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AME554-Additive Manufacturing Technologies

Project Presentation

COVID-19 Killer-
A Smart Alcohol Sanitizing Robot

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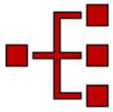
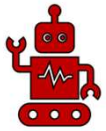
Jiaoran Wang 6205909903
Yaan Wang 7849395029

18/11/20

Contents



- Goals and Background



- Additive Manufacturing

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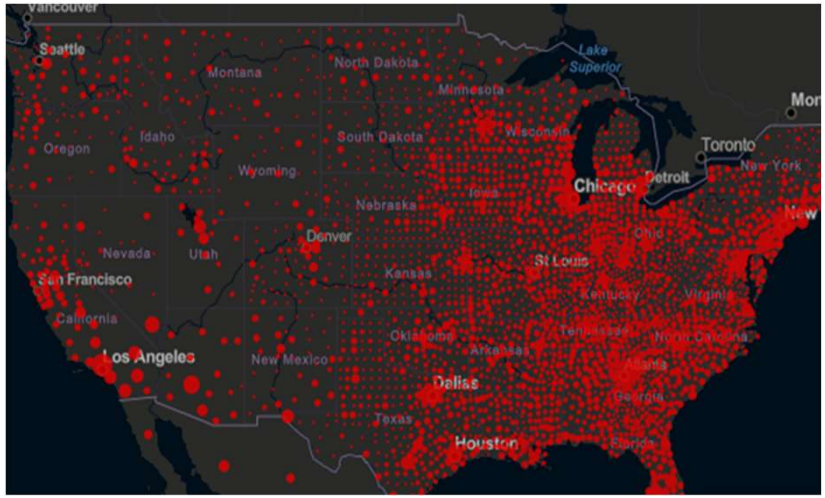
- Conclusions & Future Works

Background



Time-consuming And Laborious

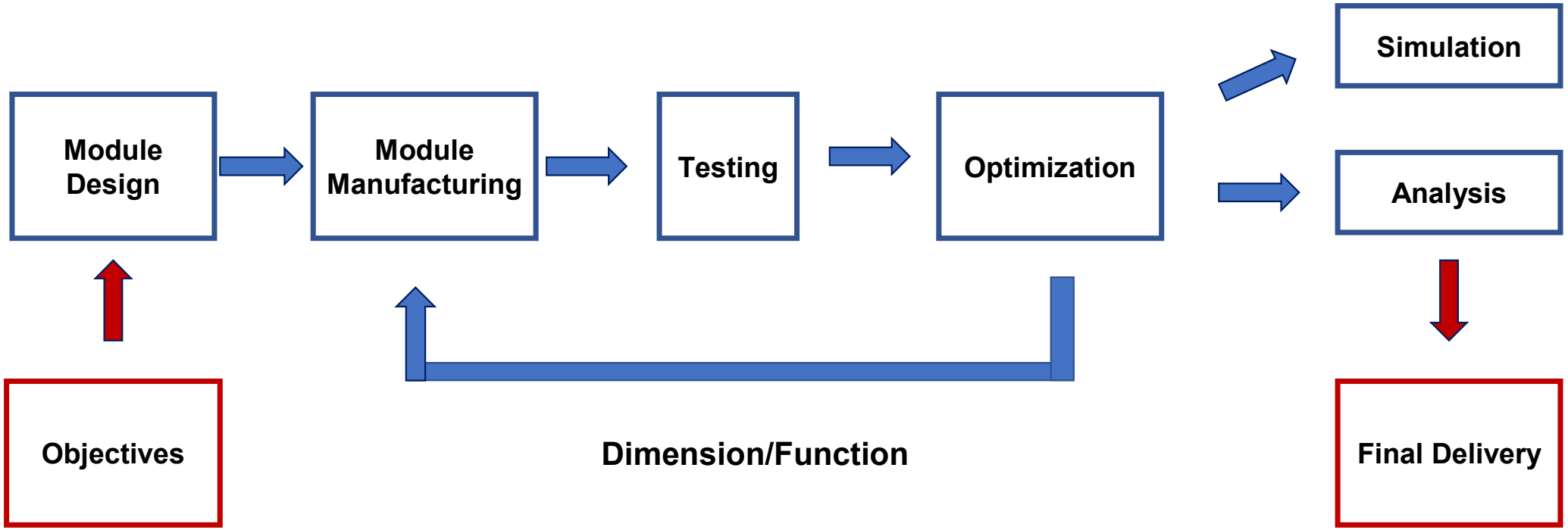
Difficult To Reach Narrow Places

Expensive Equipment

Wild COVID-19 Spreading ⟺ Floor Sanitation

Fully Automatic + Small Size + Low Cost

Production process diagram



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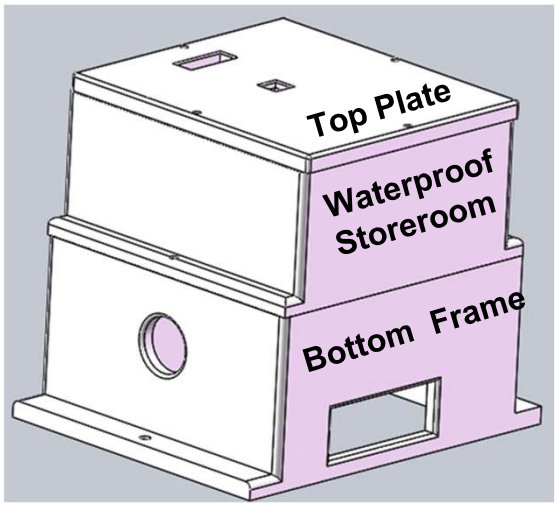
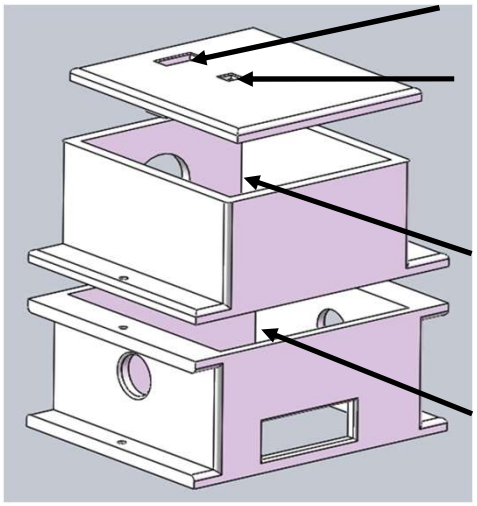
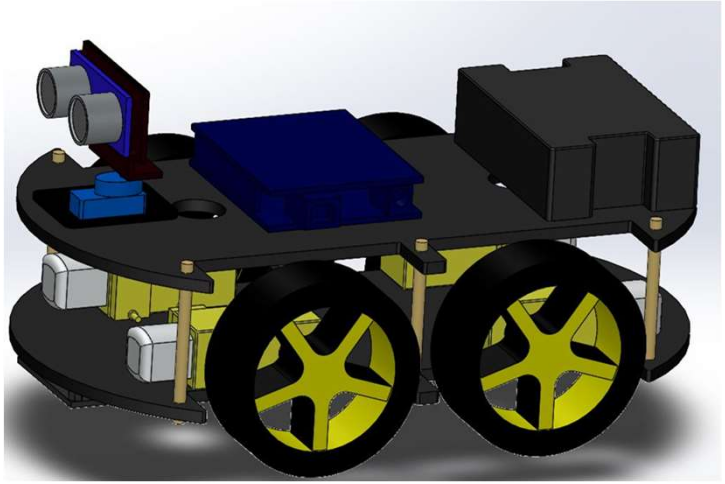
Prototyping

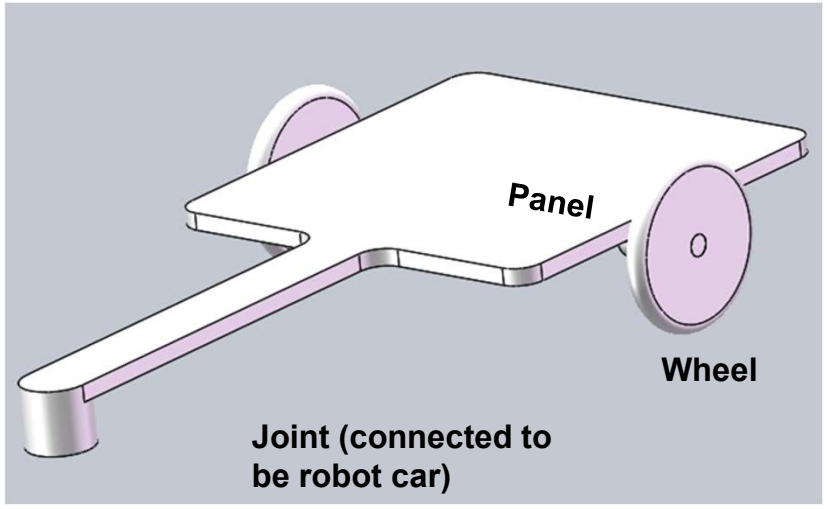


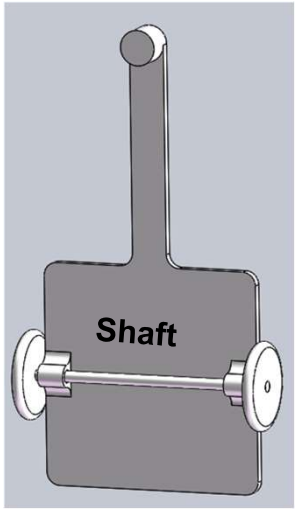


- **Isolation shelfs**

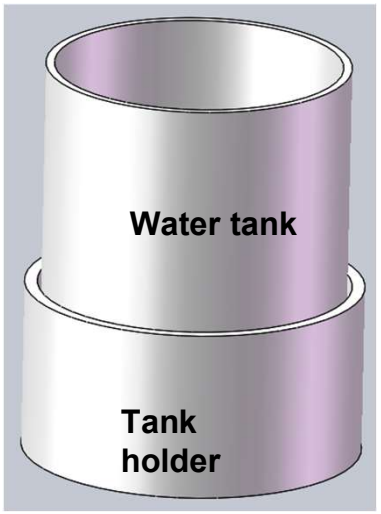


- **Robot CAR**





- **Trailer**



- **Water**

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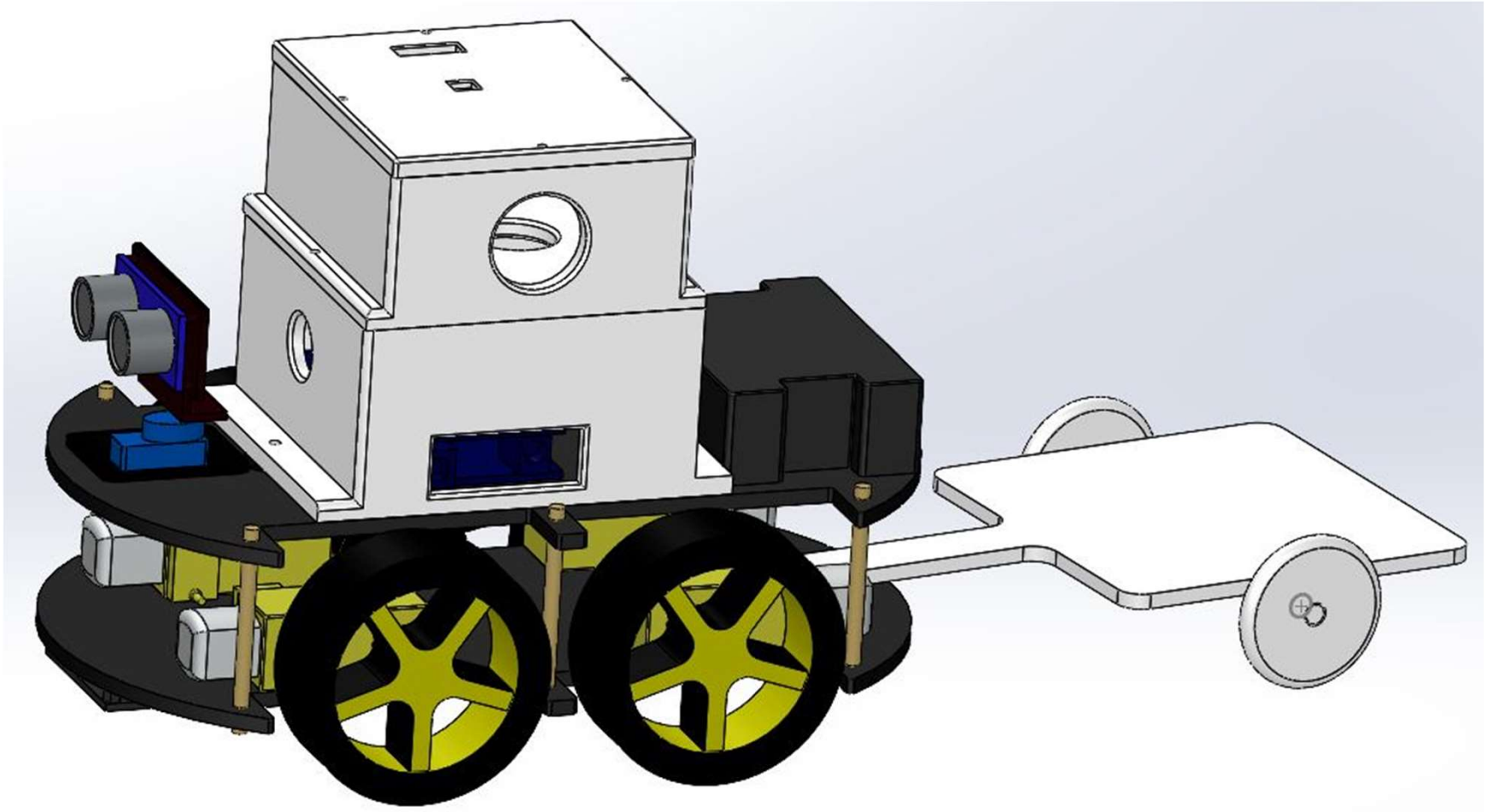

- CAD Assembly

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Components

Components

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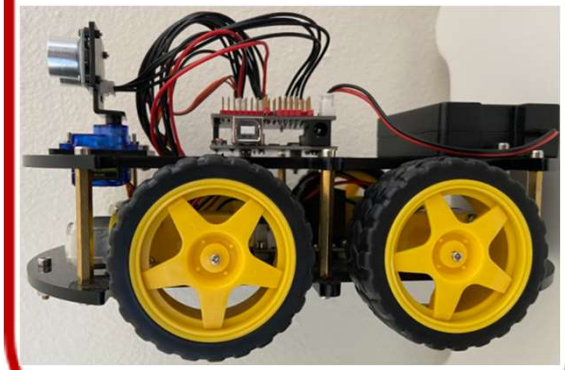
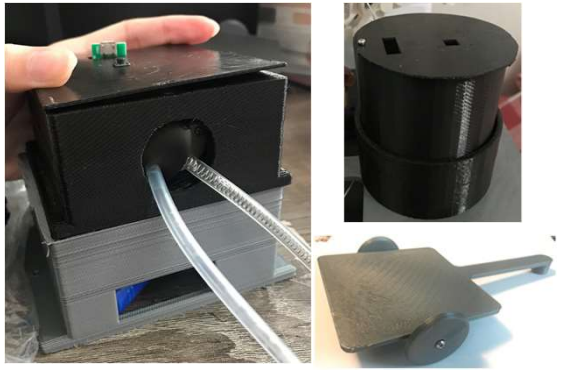
Robot Car



Disinfectant Spraying Device

3D Printed Components



Robot Car Components

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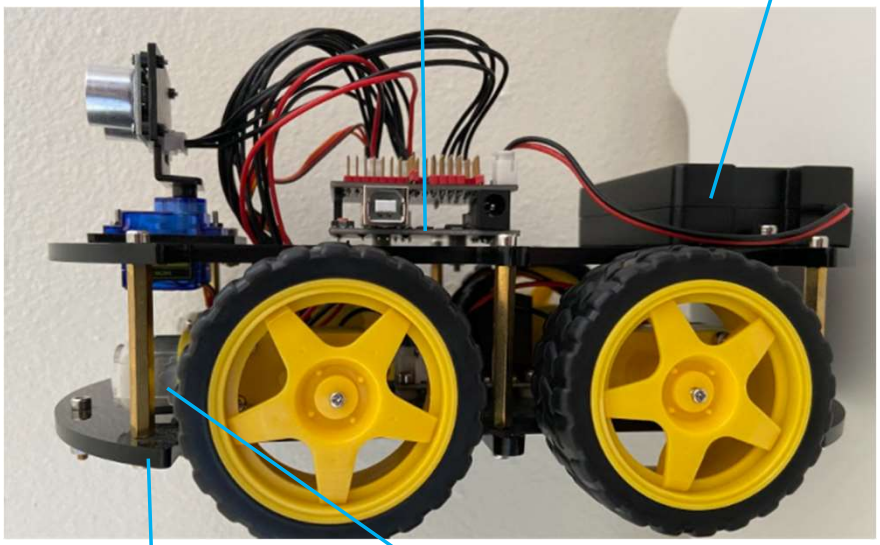

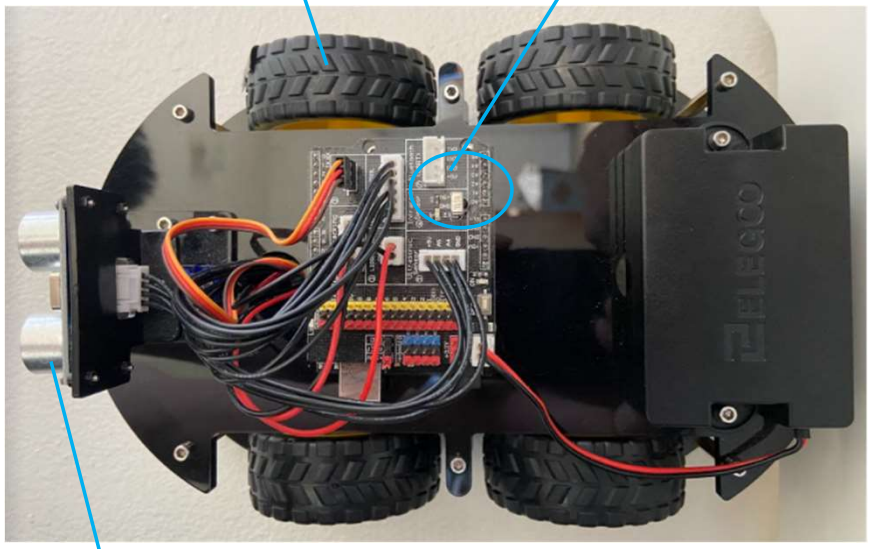

Control Methods:

- Infrared Control
- Obstacle Avoidance
- Write-in Path Planning
- Line Tracking
- Bluetooth Control

Components

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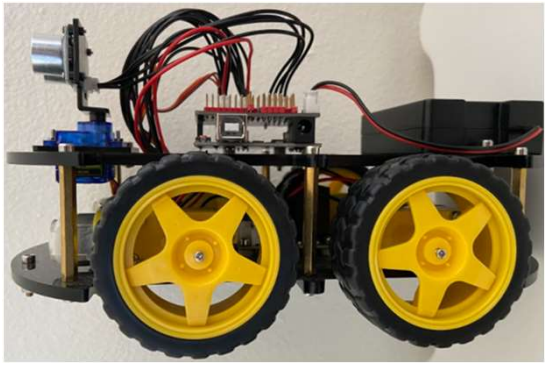
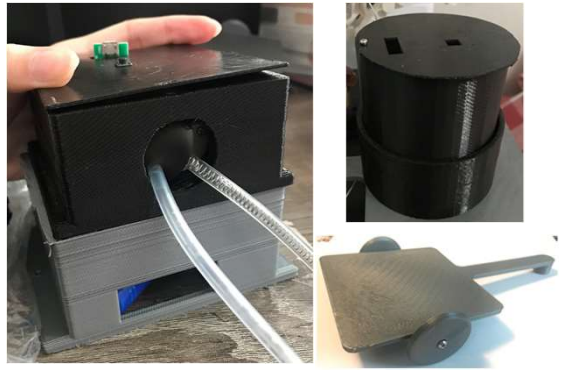
Robot Car

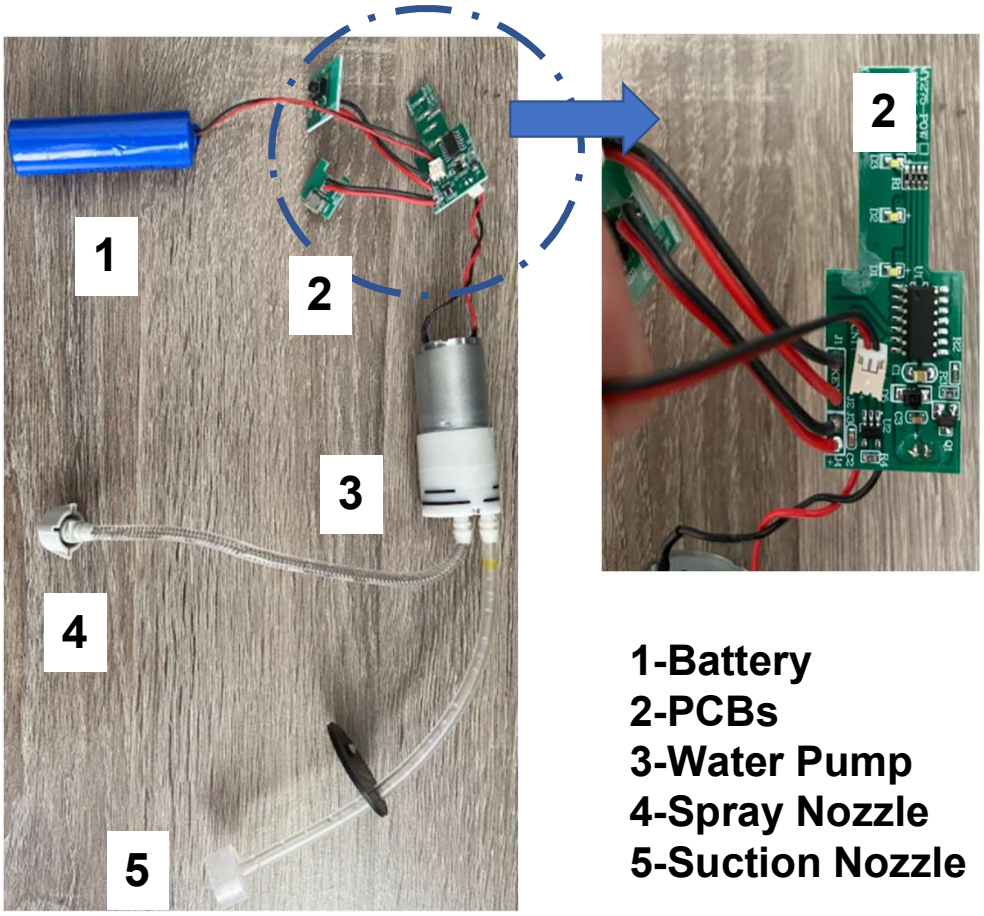


Disinfectant Spraying Device

3D Printed Components

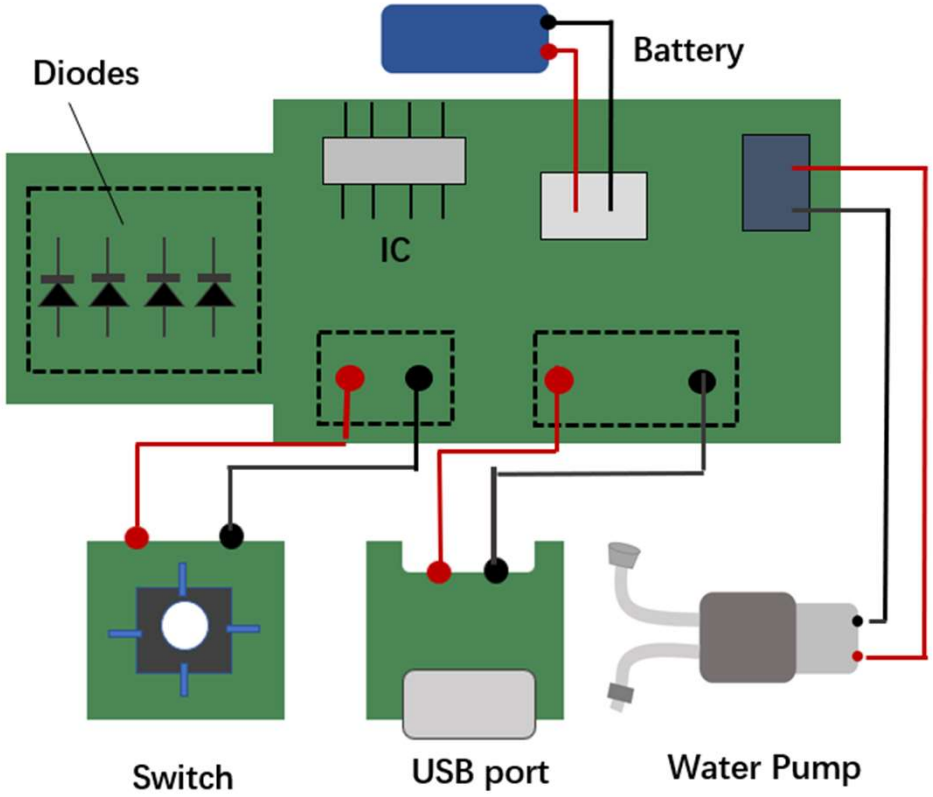


Disinfectant Spraying Device



1-Battery
2-PCBs
3-Water Pump
4-Spray Nozzle
5-Suction Nozzle

- Spray System Components



- 2- PCB Schematic

Components

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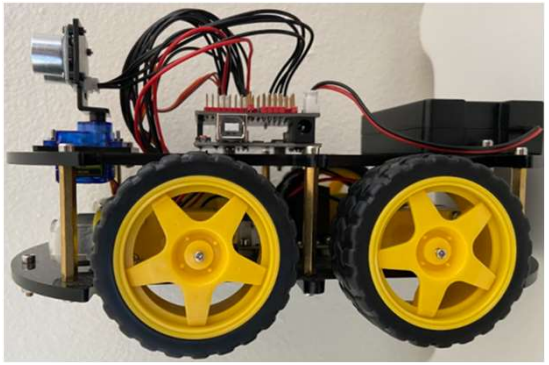
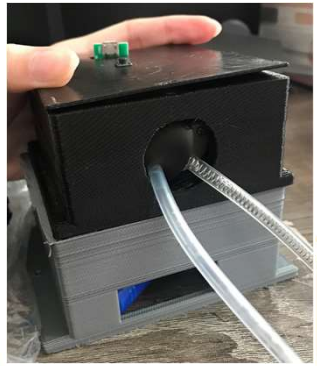
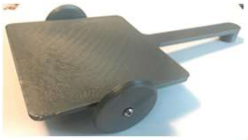
Robot Car



Disinfectant Spraying Device

3D Printed Components





Components

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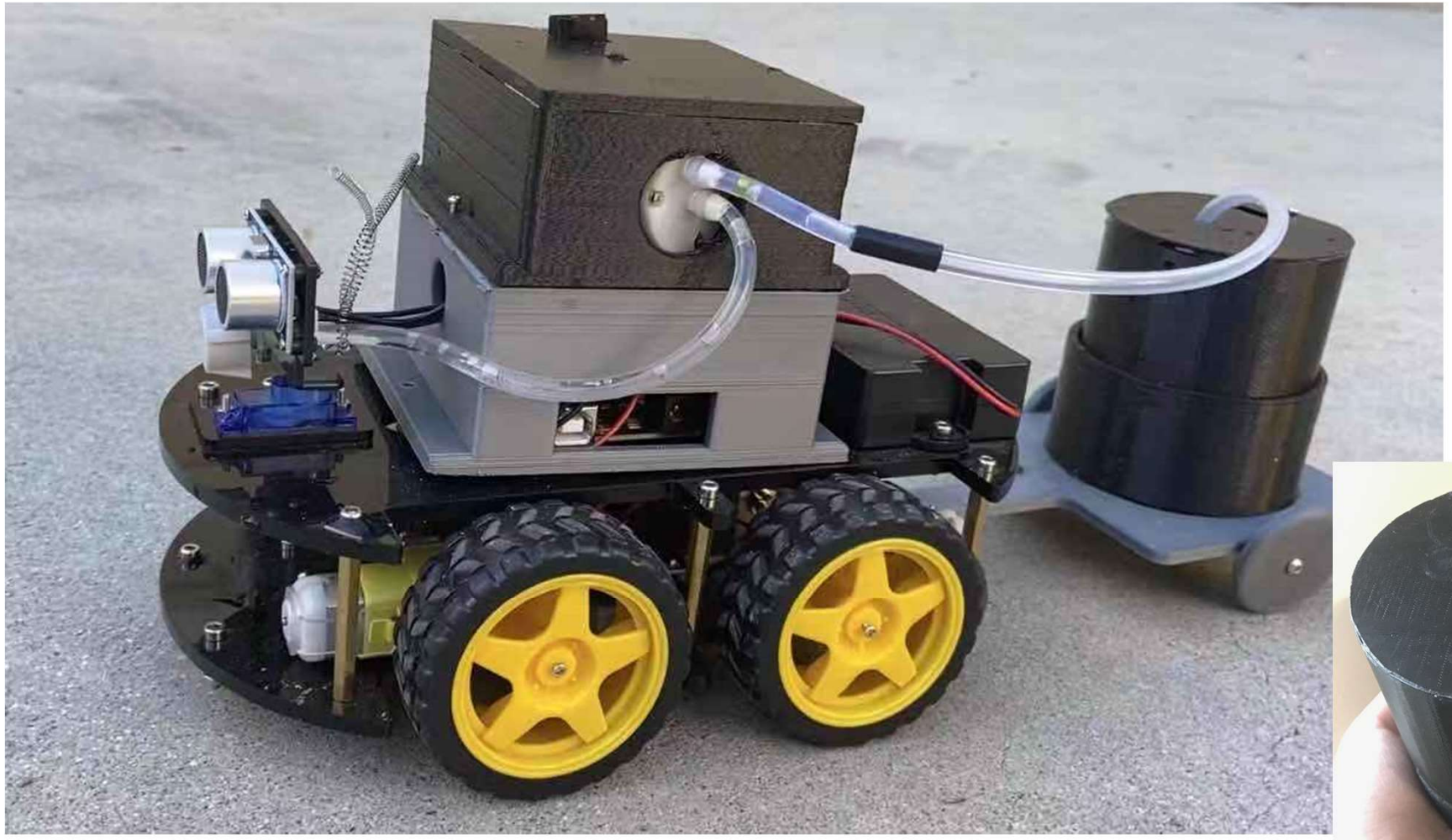
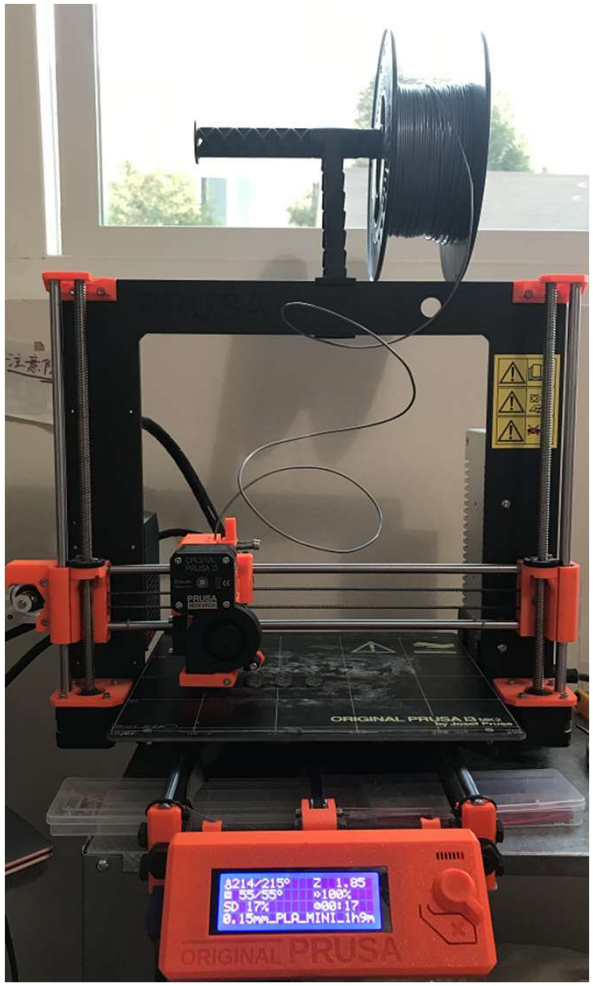
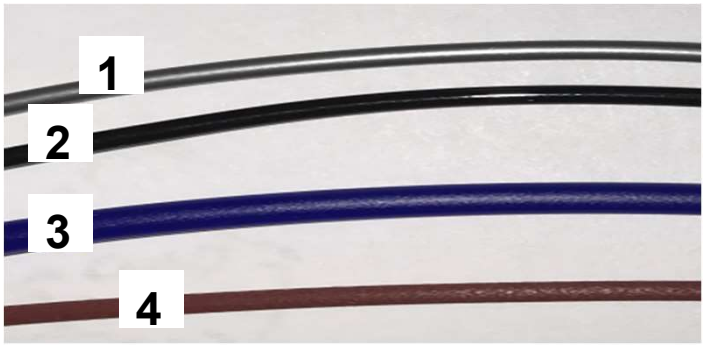


3D Printer and Filament Material



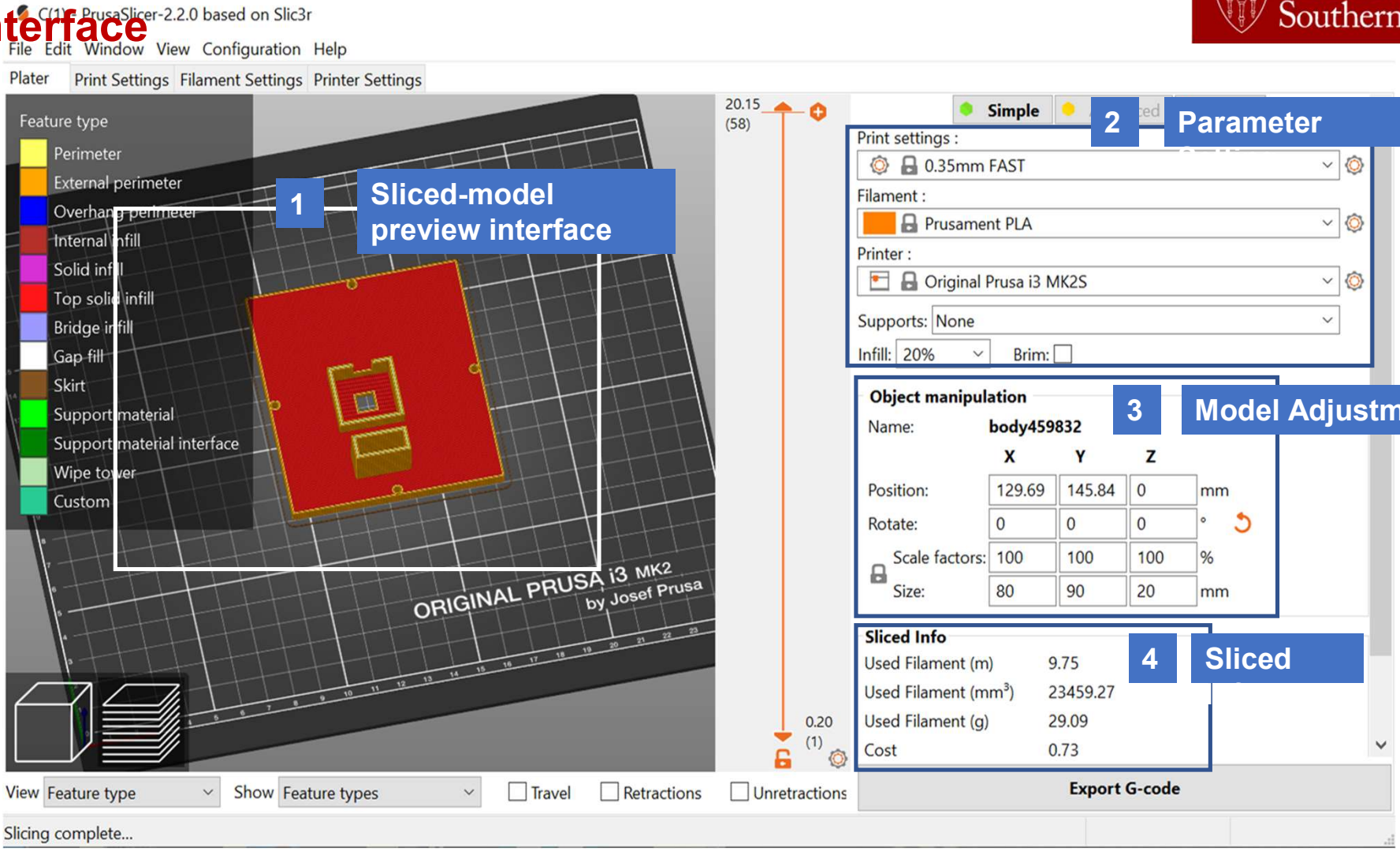
- PRUSA i3 MK2

- Filament Spools

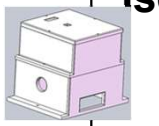


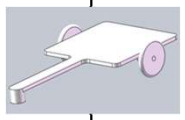
1. PLA (1.5mm grey)
2. PLA (1.5mm black)
3. TPU (3.0mm blue)
4. TPU (1.5mm red)

3D Printer Interface



Summary of Model Printing Information





Name		Infill (%)	Infill shape	Filament width(mm)	Method	Time	Weight(g)
Isolation shelf	Top plate	10%	Rectangular	0.35	FAST	1h15m	26.9
	Storeroom	20%				3h4m	70.5
	Bottom Frame					3h20m	72.6
Trailer	wheel		Concentric	0.10	DETAIL	33m	4.2
	Panel		Triangular	0.20	NORMAL	2h52m	40.1
	Shaft	50%	Triangular + Concentric	0.10	DETAIL	1h2m	2.3
	Shaft (for experiment use)	20%				50m	1.9
		80%				1h18m	2.7
		90%				1h22m	2.9
Water Tank	Tank	20%	Concentric	0.35	FAST	1h59m	50.1
	Tank Holder					2h1m	44.4

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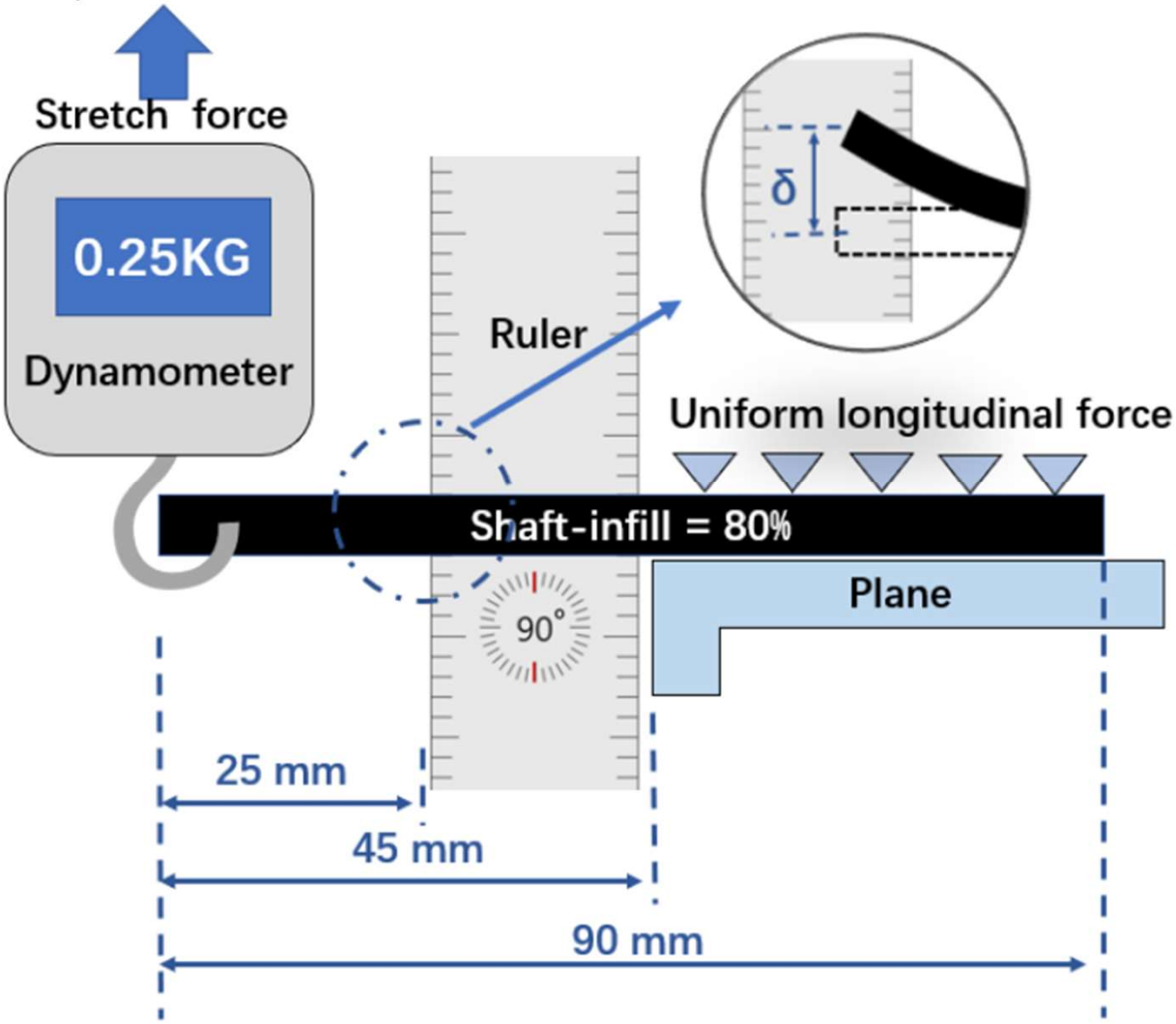
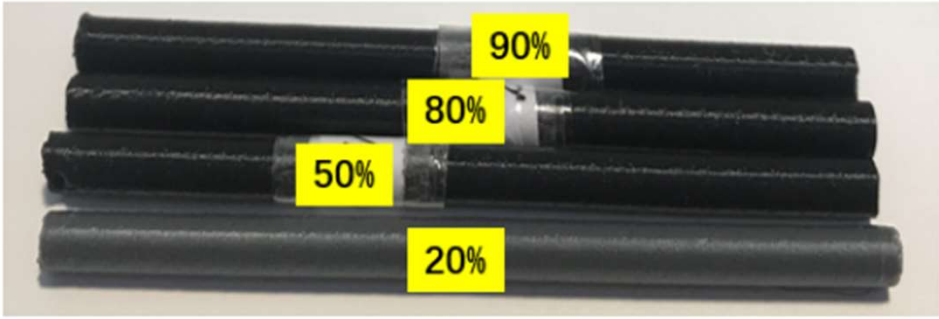
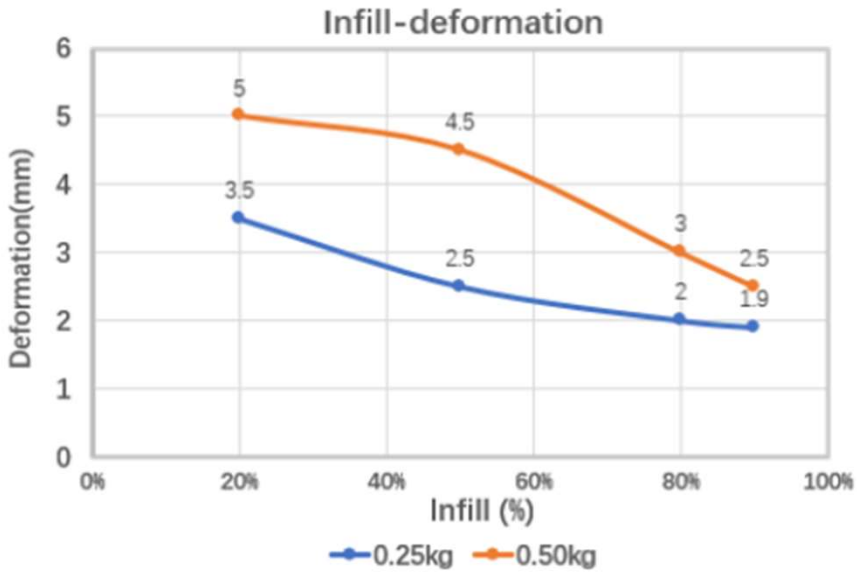
Multichip Antenna Printing

Lateral Force Testing



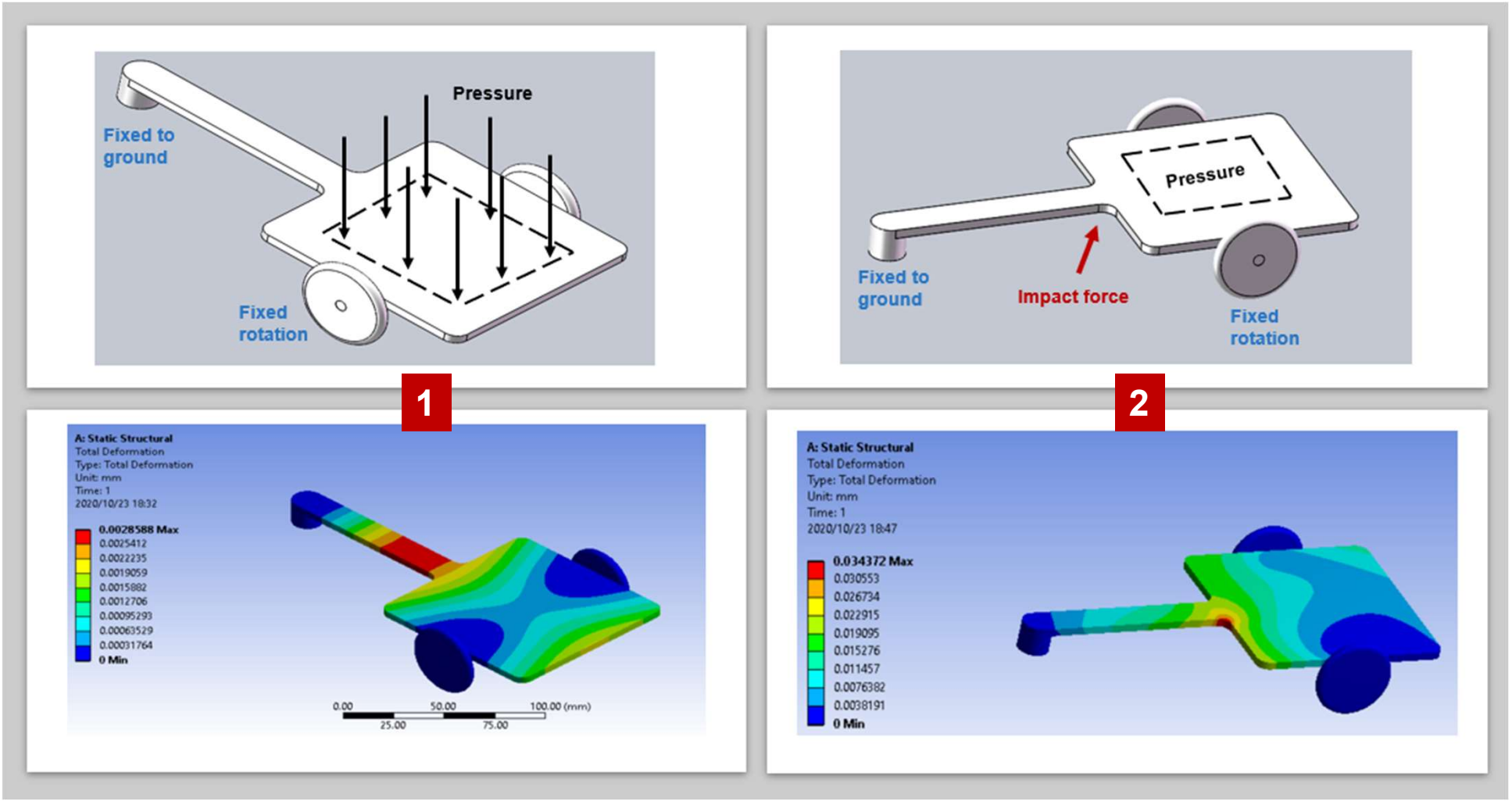


✔ Shaft with different infill(%)



✔ Deformation Curve

Trailer FEA


Pressure
Fixed to ground
Fixed rotation
1
A: Static Structural
Total Deformation
Type: Total Deformation
Unit: mm
Time: 1
2020/10/23 18:32
0.0028588 Max
0.0025412
0.0022235
0.0019059
0.0015882
0.0012706
0.00095293
0.00063529
0.00031764
0 Min
0.00
50.00
100.00 (mm)
25.00
75.00
Pressure
Fixed to ground
Impact force
Fixed rotation
2
A: Static Structural
Total Deformation
Type: Total Deformation
Unit: mm
Time: 1
2020/10/23 18:47
0.034372 Max
0.030553
0.026734
0.022915
0.019095
0.015276
0.011457
0.0076382
0.0038191
0 Min

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Filament Width (mm)

[0.10mm, 0.15mm, 0.20mm, 0.35mm]

Method

Number	Method
1	ULTRADETAIL
2	DETAIL
3	LINEAR ADVANCE
4	OPTIMAL
5	NORMAL
6	FAST

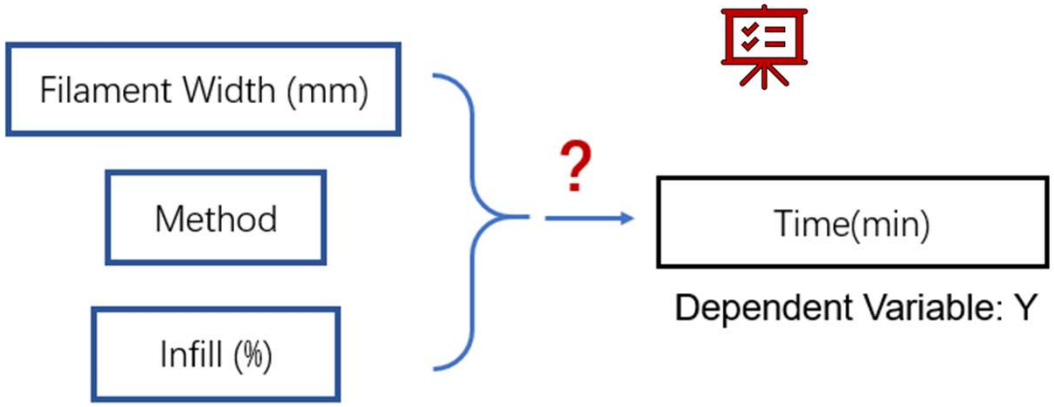
Infill (%):

[5%, 10%-90% (Δ=10%)]

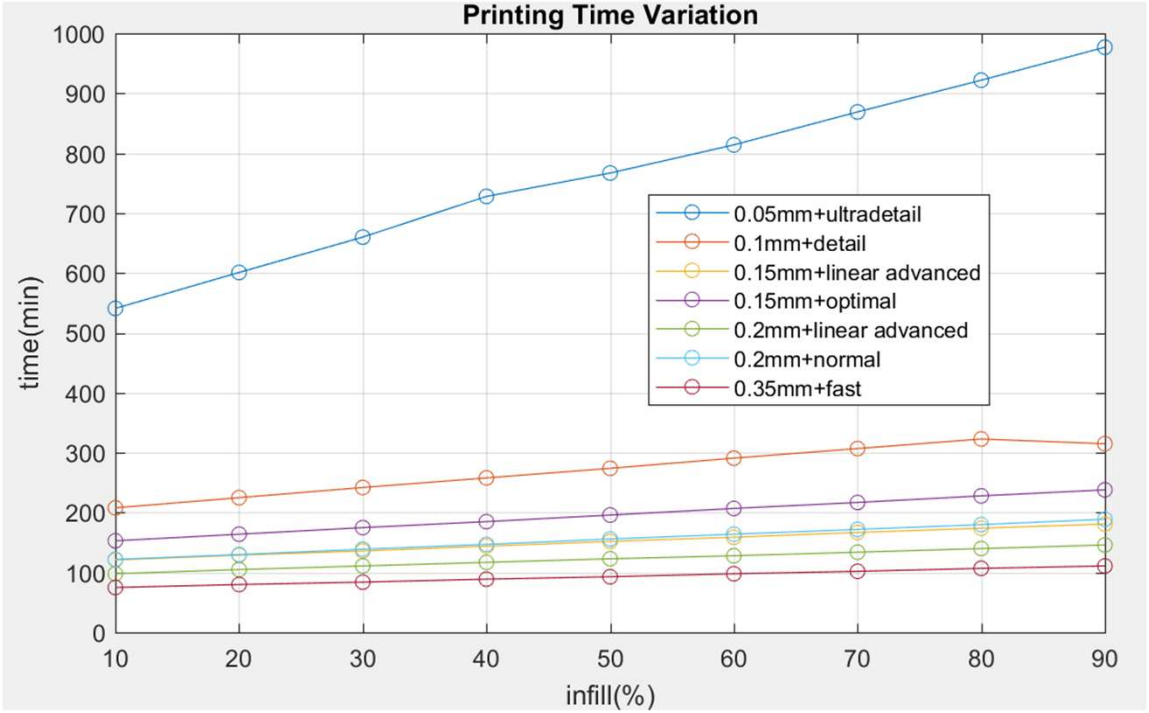
Printing complexity

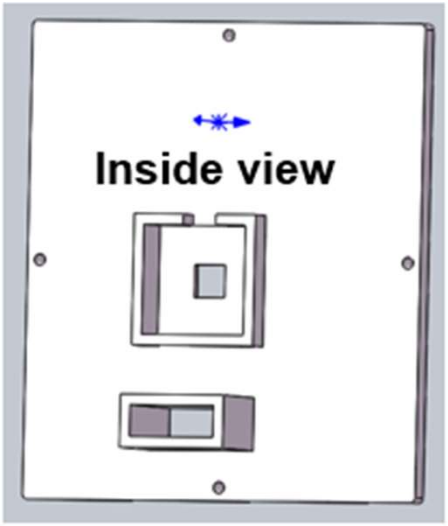
Time(mins)

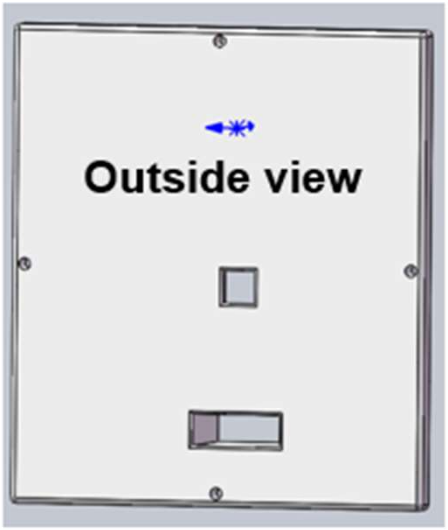
Structural Strength



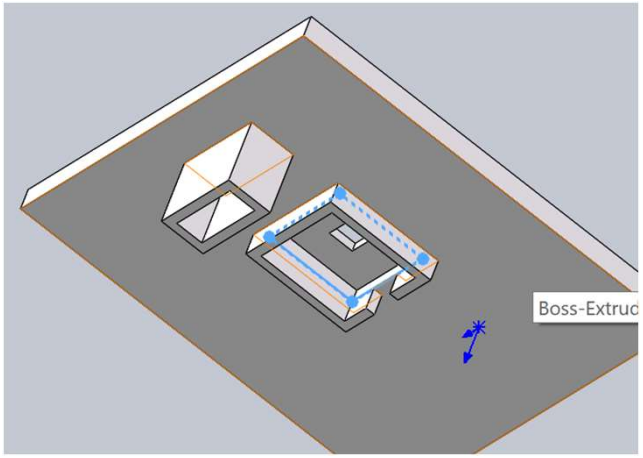
Independent Variable: [X1, X2, X3]







PRUSA i3 MK2-infill setting



Simple | Advanced | Expert

Print settings :

0.10mm DETAIL

Filament :

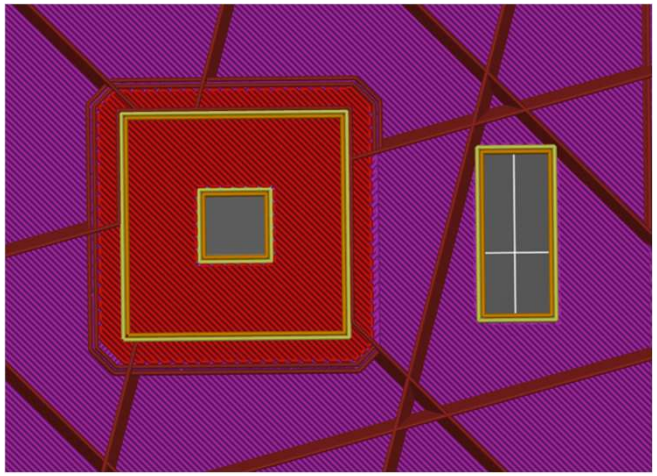
Prusament PLA

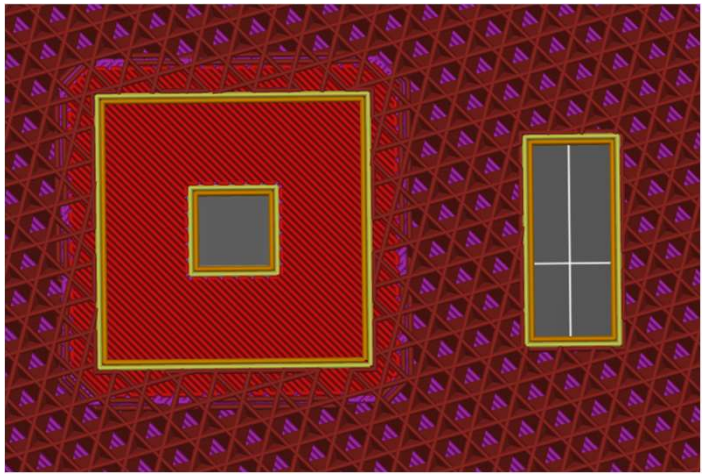
Printer :

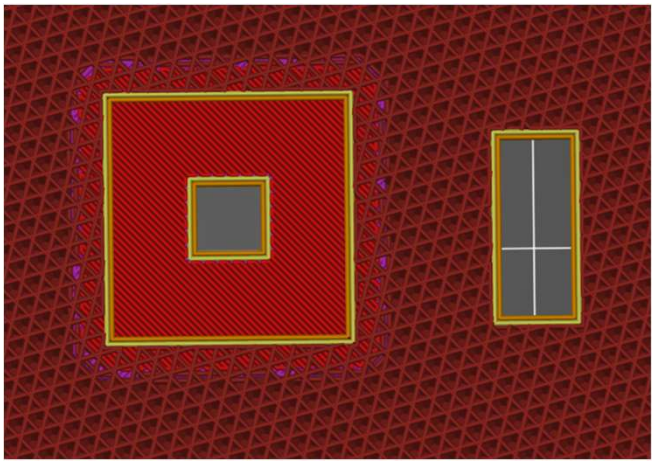
Original Prusa i3 MK2S

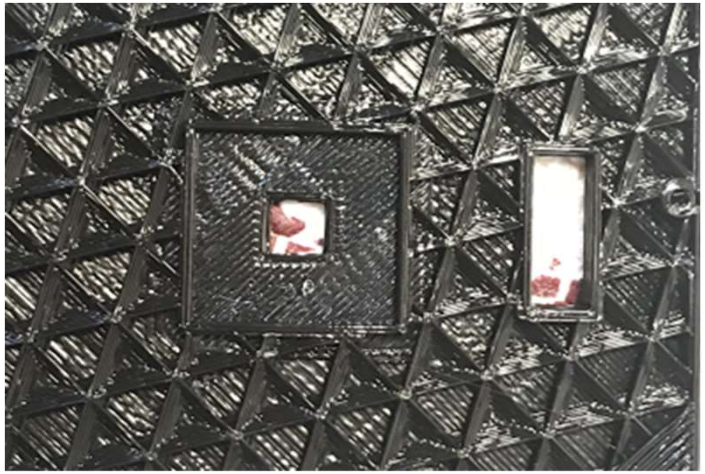
Supports: None

Infill: 20% Brim:



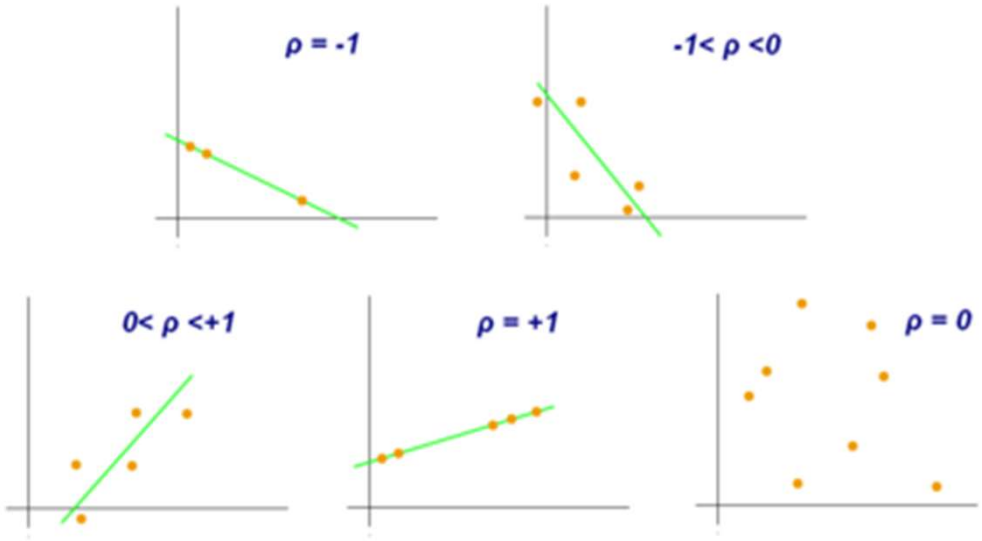


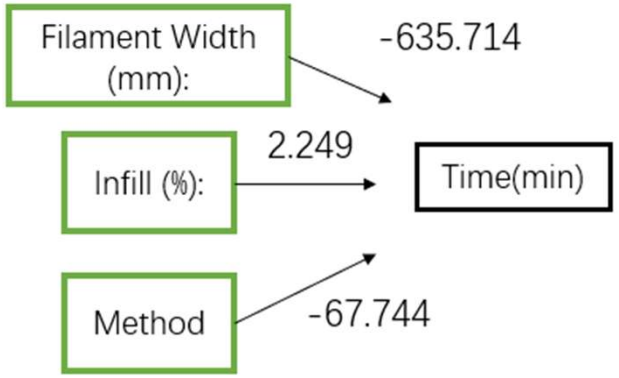




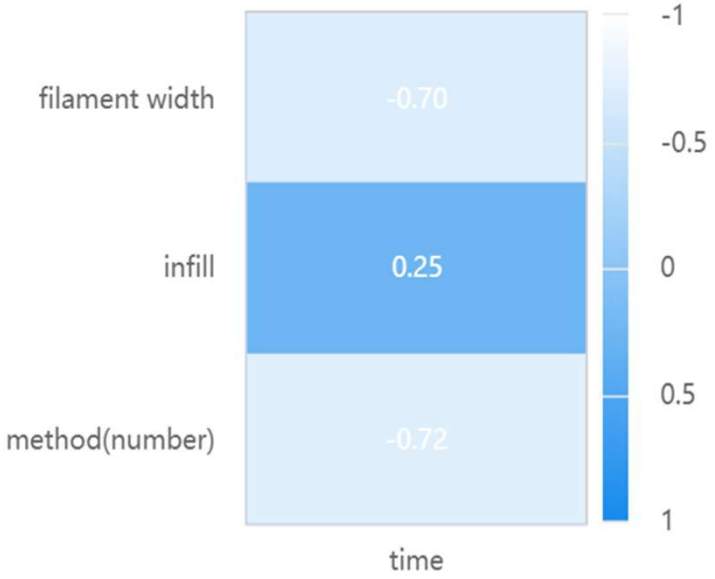
Parameter → Printing Efficiency (time)

Time(min) = 494.241 - 635.714*Filament_Width(mm) + 2.249*Infill - 67.744*Method(i)





➢ **Linear Regression Analysis**



➢ **Pearson Correlation Analysis**

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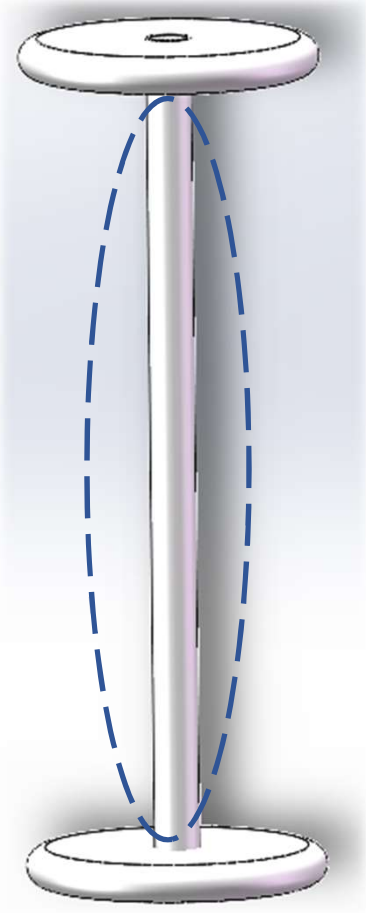
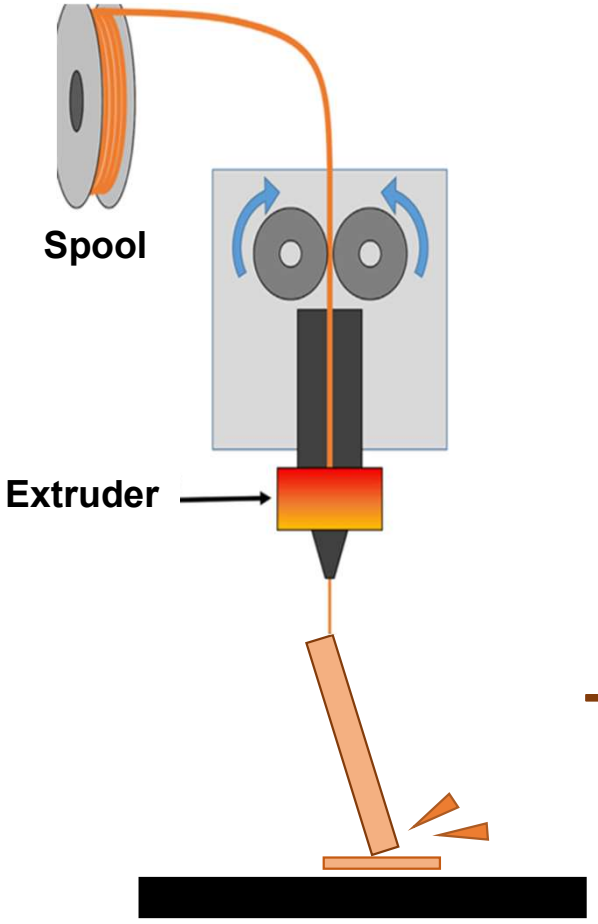
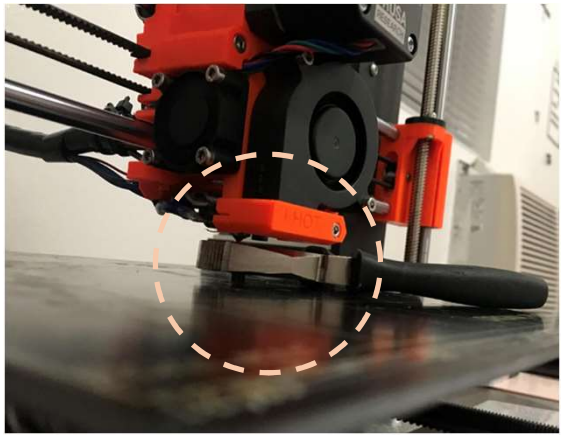
Problems and Optimization

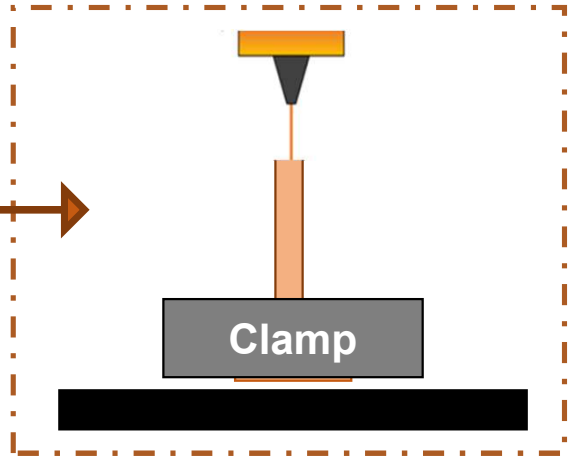
Problems and Optimization



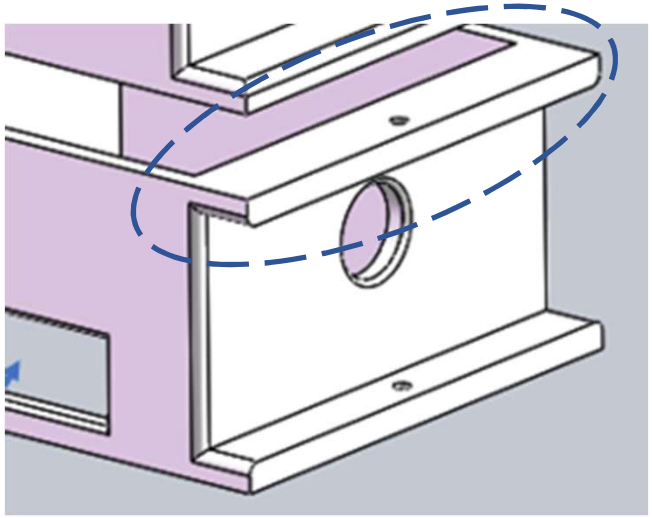
Axle of the wheel

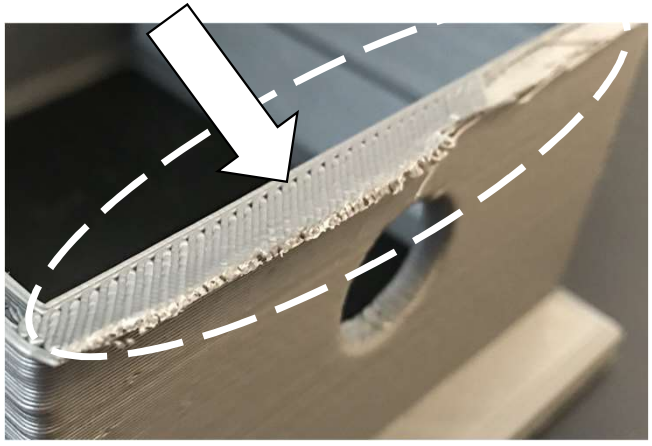


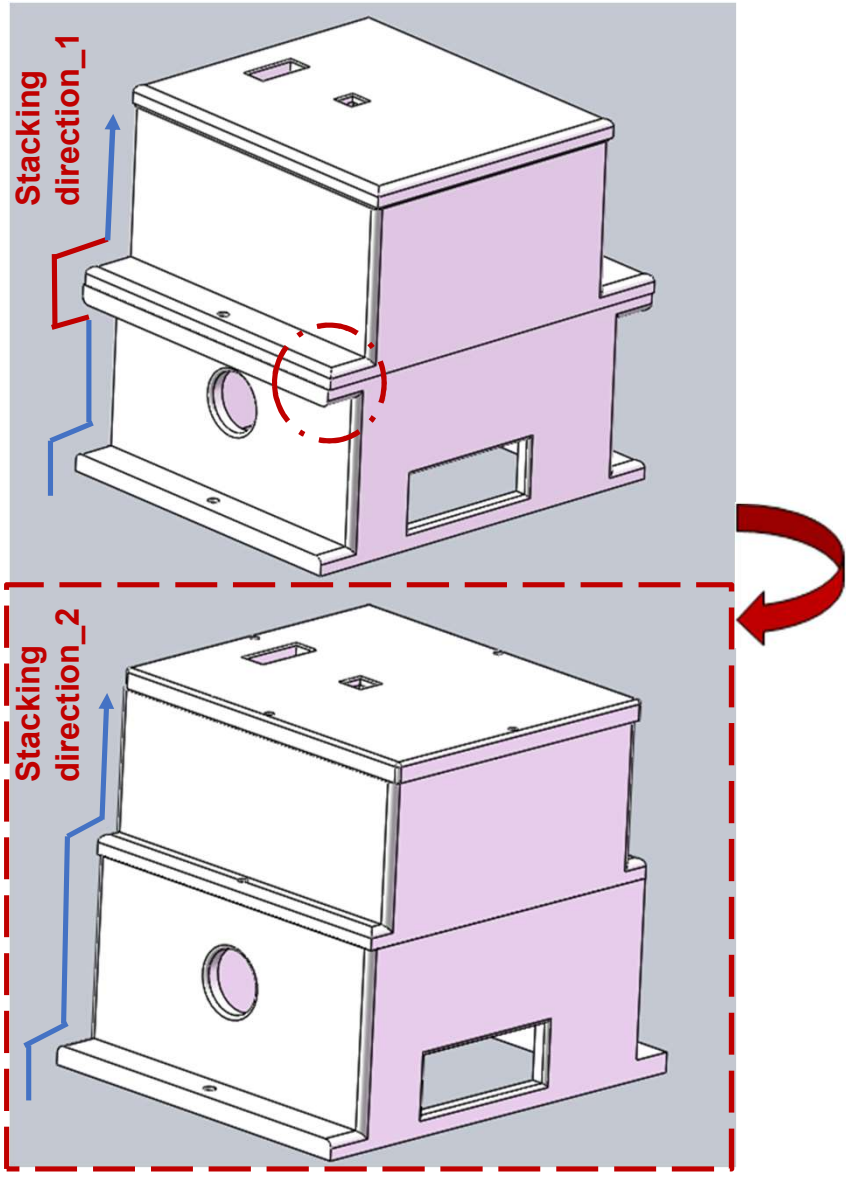




Problems and Optimization







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