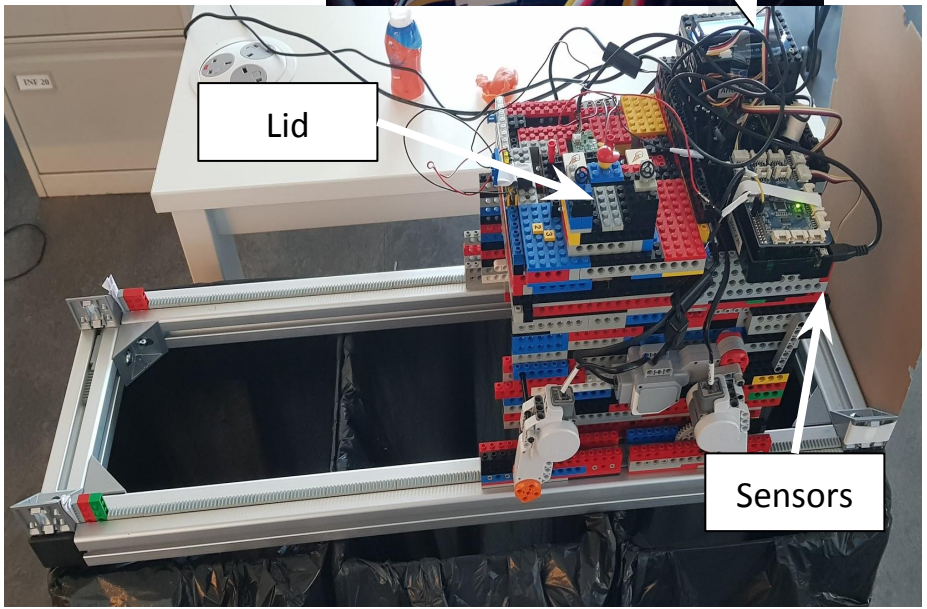


What we made for Demo 2

- Added a lid to act as a trigger for detecting rubbish
- 3D printed a model for better structural stability
- Added a screen to show clear feedback
- Added ultrasonic sensors to track position
- Extended the ML model to work with 3 and 4 bins
- Improved the ML model with better datasets

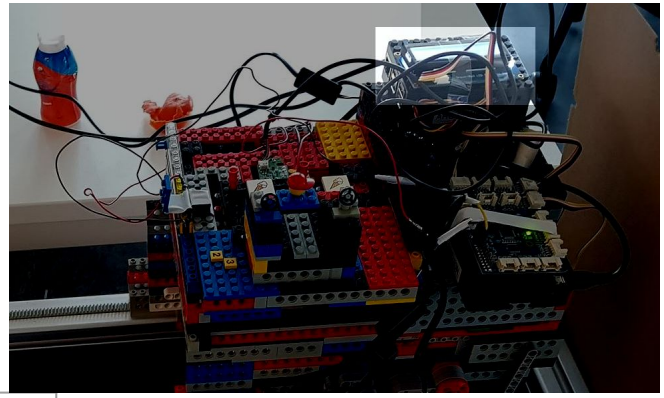




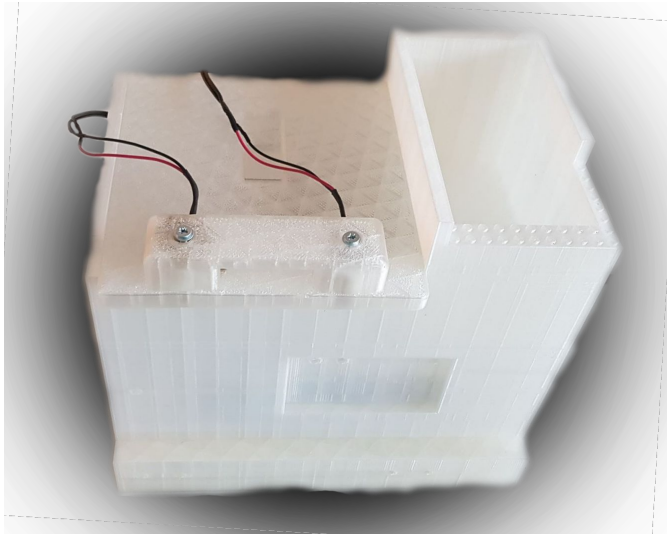


Problems with Demo 2

- Feedback was passive and non-interactive
- 3D Printed model took too long to print & test
- We had to use 2 Raspberry PIs (for motors and sensors)
- No single metric to measure success rate of system
- Paper and glass were poorly classified



	Glass	*Metal*	*Paper*	*Plastic*	*Trash*	*Precision*
Glass	0	0	1	0	0	0
Metal	0	2	0	0	1	0.67
Paper	0	0	20	1	10	0.65
Plastic	0	0	0	12	2	0.86
Trash	0	0	5	11	42	0.72
Recall	0	1	0.8	0.48	0.76	



Confusion Matrix (on Soundsnap Dataset)

	Metal	*Glass*	*Plastic*	*Paper*	*Trash*	*Precision*
Metal	4	2	2	1	0	0.44
Glass	5	9	1	0	1	0.56
Plastic	1	1	3	0	3	0.38
Paper	1	1	0	7	2	0.64
Trash	3	0	0	1	2	0.33
Recall	0.29	0.69	0.5	0.78	0.25	

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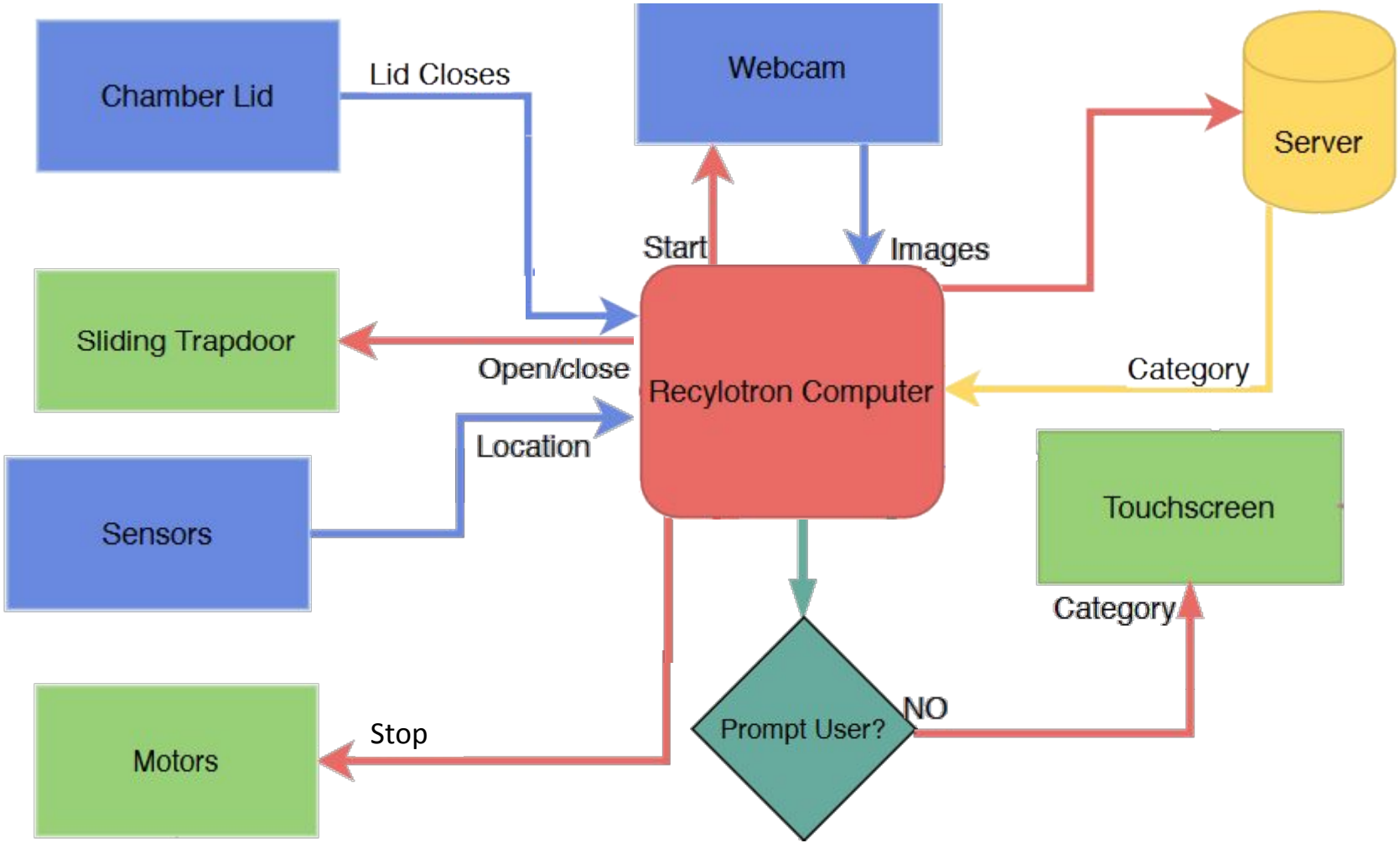
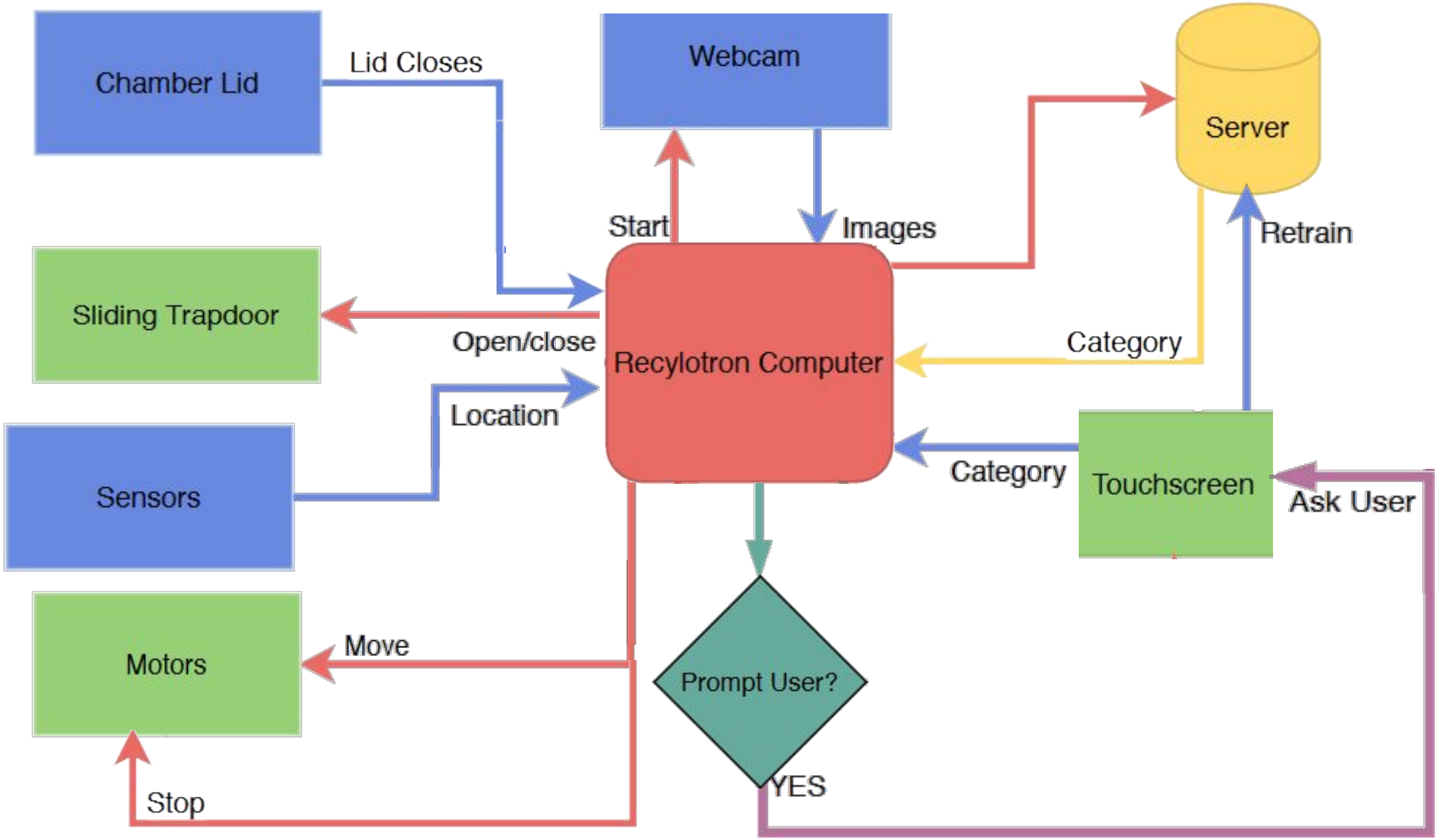
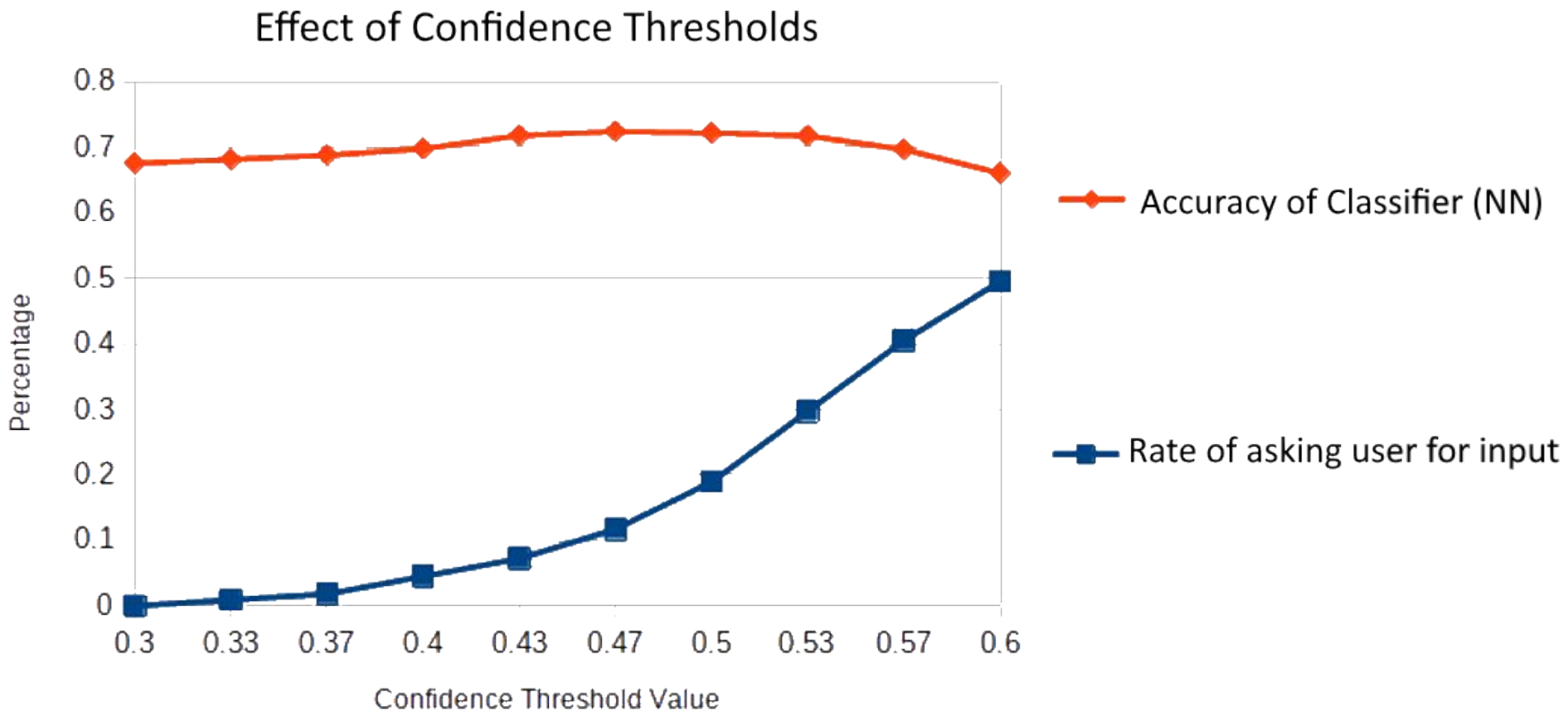

Chamber Lid
Lid Closes
Webcam
Server
Start
Images
Sliding Trapdoor
Open/close
Recylotron Computer
Category
Location
Sensors
Touchscreen
Category
Prompt User?
NO
Motors
Stop


Chamber Lid
Lid Closes
Webcam
Server
Start
Images
Retrain
Sliding Trapdoor
Open/close
Recylotron Computer
Category
Location
Sensors
Category
Touchscreen
Ask User
Motors
Move
Prompt User?
Stop
YES


Effect of Confidence Thresholds
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Percentage
0.3
0.33
0.37
0.4
0.43
0.47
0.5
0.53
0.57
0.6
Confidence Threshold Value
Accuracy of Classifier (NN)
Rate of asking user for input

Budget

RED indicates items that were purchased this demo

COMPONENT	***COST***
Touchscreen	£10
3D Printed Body & Lid	£65
3 Electromagnets	£4
2 Ultrasonic Sensors (GrovePI Kit)	£5
2 Webcams	£15
5 EV3 Motors	£130
2 Steel Railings	£10
Higher End Raspberry PI	£50
Total Cost	*£280*
Total Spent	*£100*