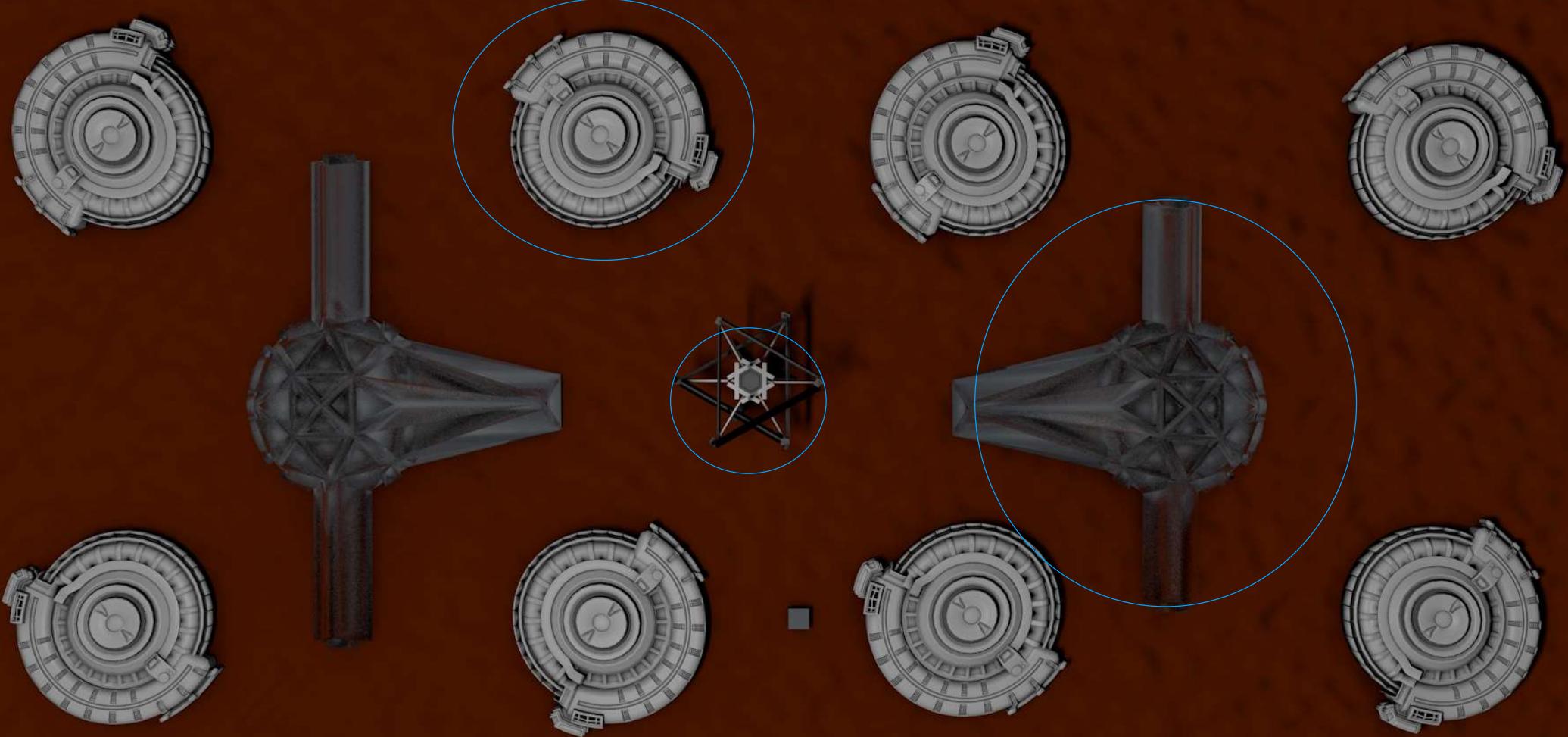


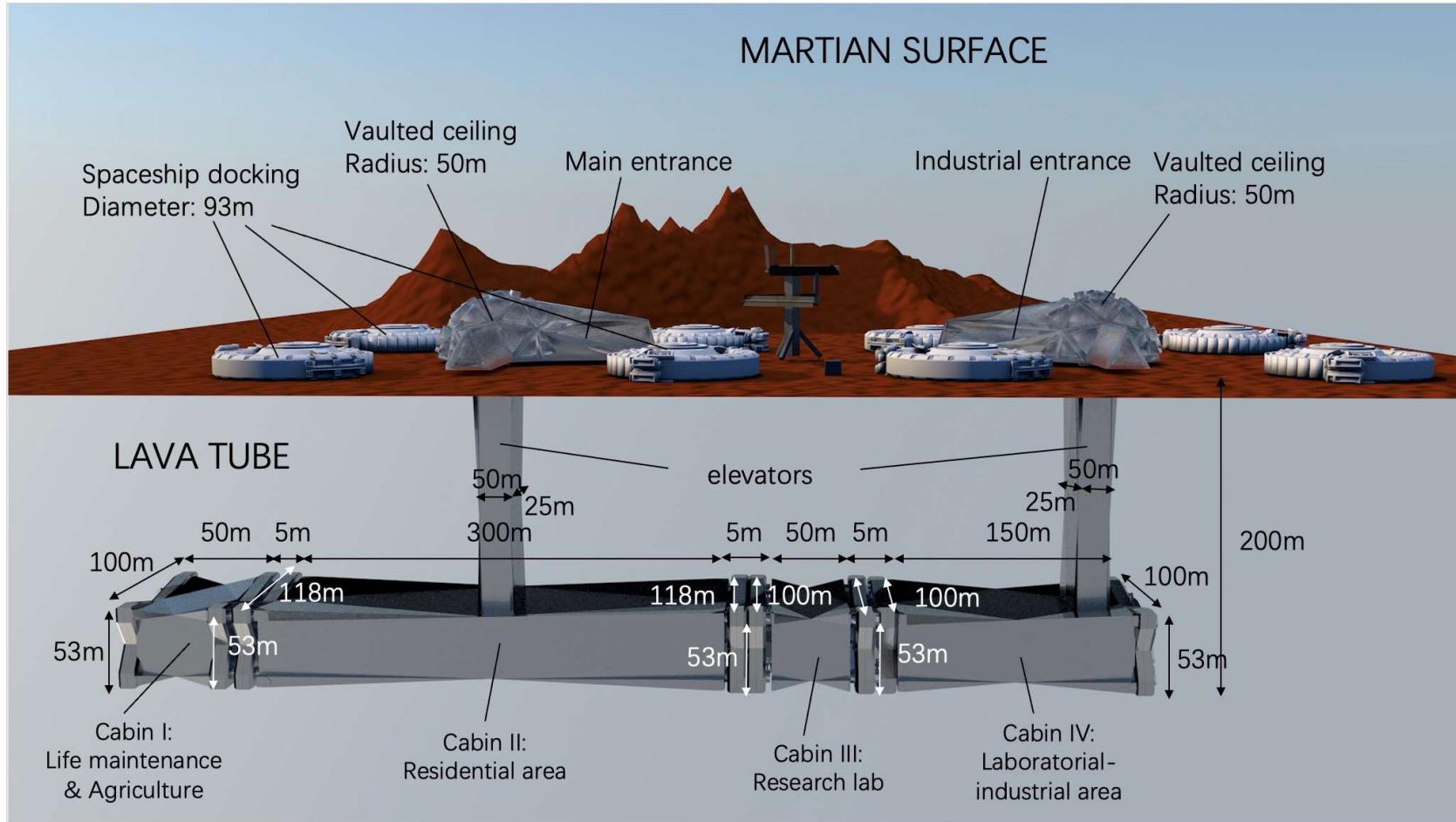
ROCKDONNELL  
Holmes.om

# 1 EXECUTIVE SUMMARY

# 2 STRUCTURAL DESIGN

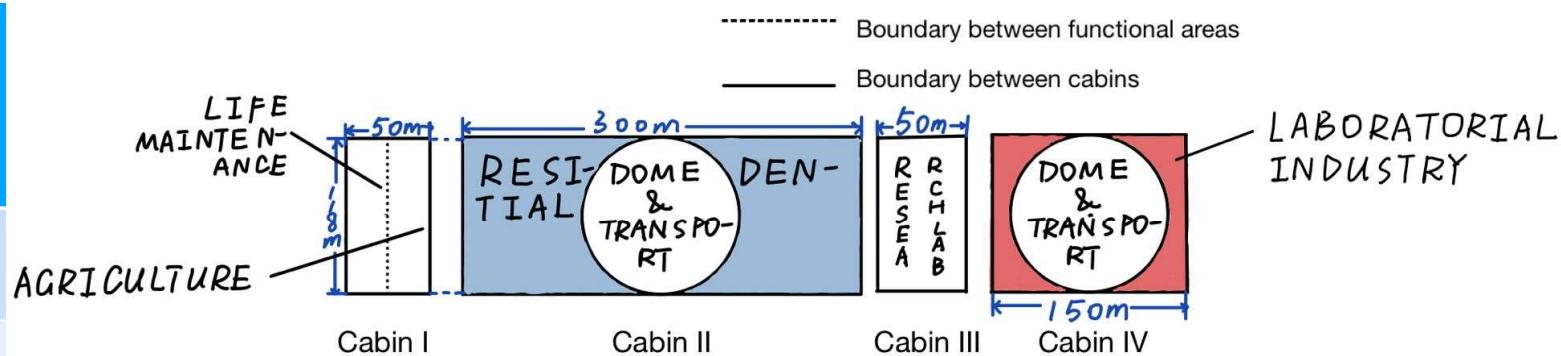


## 2.2 Interior Arrangements



## 2.2 Interior Arrangement: Overall

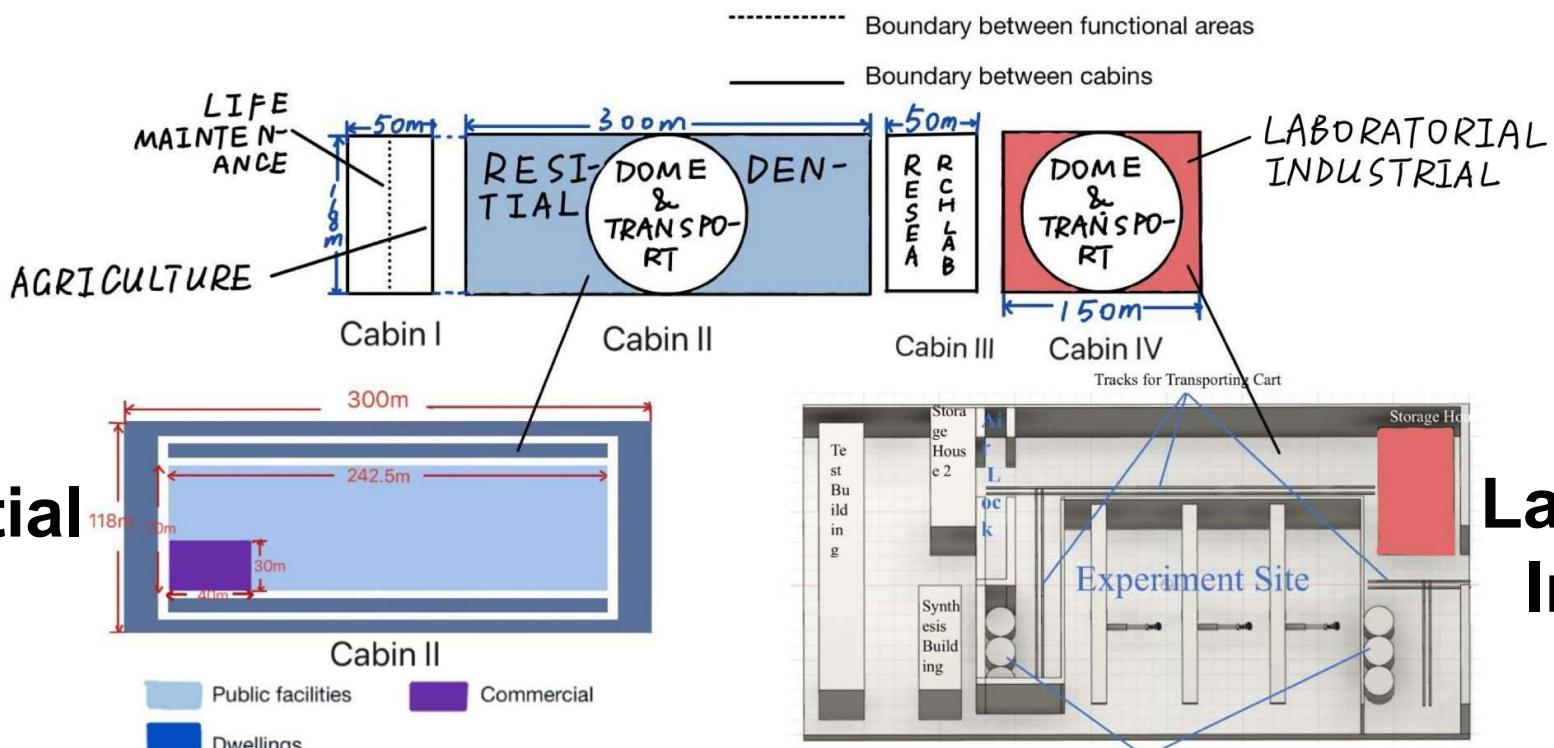
Functional Areas	Surface Area( $m^2$ )	Volume( $m^3$ )
Agricultural Area	$2.95 \times 10^3$	$1.475 \times 10^5$
Life Maintenance	$2.95 \times 10^3$	$1.475 \times 10^5$
Residential Area	$3.54 \times 10^4$	$1.475 \times 10^6$
Research Lab	$3.54 \times 10^3$	$1.475 \times 10^5$
Industrial Area	$7.08 \times 10^4$	$3.54 \times 10^6$



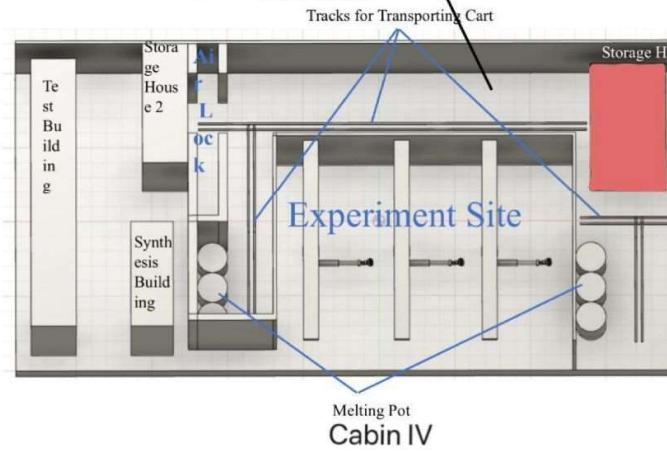
- Life maintenance& agriculture→The same cabin
- Residential& Industrial areas below the transportation system→convenience
- Research lab between residential area and industrial area—ensure safety
- Residential Area(Cabin II): dwellings, commercial, public facilities
- Industry Area(Cabin IV&V): manufacture& warehouses

## 2.2 Interior Arrangement: Overall & specified

**Residential Area**

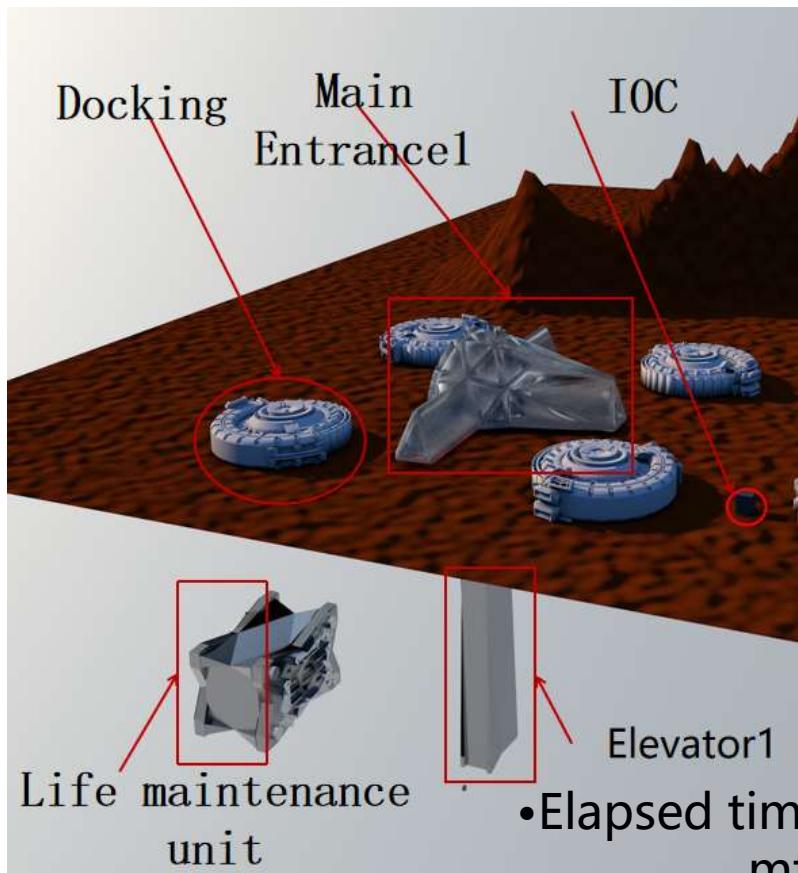


**Laboratorial Industrial Area**



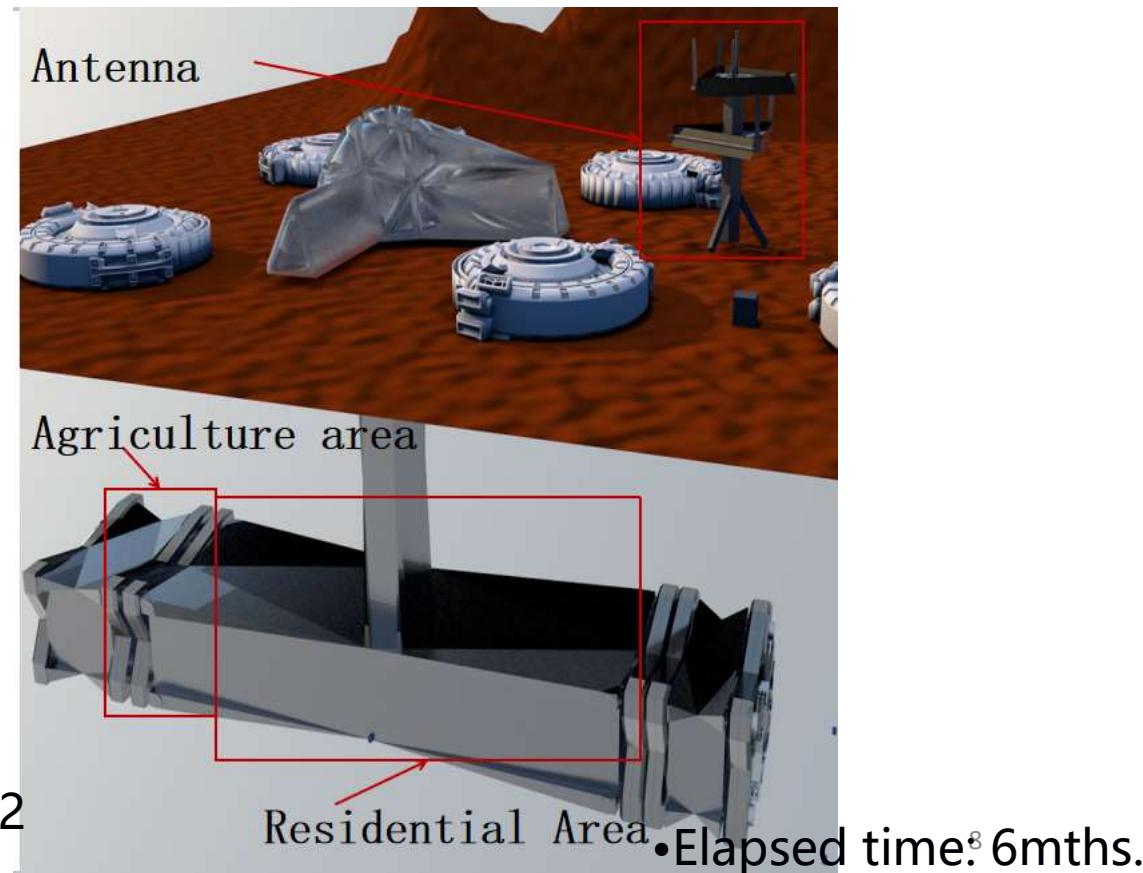
## 2.3 Phase 1

**Main focus:** construct a fully-functional life maintenance system.



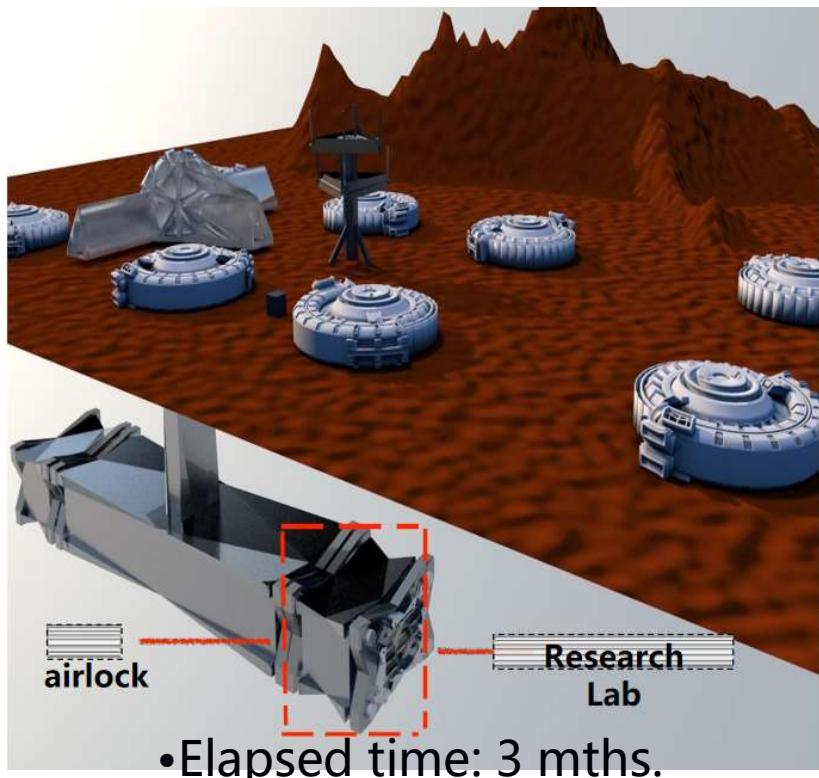
## Phase 2

**Main focus:** Accommodation for permanent residents.



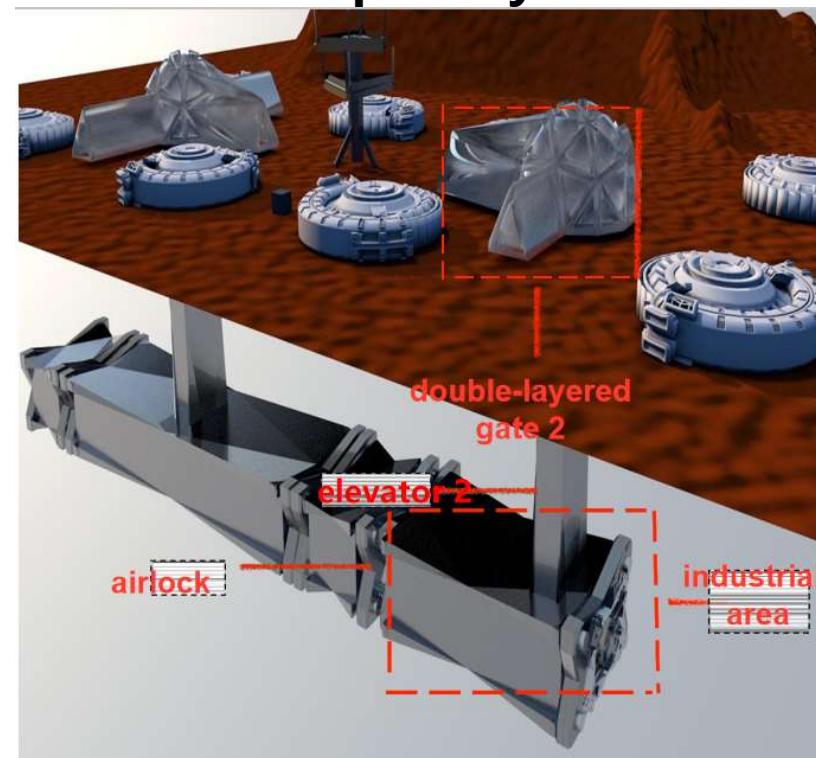
# Phase 3

Main focus: professional scientific research laboratory



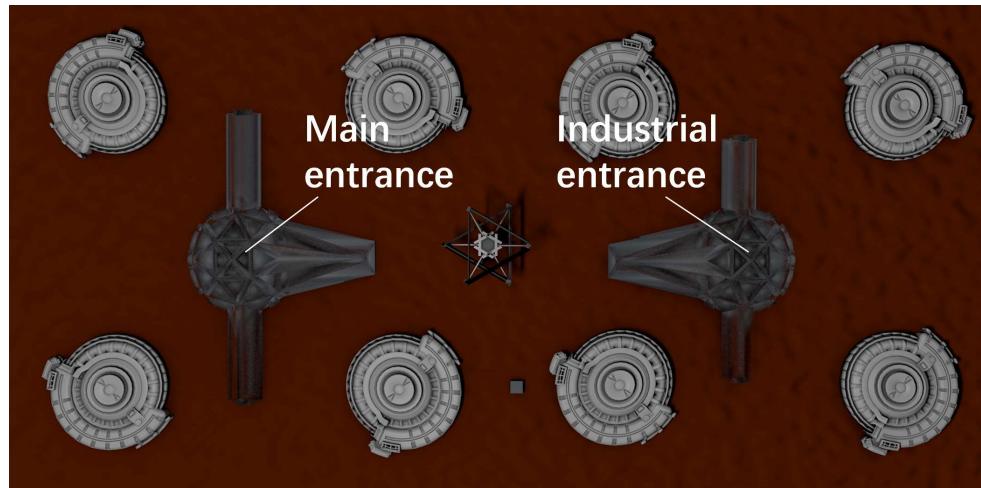
# Phase 4

Main focus: Refine industrial capability.

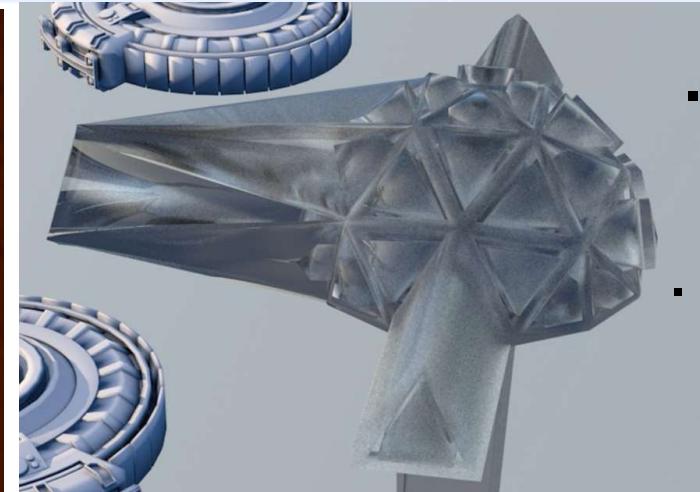


•Elapsed time: 1 yr and 5 mths.

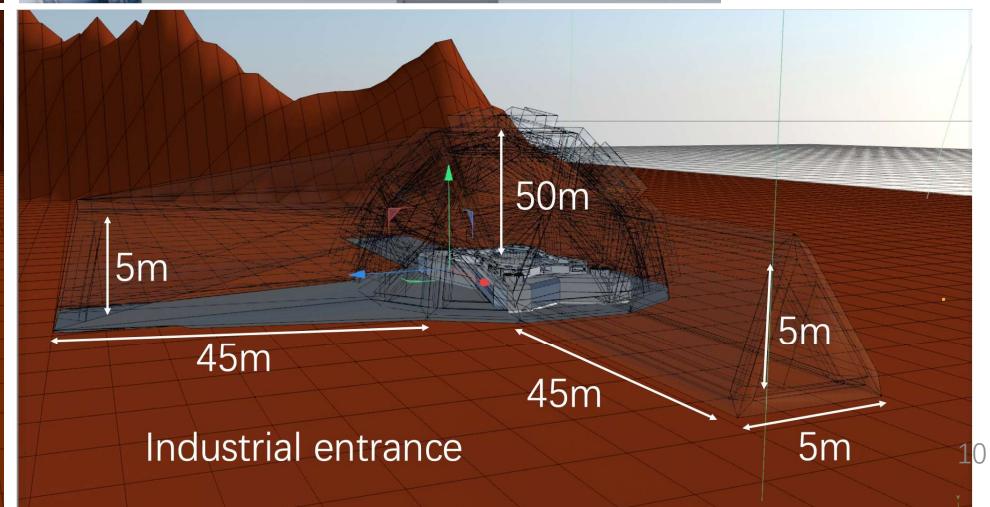
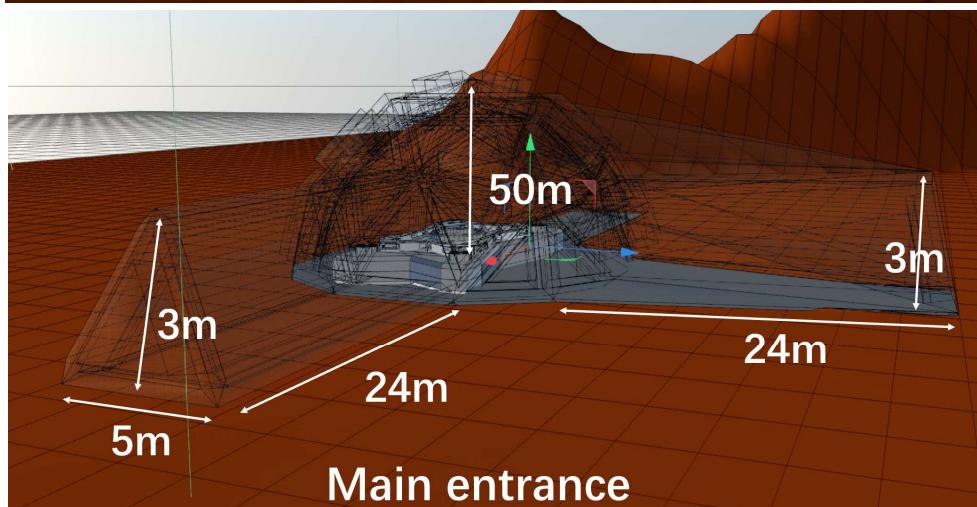
## 2.4 Entrance & Exit



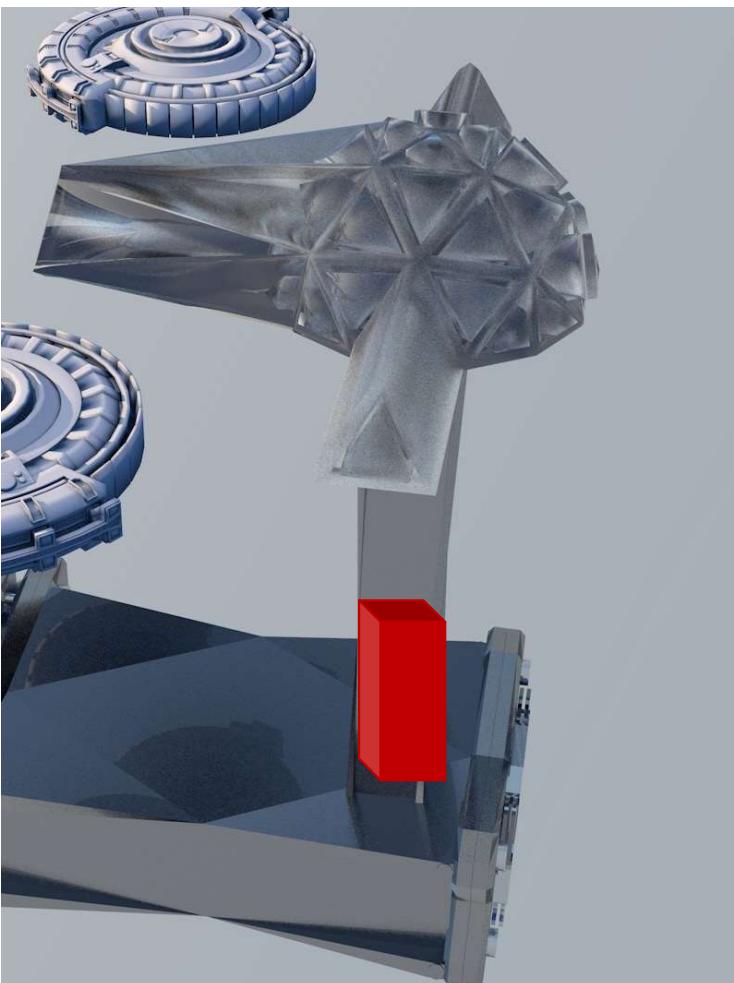
Entrance/ Exit	Function
Main Entrance( above II)	Transport residents/tourists and small vehicle
Industrial Entrance(above IV)	Transport CASSSCs containing materials to be processed



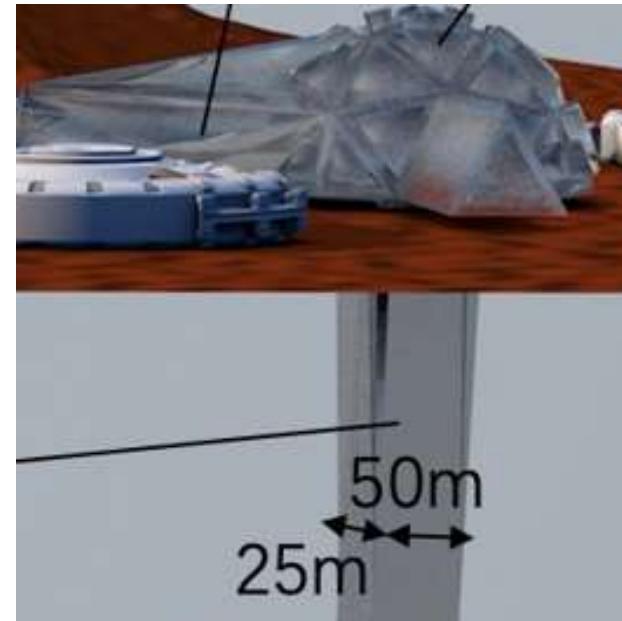
- Each is extended from the vaulted ceiling
- 3 gates / entrance



## 2.4 Entrance& Exit: Transportation

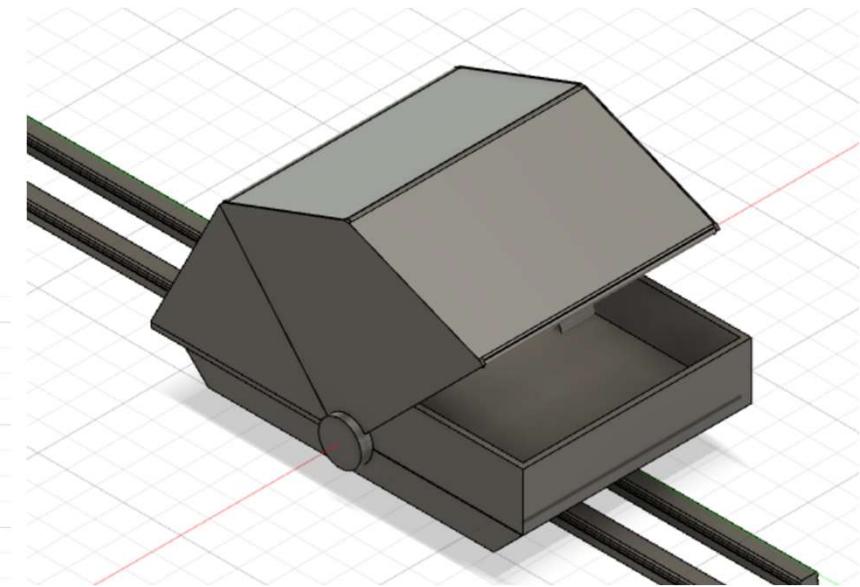
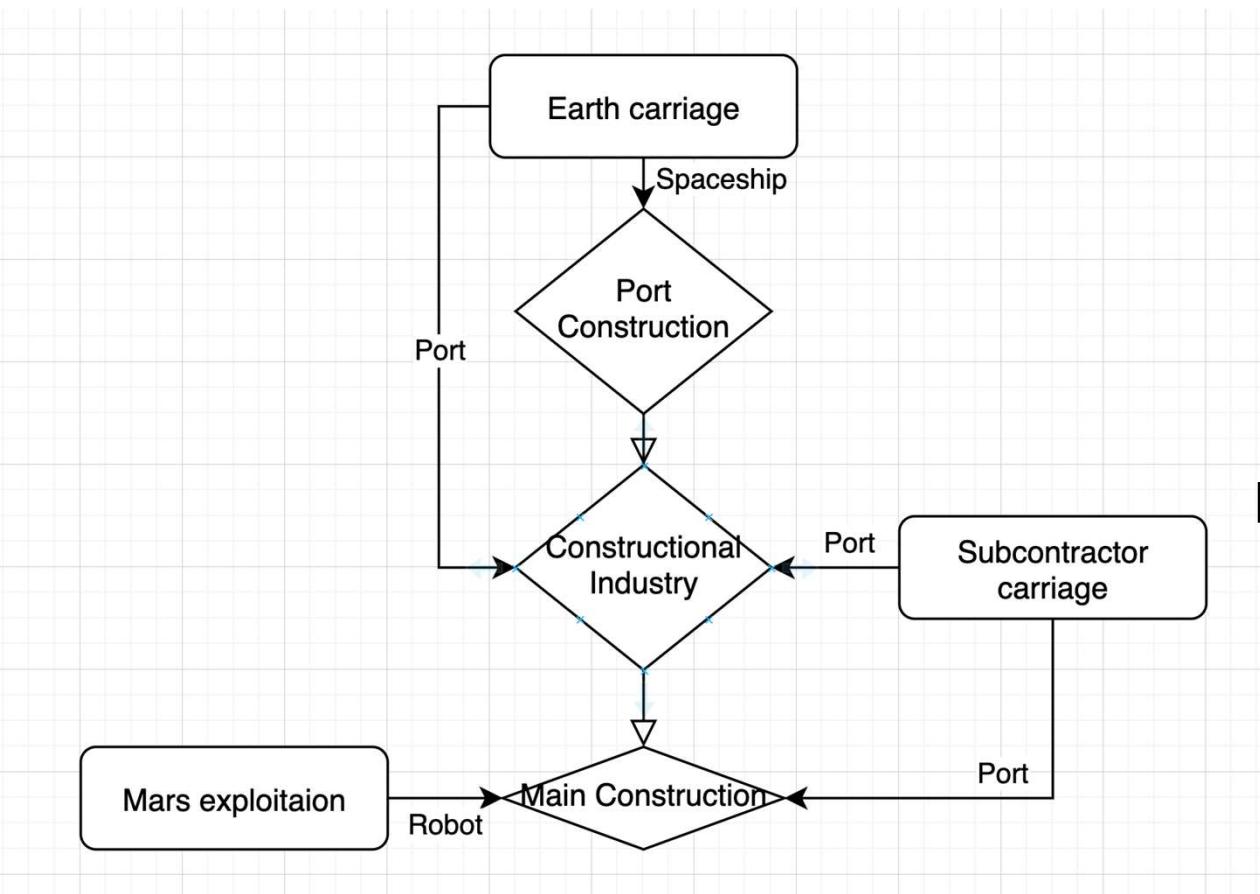


- Elevators are assigned in pillars below
  - One elevator in one pillar only
  - The elevator travels up/ down→ transports people/cargos out/in



# 3 OPERATIONS AND INFRASTRUCTURE

## 3.1 material



Bulky Breakthrough: radiation protective, thermal insulative and atmosphere retaining windows  
Hard Roll: refine metal from ores  
Large print: build industry equipments

# 3.1 material

535 CASSSC

2219Al	Ti-Al alloy	Bare cooper wire	Aluminum zinc plated steel plate	Color steel composite panels	glass
370000m <sup>3</sup>	370000m <sup>3</sup>	0.08m <sup>3</sup>	450m <sup>3</sup>	7000m <sup>3</sup>	
Mars, Hard Roll	Earth & Mars, Hard Roll	Earth	Earth & Mars, Hard Roll	Earth	Bucky Breakthroughs

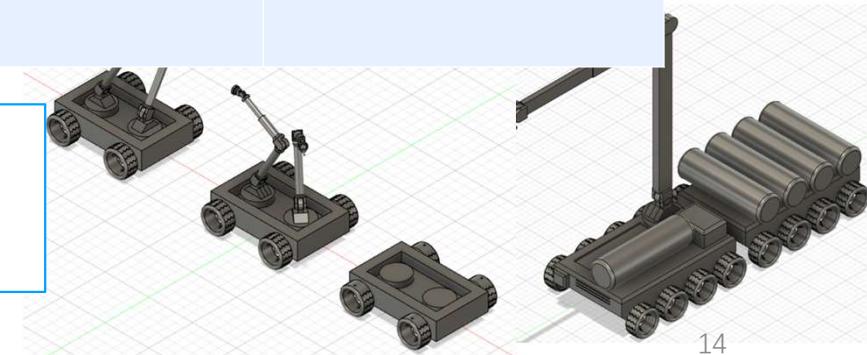
CASSSC

houses

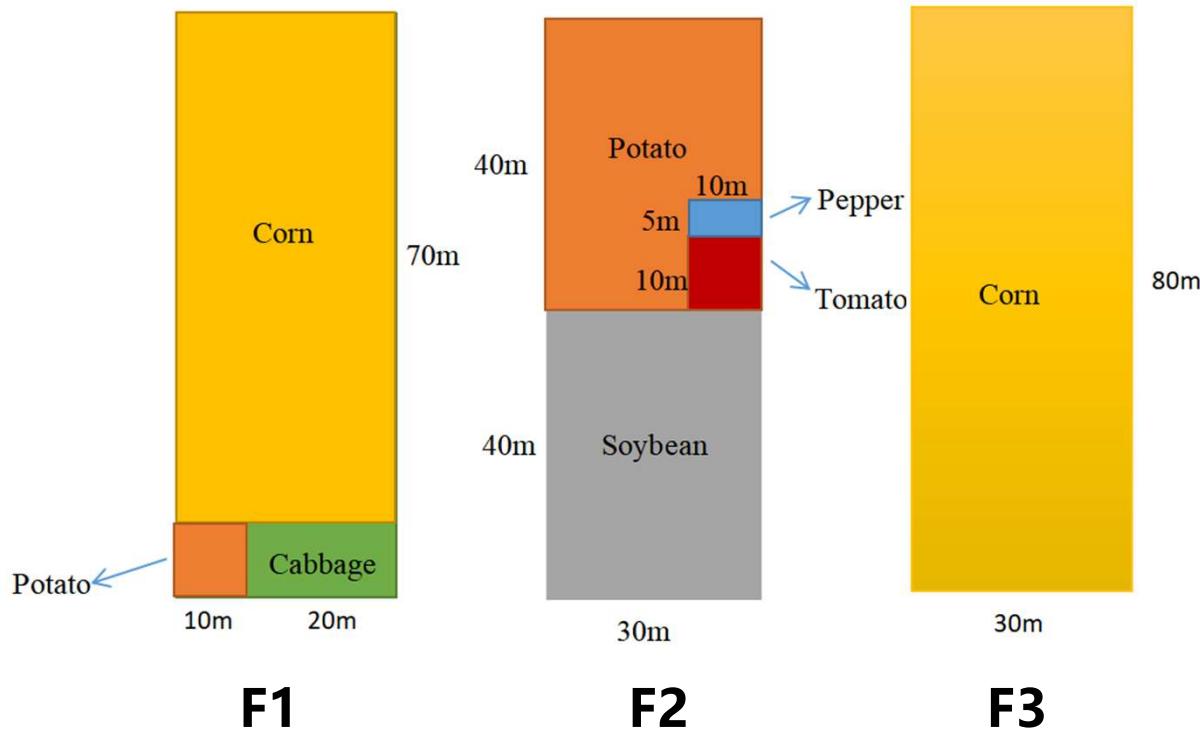
245houses in total

Other material

45houses



## 3.2.1 Food Production

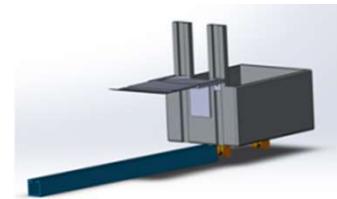
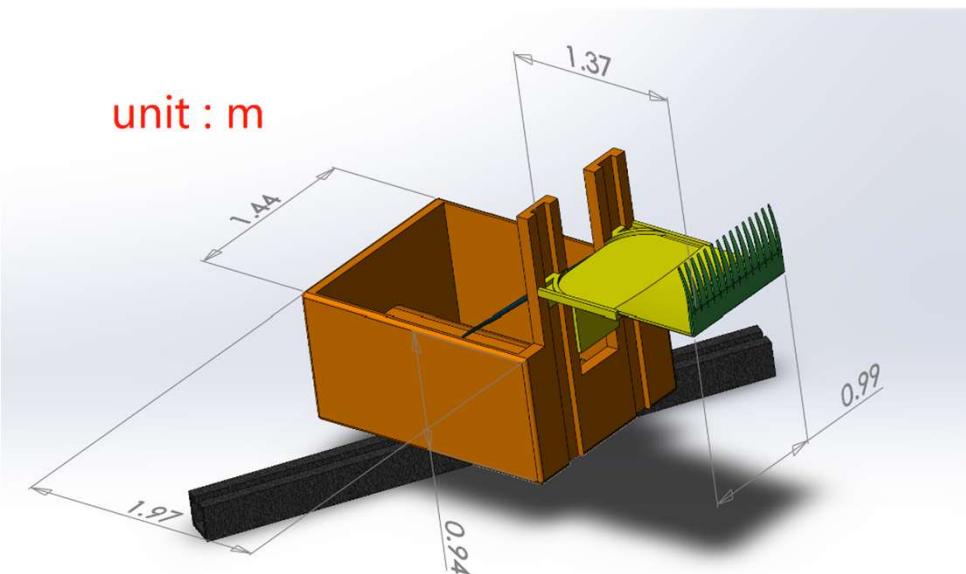


- Vertical Farming
- Hydroponics

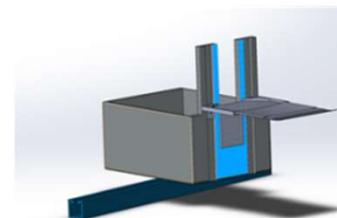
CASSSC:36

	Annual output (kg)	Daily supply per person (g)	Nutrition
Total	210025	1150	
Potato	73000	400	Energy:76kJ
Soybean	9200	50	Energy:359kJ Ca: 191mg Mg:199mg
Chinese Cabbage	27375	150	Vitamin A: 20mg
Tomatoes	18250	100	Vitamin C: 19mg
Corn	73000	400	Carbohydrate: 19.9g
Space pepper	9200	50	Vitamin A: 57mg Vitamin C: 62mg

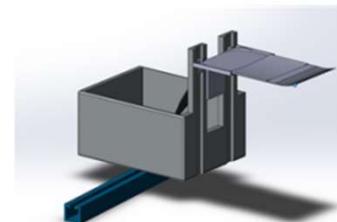
## 3.2.1 Food Production



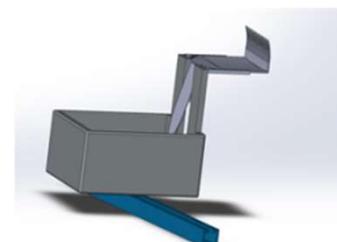
The harvest on track.



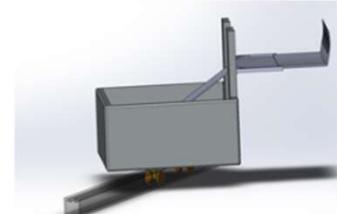
Rise to specific height.



Reach inside the crop box  
Bend & pull back



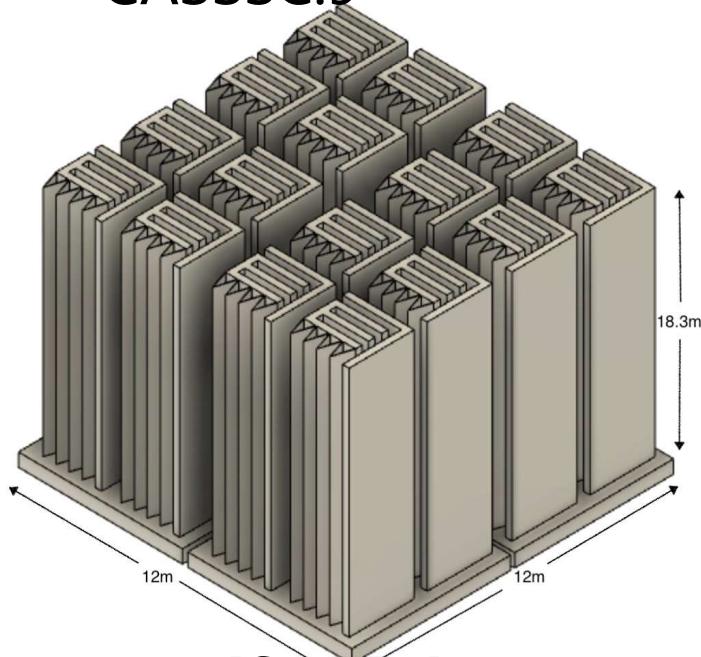
Drop crop-storage boxes



Return to a position  
along a specified track

## 3.2.2 Electrical Power Generation and Distribution

- Subcontractor: Fusion Founders(installed next to battery).
- CASSSC:9



Section (daily)	Consumption/kW
Agricultural Area	201.1
Residential Area	400
Industrial Area	100
Research Lab	267
Transportation	67
Emergency(not included in total)	400
Total	1035

- Only provide power to Residential Area in emergency
- Volume of battery(emergency):  $1570 \text{ m}^3$ 
  - Produce while consuming

### 3.2.3 Communication System

Internal

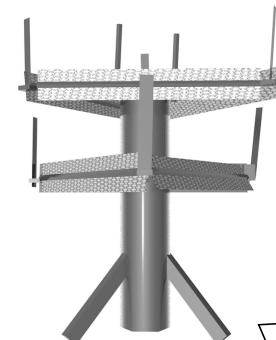
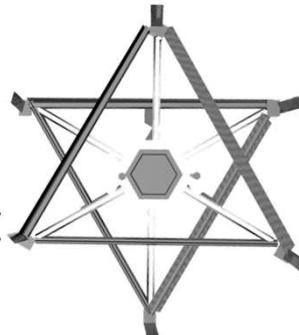
Between individuals:

Network connected

AR glasses

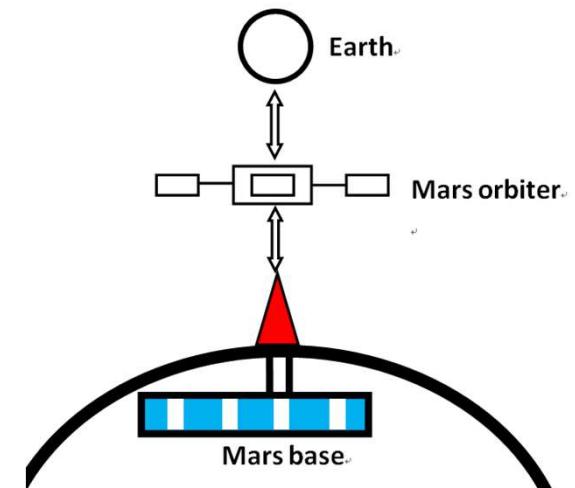
Between mars bases:

Satellite



External: DTN mode

- Electro Protect: components for circuitry
- Orbit Link Communications: augment standard communications channels
- ZAP! Industries: fiber optics



## 3.2.4 Transportation System

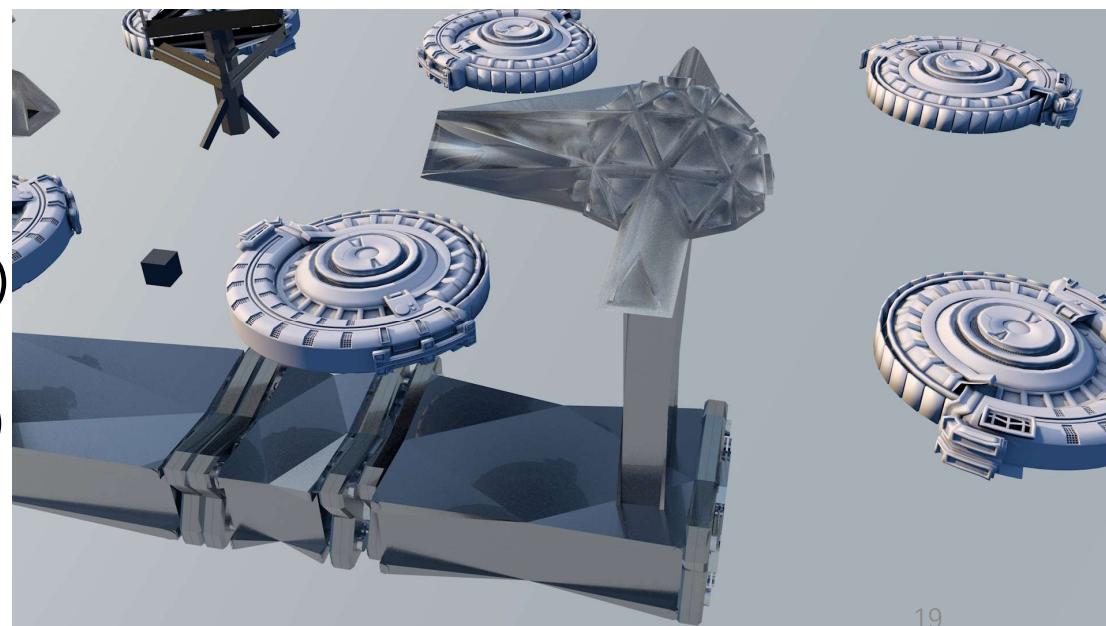
external

- elevated rail (protect the track from dust)
- manned-Rovers with graphene batteries for long endurance that could traverse tough terrains

internal

- complete automatic stations
- pressurized airlocks (at the hatch doors)
- pressurized lid covering the rail outside the station (protect the track from dust)

**High transporting efficiency, complete automatic, relative low cost  
CASSSC:30**



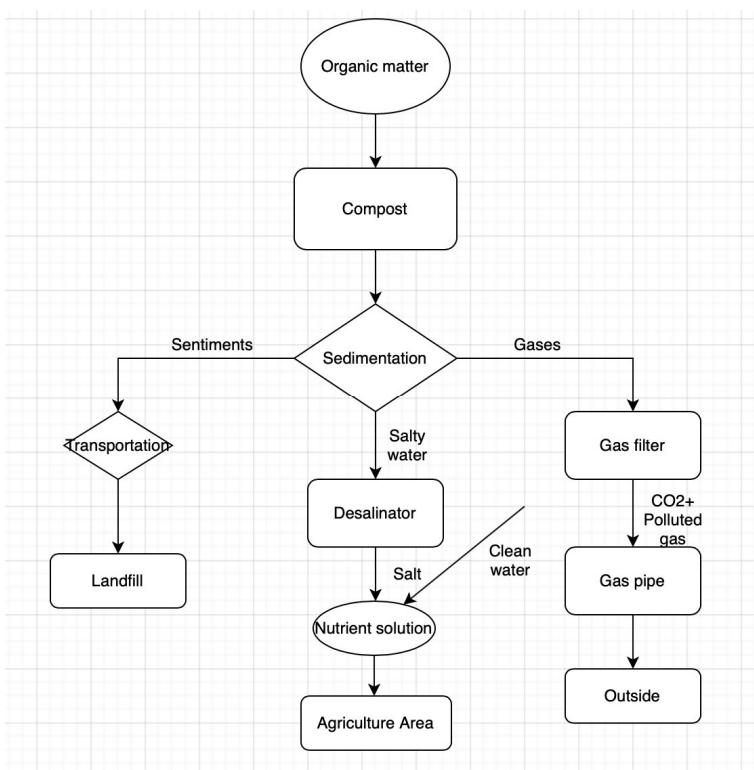
# 3.2.5 Atmosphere Composition and Pressure

District	Air Partial Pressure/atm	Composition	Volume/m <sup>3</sup>
Residential area	0.624 atm N <sub>2</sub> 0.1714 atm O <sub>2</sub> 0.004 atm CO <sub>2</sub> 0.0006 atm H <sub>2</sub> O	78.0% N <sub>2</sub> 21.425% O <sub>2</sub> 0.5% CO <sub>2</sub> 0.075% H <sub>2</sub> O	1364493m <sup>3</sup> N <sub>2</sub> 374798m <sup>3</sup> O <sub>2</sub> 8747m <sup>3</sup> CO <sub>2</sub> 1312m <sup>3</sup> H <sub>2</sub> O
Agricultural area	0.624 atm N <sub>2</sub> 0.160 atm O <sub>2</sub> 0.008 atm CO <sub>2</sub> 0.008 atm H <sub>2</sub> O	78.0% N <sub>2</sub> 20% O <sub>2</sub> 1% CO <sub>2</sub> 1% H <sub>2</sub> O	117000m <sup>3</sup> N <sub>2</sub> 30000m <sup>3</sup> O <sub>2</sub> 1500m <sup>3</sup> CO <sub>2</sub> 1500m <sup>3</sup> H <sub>2</sub> O
Research lab	0.624 atm N <sub>2</sub> 0.1714 atm O <sub>2</sub> 0.004 atm CO <sub>2</sub> 0.0006 atm H <sub>2</sub> O	78.0% N <sub>2</sub> 21.425% O <sub>2</sub> 0.5% CO <sub>2</sub> 0.075% H <sub>2</sub> O	206700m <sup>3</sup> N <sub>2</sub> 56776.25m <sup>3</sup> O <sub>2</sub> 1325m <sup>3</sup> CO <sub>2</sub> 198.75m <sup>3</sup> H <sub>2</sub> O

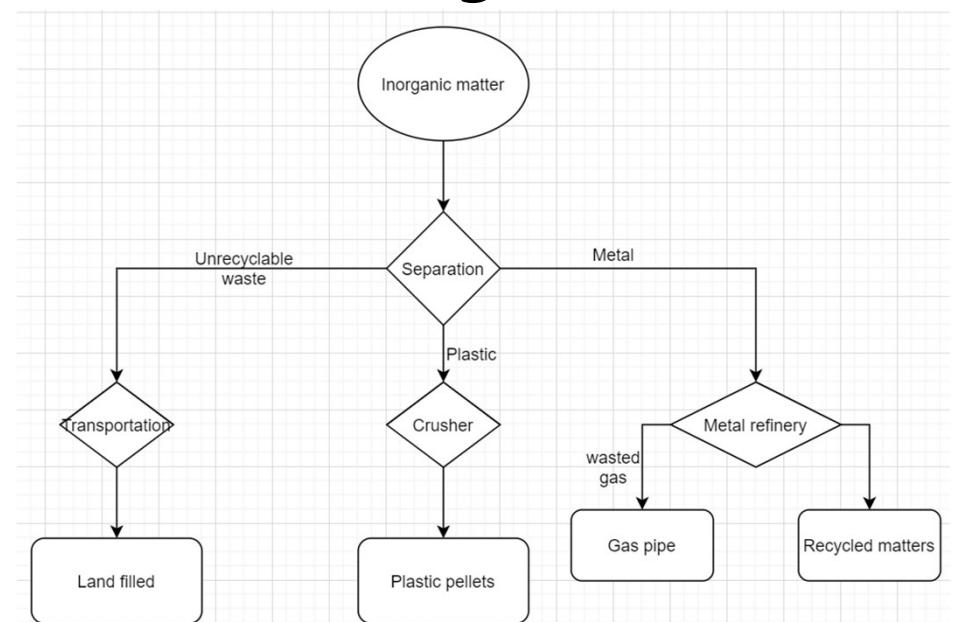
- Air pressure: 0.8 ATM: low cost, harmless
- Initial atmosphere will be provided by Stuff of Life
- Specialization (productive)
- CASSSC: 16

## 3.2.6 Household and Industrial Solid Waste Management

Organic matter: .



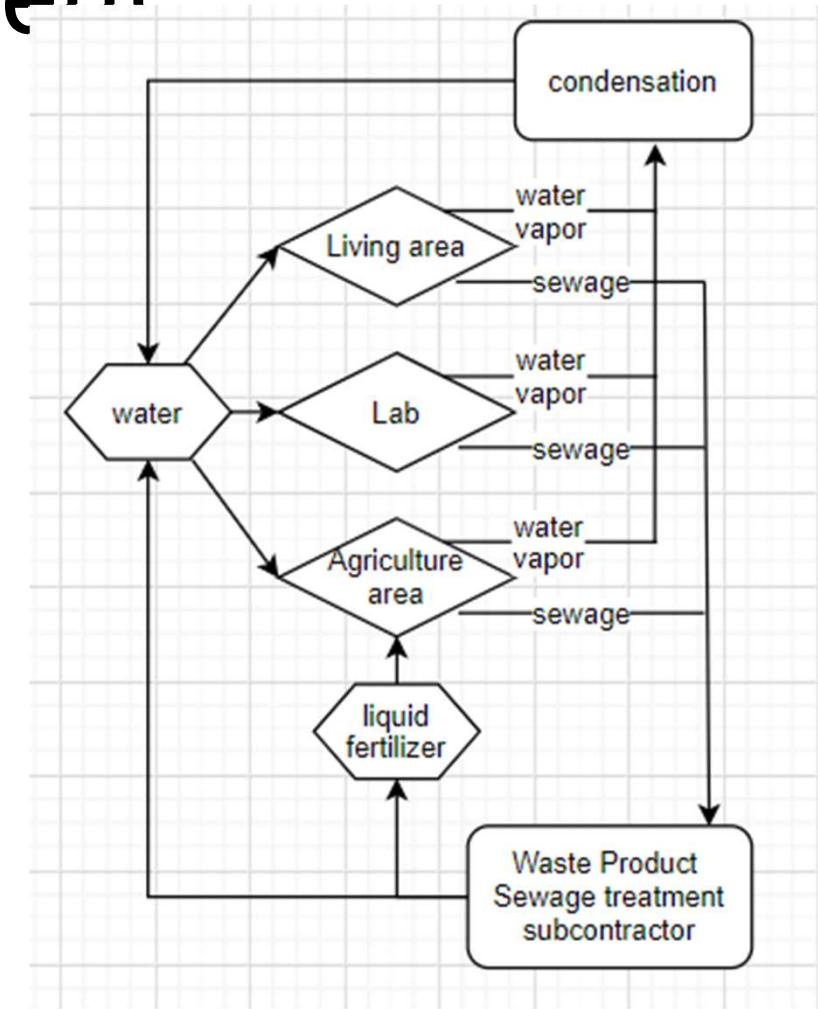
Inorganic matter:



Separate to different states of matter

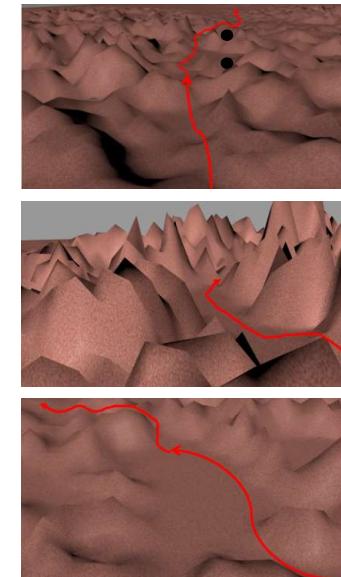
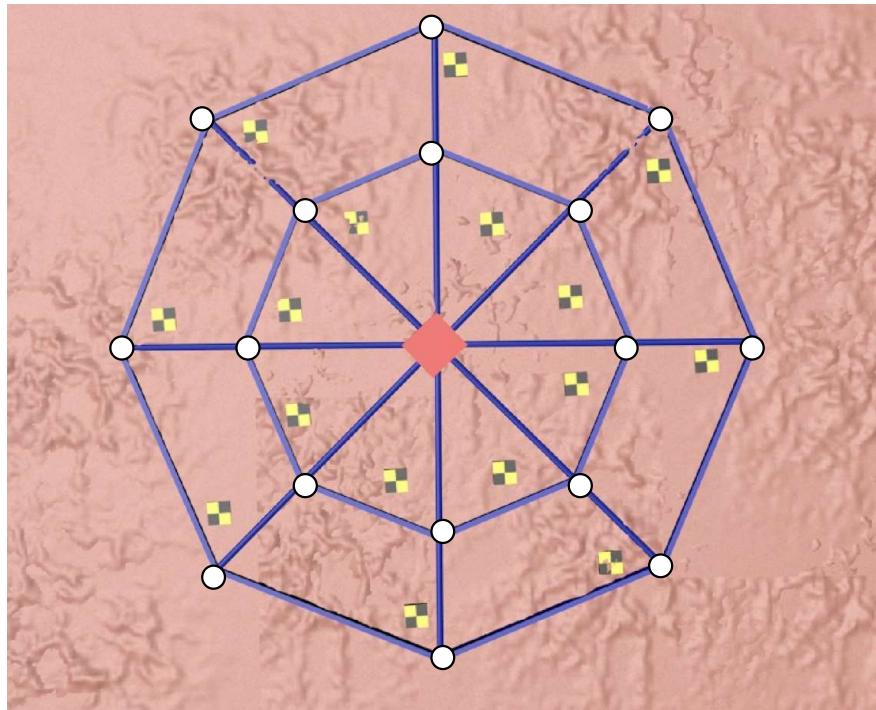
### 3.2.7 Water Management

- Water tank for residential area: 600m<sup>3</sup>
- Water tank for food production: 40m<sup>3</sup>
- Diameter of pipeline: 0.5m
- CASSC: 9
- Subcontractor: Waste products - convert sewage into fresh water and fertilizer.



### 3.3 Mars harvest operations route

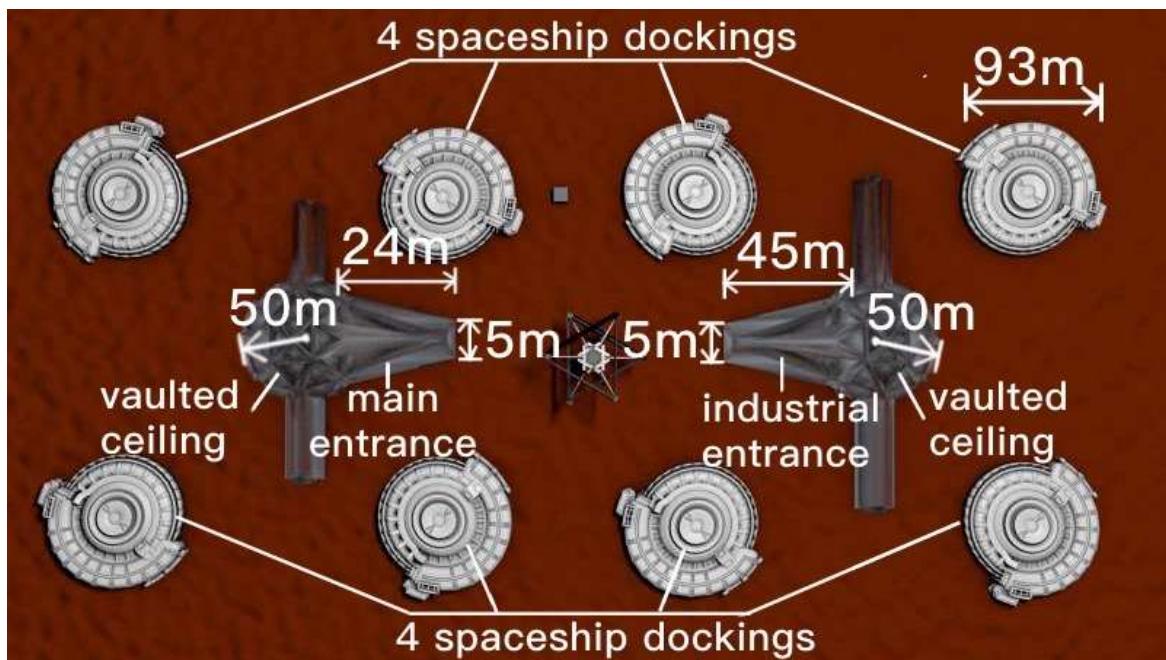
Landforms



- Ke** Scheduled route
- oy** Joint
- Mars base
- [■■]** Emergency point

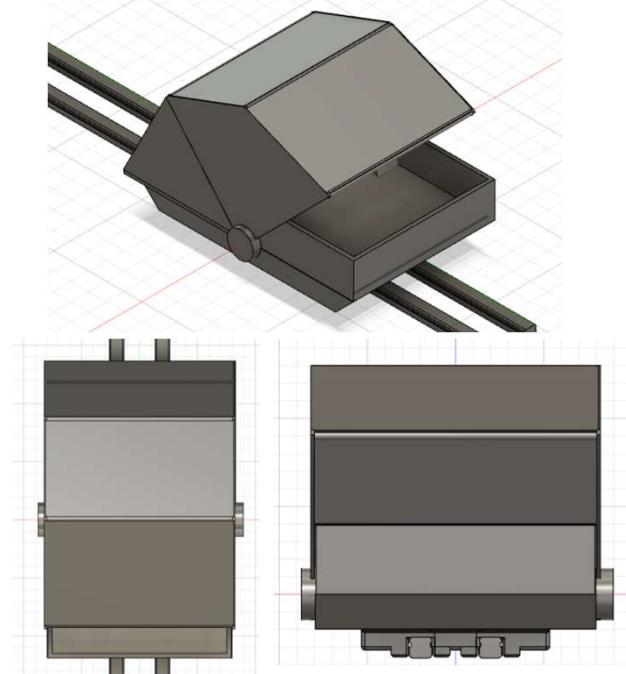
## 3.4

### plan of surface docks and base entrances



Transportation vehicles:  
railcars

Connects external docks and  
internal base with tracks



# 4 HUMAN FACTORS AND SAFETY



# 4.1.1: Interior Design Plan

296.5m (973ft)



## 4.1.2 Supplies and Consumables:

Types of Supplies and Consumables	Quantities of Supplies and Consumables	Means of Distribution	Types of Supplies and Consumables	Quantities of Supplies and Consumables	Means of Distribution
Food	2500*400 calorie /day	From: Life Maintenance Department To: Food service By: Rails (Automation)	Clothing	1000 suits /2 Earth year	From: Elevator To: Business center By: Rails (Automation)
			Household Supplies	Bathroom Amenities: 400 sets /Earth month	
				Beddings: 100 sets /5 Earth years	
				Furniture & Electric Appliances: 74 sets /5 Earth years	
Medical Supplies	40 sets /Earth year	From: Elevator To: Medical facilities By: Rails (Automation)	Greening supplies	80m^2 /Earth month	From: Elevator To: Greening By: Rails (Automation)
Office Supplies	60 sets /Earth year	From: Elevator To: Business center By: Rails (Automation)	Water	(See Auto Depart.)	From: Life Maintenance Department To: All the places where it's needed By: Pipeline transportation
Laboratory Supplies	15 sets /Earth year (Basic ones)	From: Elevator To: Labs By: Rails (Automation)	Sanitation Supplies	Note: Specific Robots (Do not need Replacements—>Repairment)	N/A

## 4.2.1 Internal floor plans



Tow hundred houses which  
are 969(sq.ft)



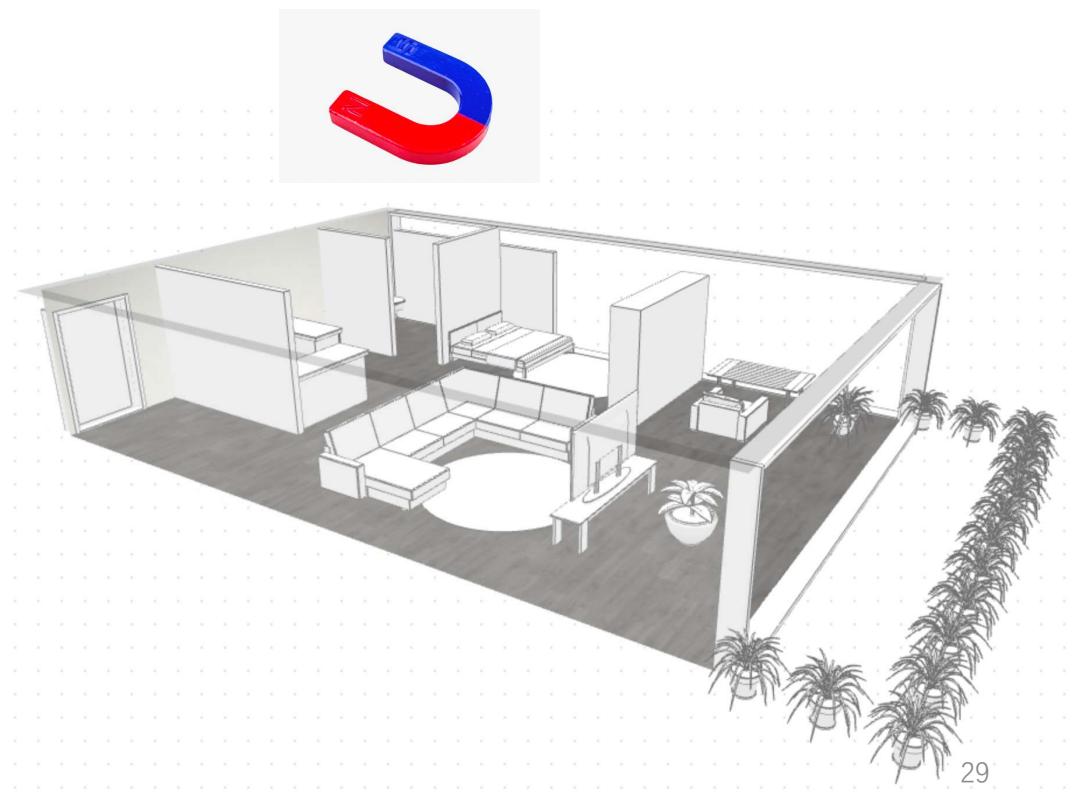
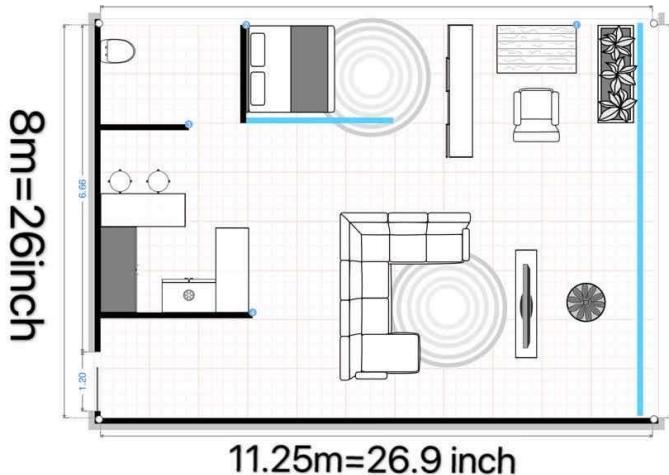
First floor: forty eight houses  
which are 1399(sq.ft)

Second floor: forty eight  
houses which are 1184(sq.ft)

- For individuals :  
90 square meters (1 occupant)
- For small families:  
110 square meters (2-3 occupants)  
130 square meters (2-4 occupants)

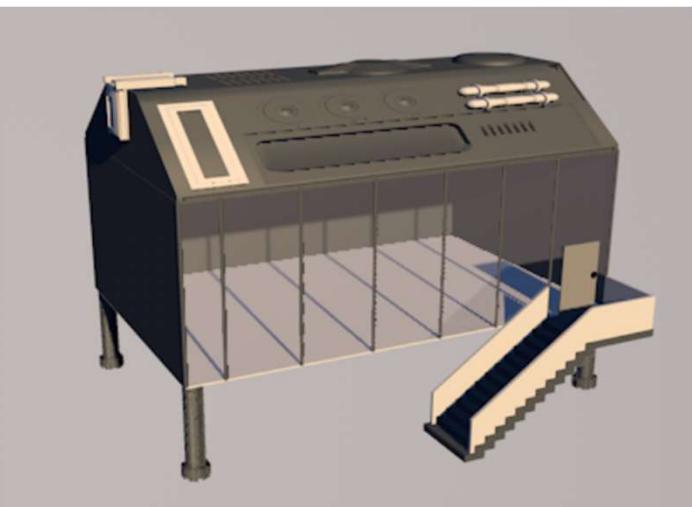
## 4.2.1 Internal floor plans

- For individuals: 90 square meters
- 1 occupant-2 occupants
- Furniture fixation plan

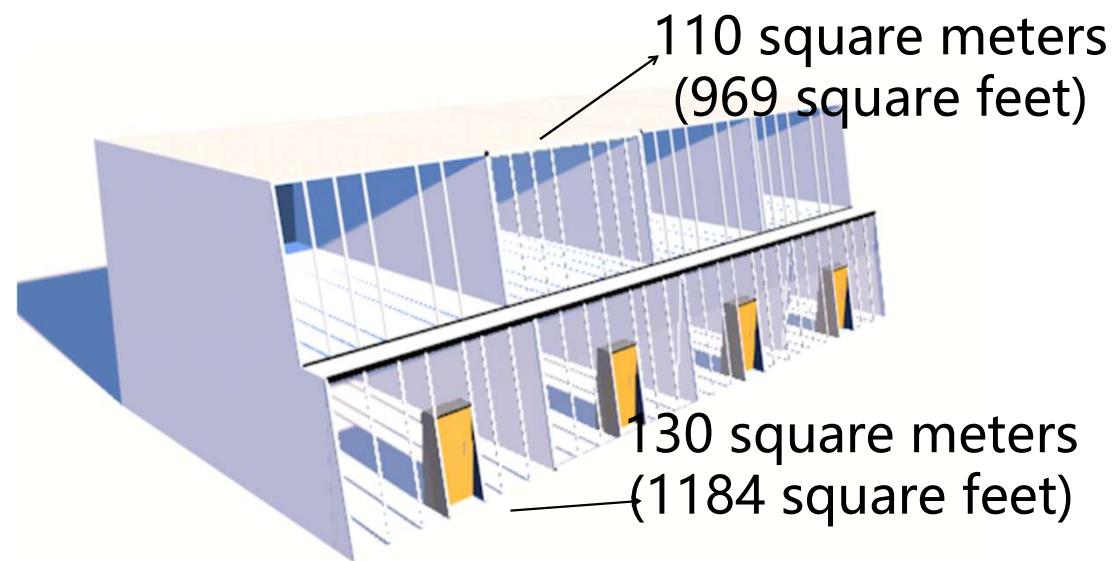


## 4.2

- For individuals: 90 square meters (1-2 occupant)
- Cargo Accommodation in Standard Space Shipping Container units

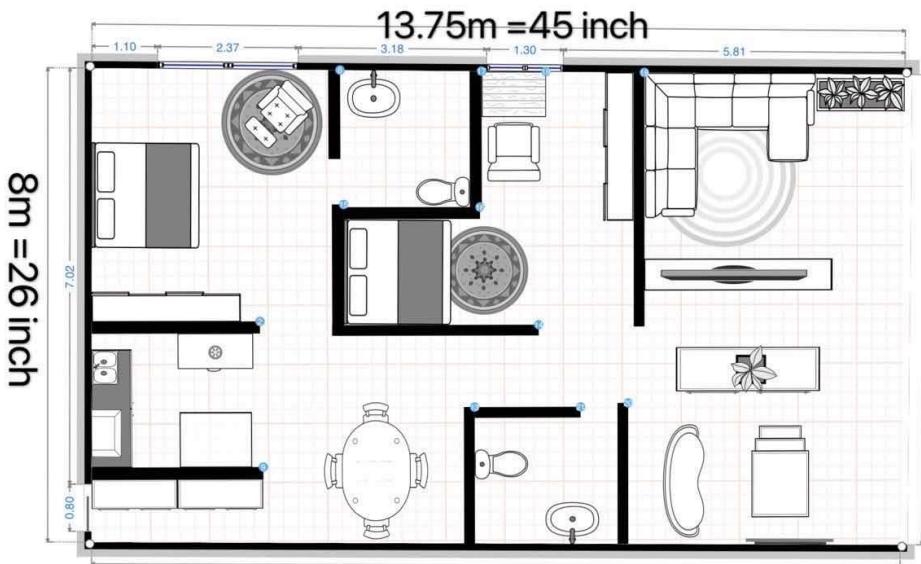


- For small families: 110/130 square meters(2-3 occupants)

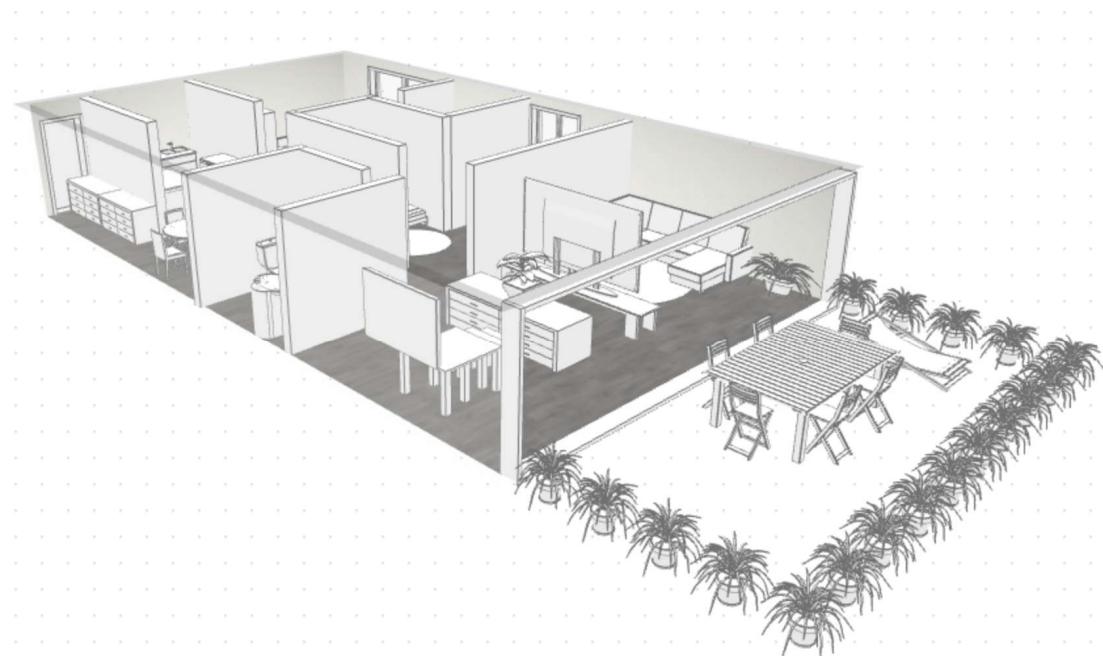


## 4.2.1 Internal floor plans

- For small families: 110 square meters
- 2-3 occupants



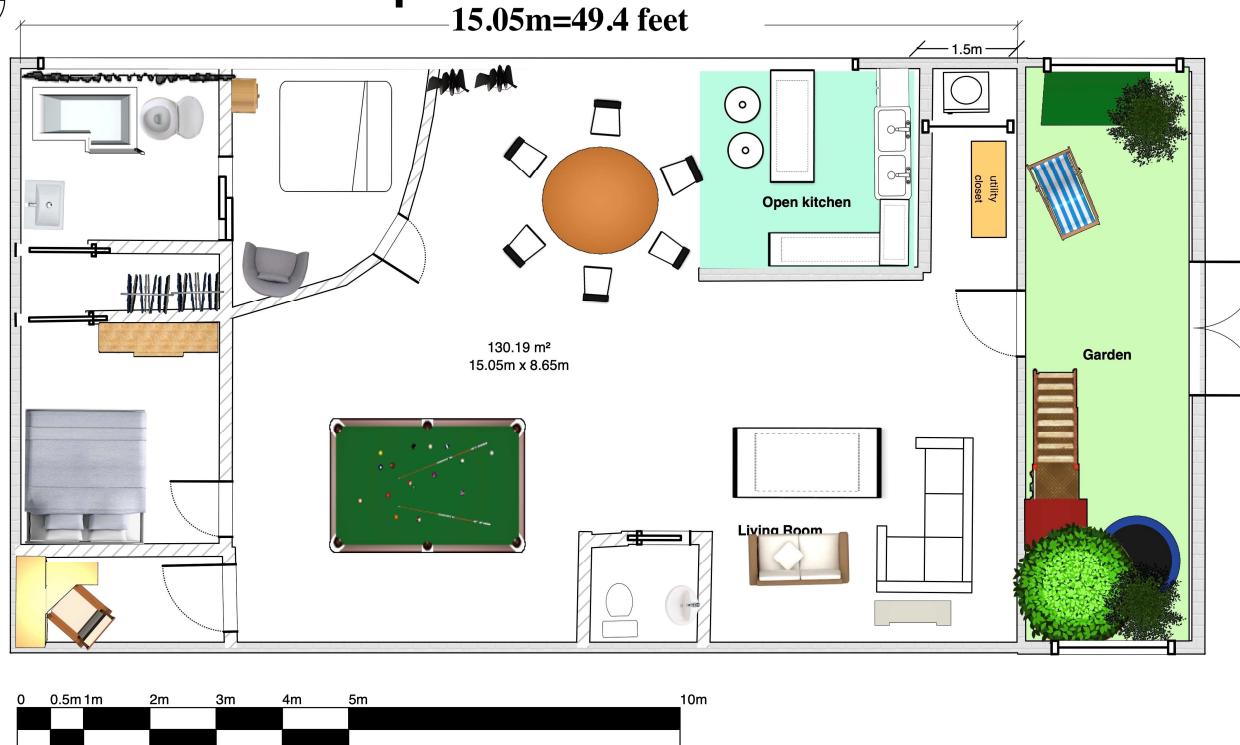
unit:meter



## 4.2.1 Internal floor plans

- For small families: 130 square meters

• 2-4 occupants



## 4.2.3 sources of the furnitures

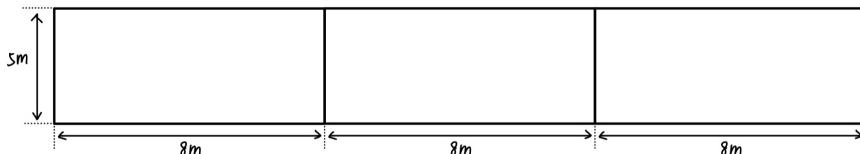
All furnitures are imported from lunar

Area of houses	Closet	Sofa	Bed	Table	Toilet	LED Screen
90 m <sup>2</sup>	1	1	1	1	1	1
110 m <sup>2</sup>	2	2	2	2	2	1
130 m <sup>2</sup>	2	2	2	2	2	1
Total number	392	392	392	392	392	296

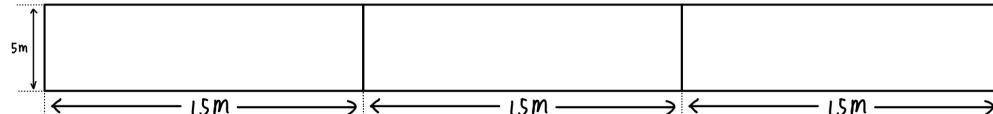
## 4.3.1 Dust Removal System

Dust Prevention System (top view)

Main Entrance (height = 3m)

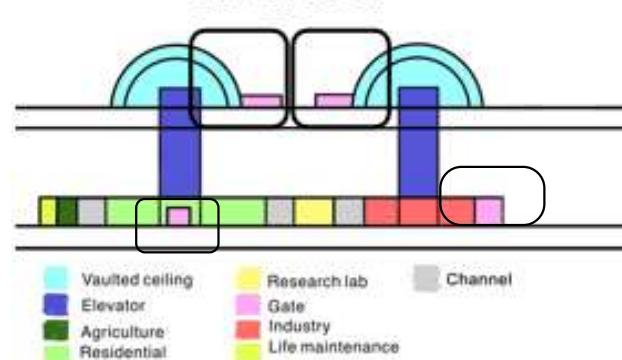


Industry Entrance (height = 5m)

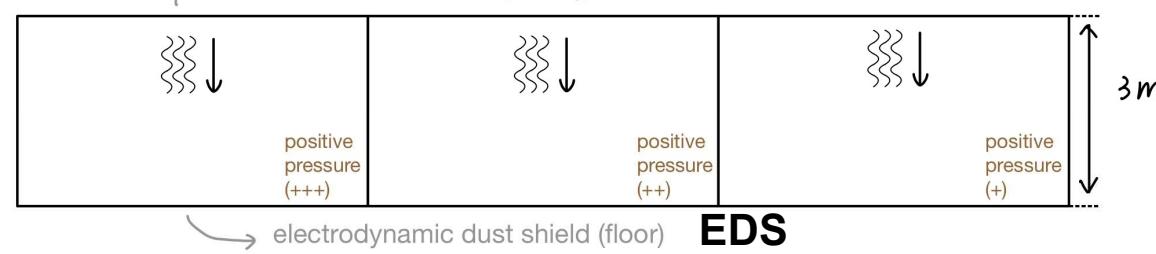


- 3 distinct dust removal chambers
- 15-second influx surge
- EDS Collections
- Positive Pressure Protection

Location

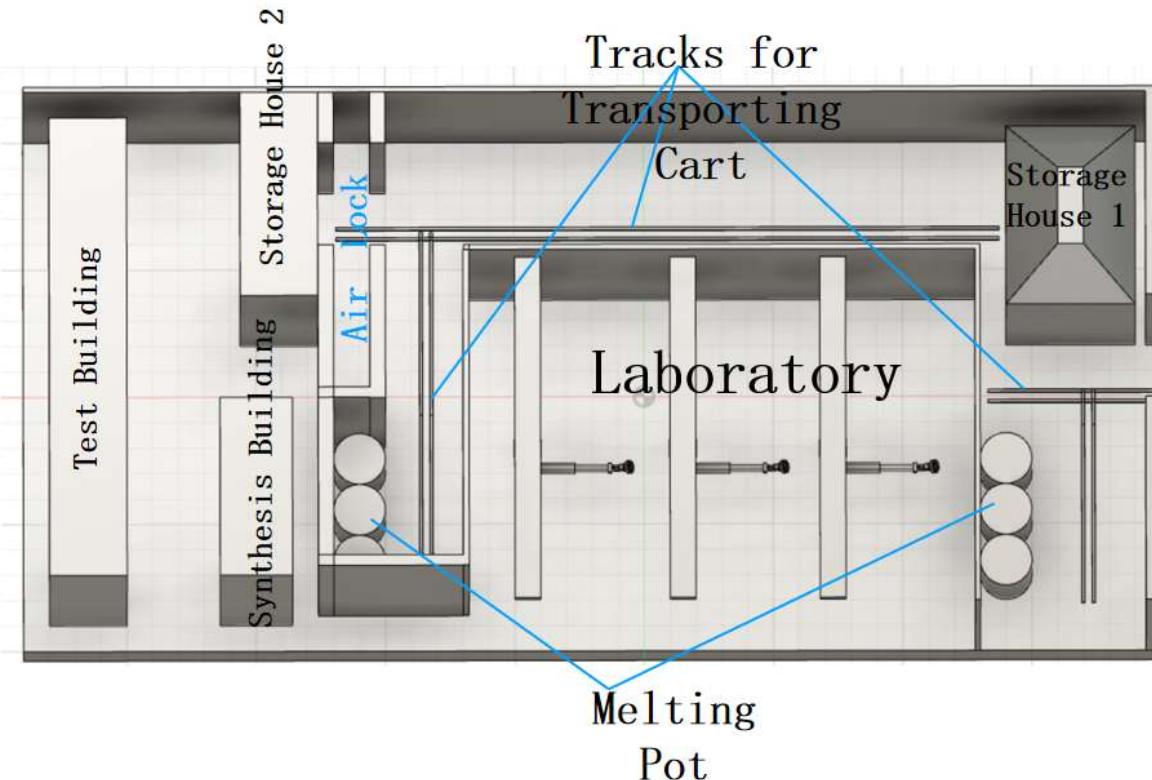


dust removal blower (ceiling)

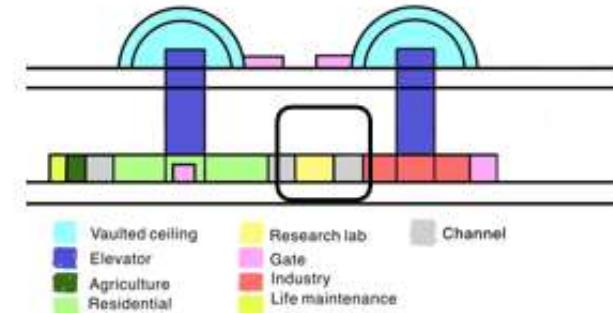


Side view

## 4.3.2



Location



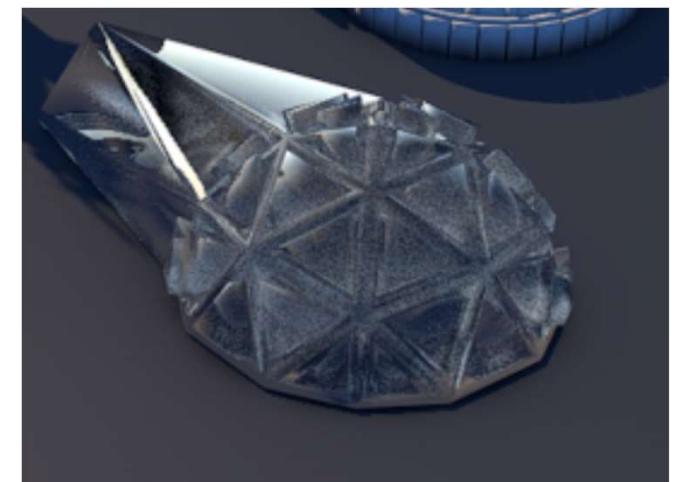
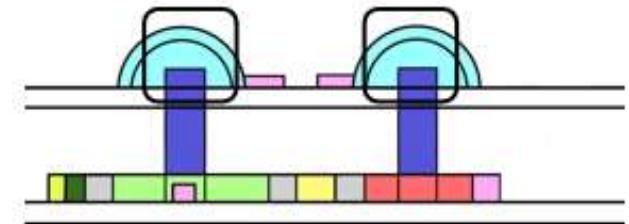
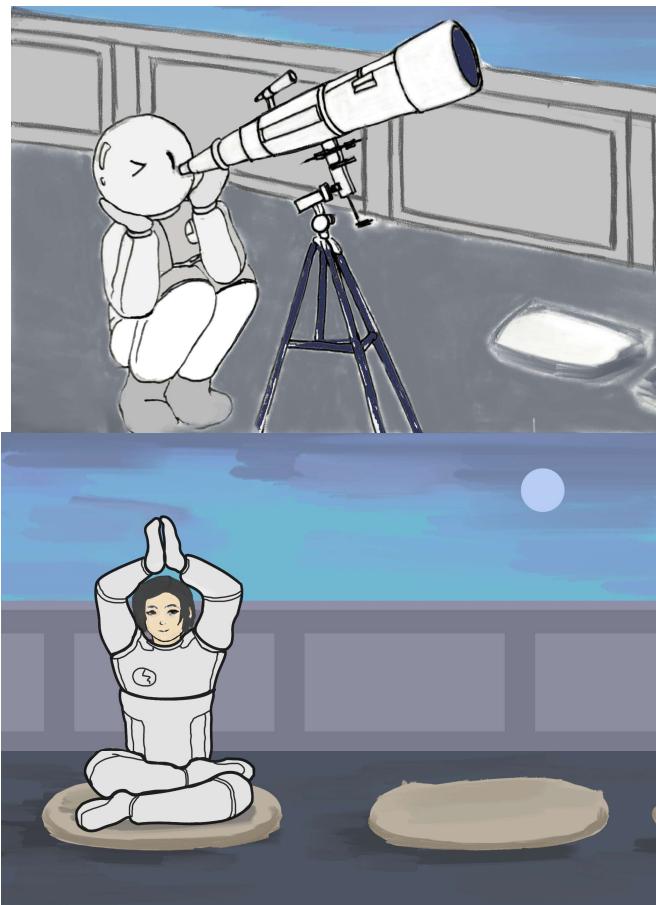
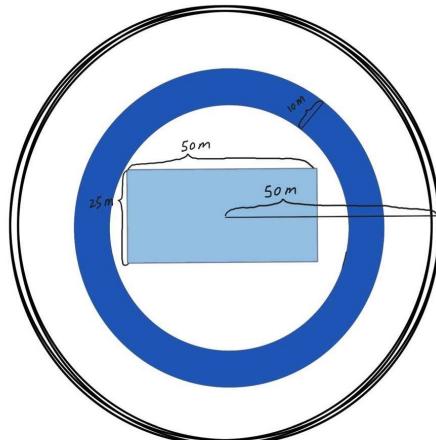
## 4.3.3 Sampling & outside working

- Simplified labs outside
- Sampling sites in different terrains

## 4.4 Recreational Activities

### Observation Deck

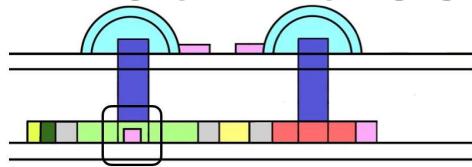
- On the surface,  
inside the glass dome



## 4.4 Recreational Activities

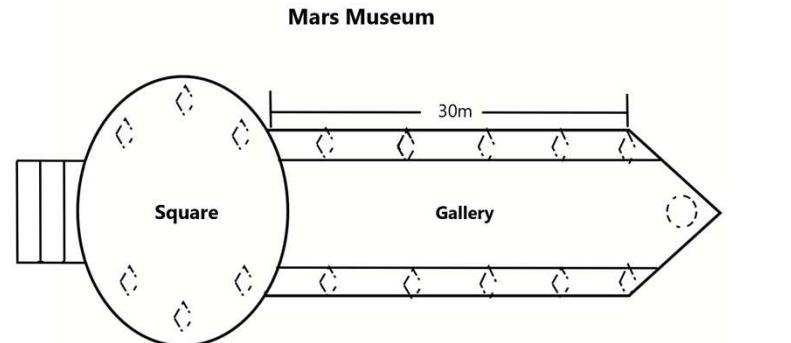
### Mars Museum

- Outside the base
- Orienteering
- On the surface



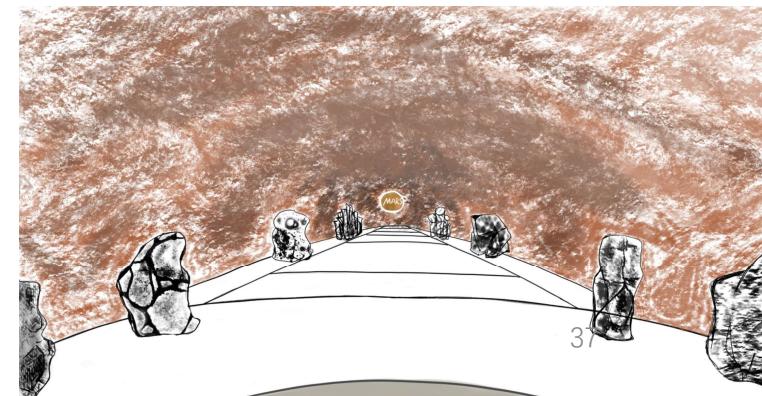
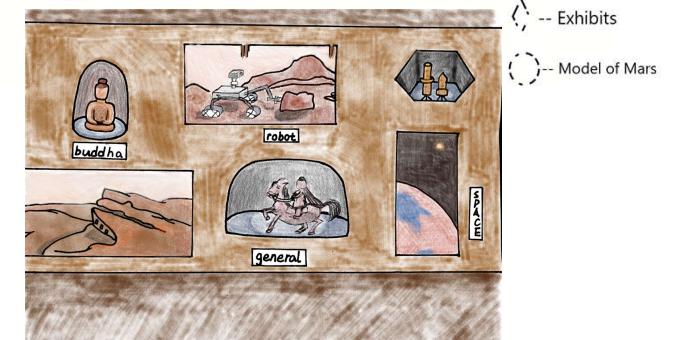
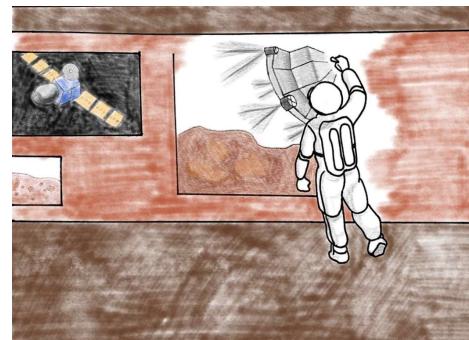
Exit on both sides(front and back)

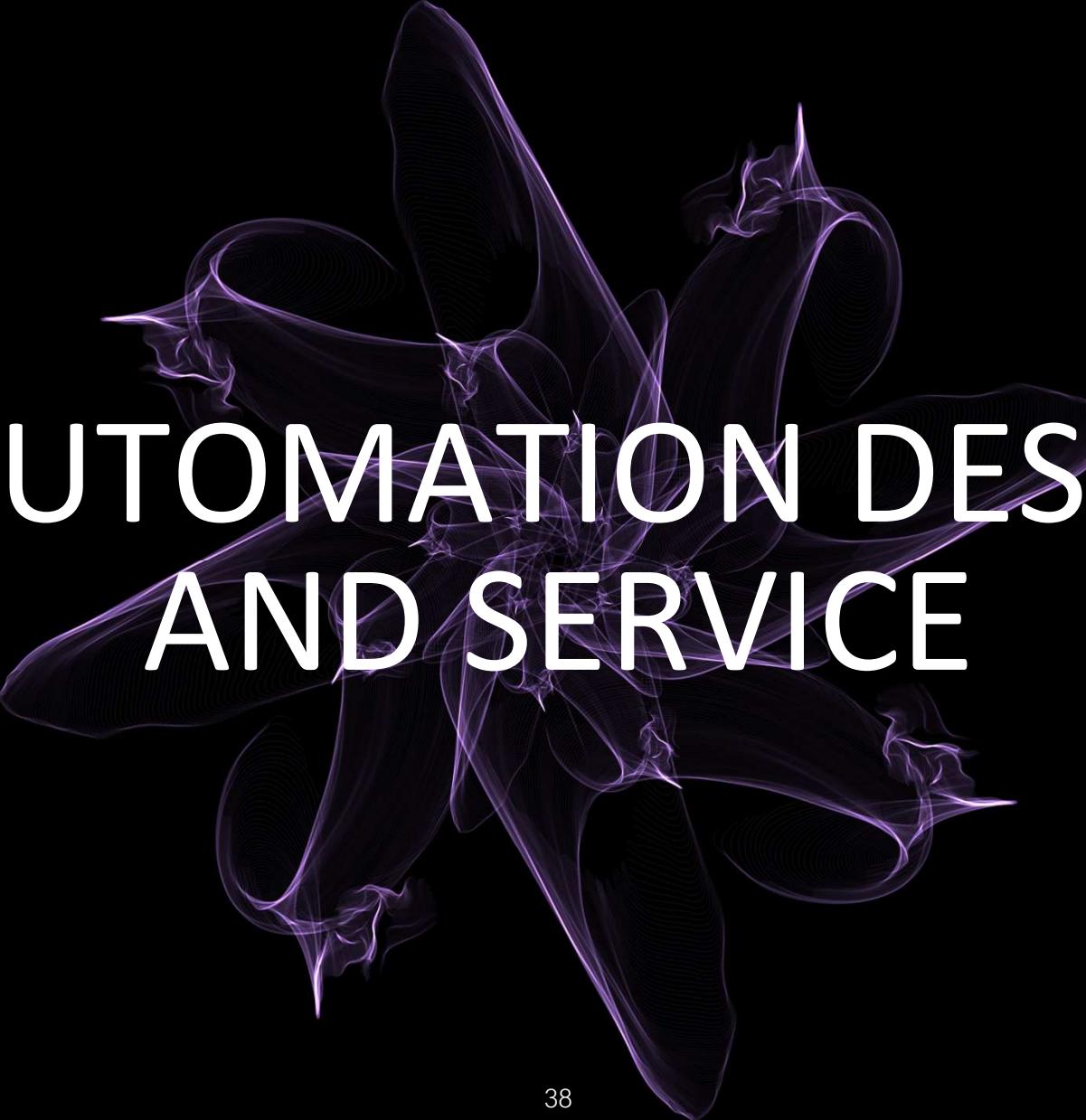
With dust removal chambers



### Interactive Mural

- Outside the base

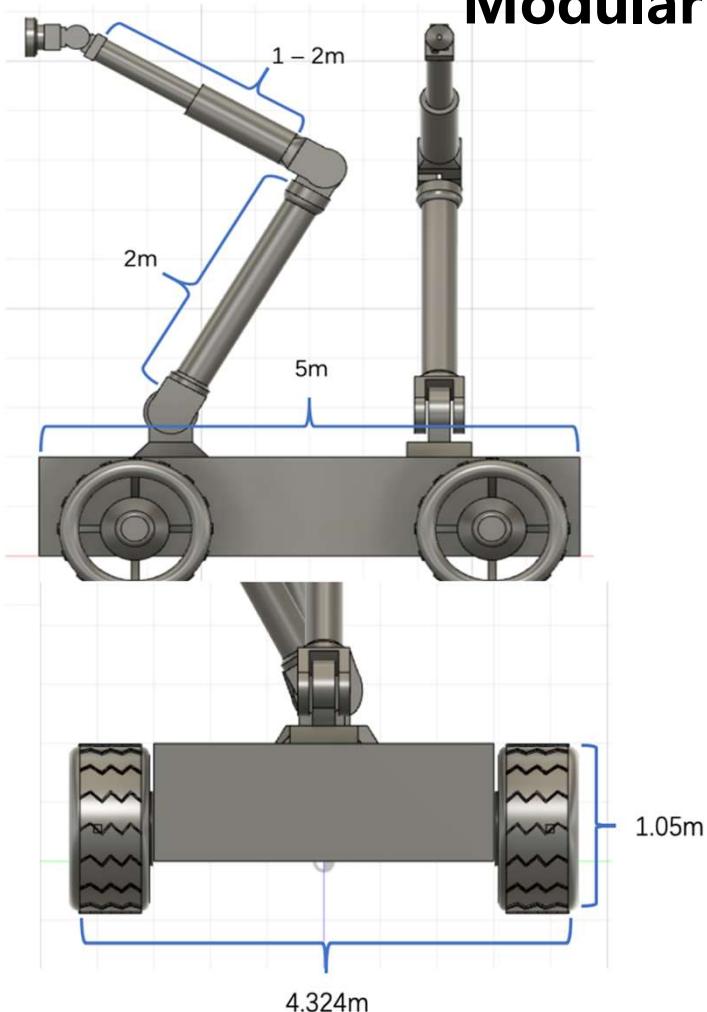


A large, abstract, glowing purple shape resembling a stylized flower or a complex energy field is centered against a black background. It has several distinct petals or lobes radiating from a central point, with fine, wavy lines creating a sense of depth and motion.

# 5 AUTOMATION DESIGN AND SERVICE

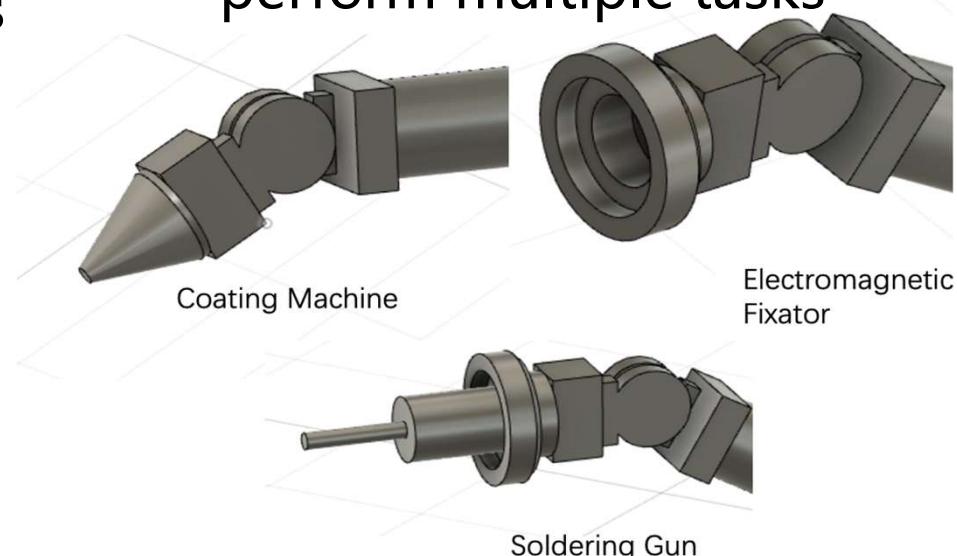
# 5.1 Construction Automation

Construction Robot A



Modular Units

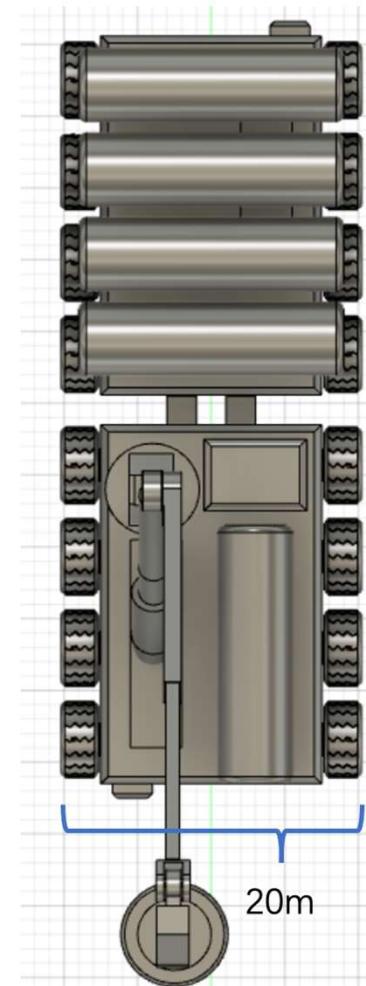
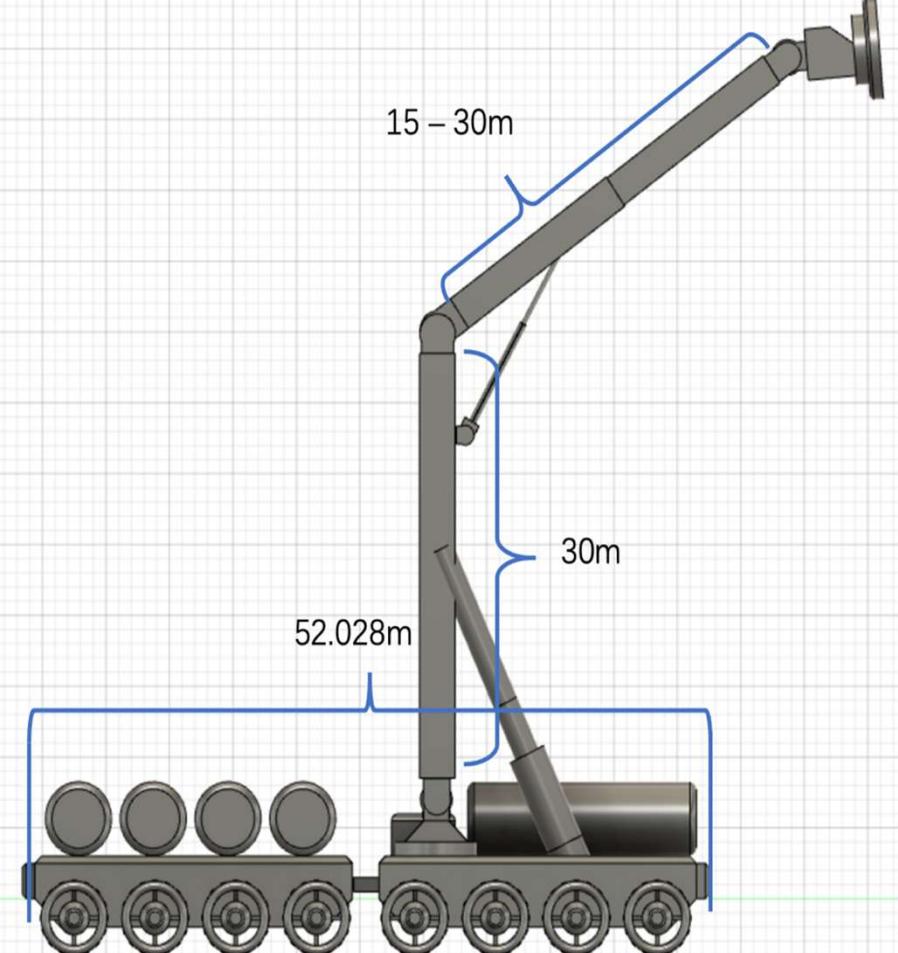
Dedicated in interior construction; Able to perform multiple tasks



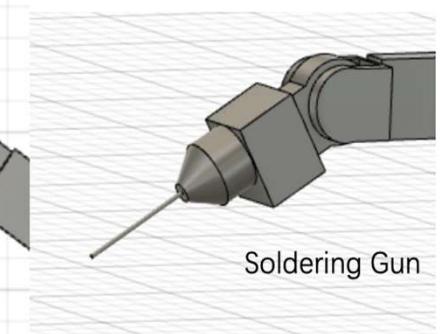
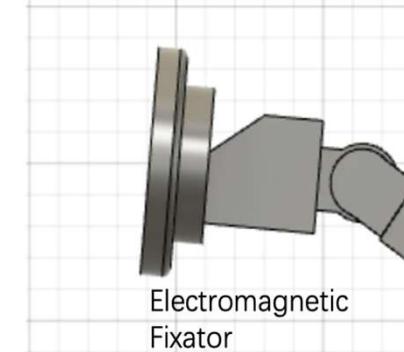
Property	Perimeter
Material	Aluminum-Iron Alloy
Mass	30kg
Amount	100

# 5.1 Construction Robot B

Exterior Construction; 2 tasking units (Listed below)



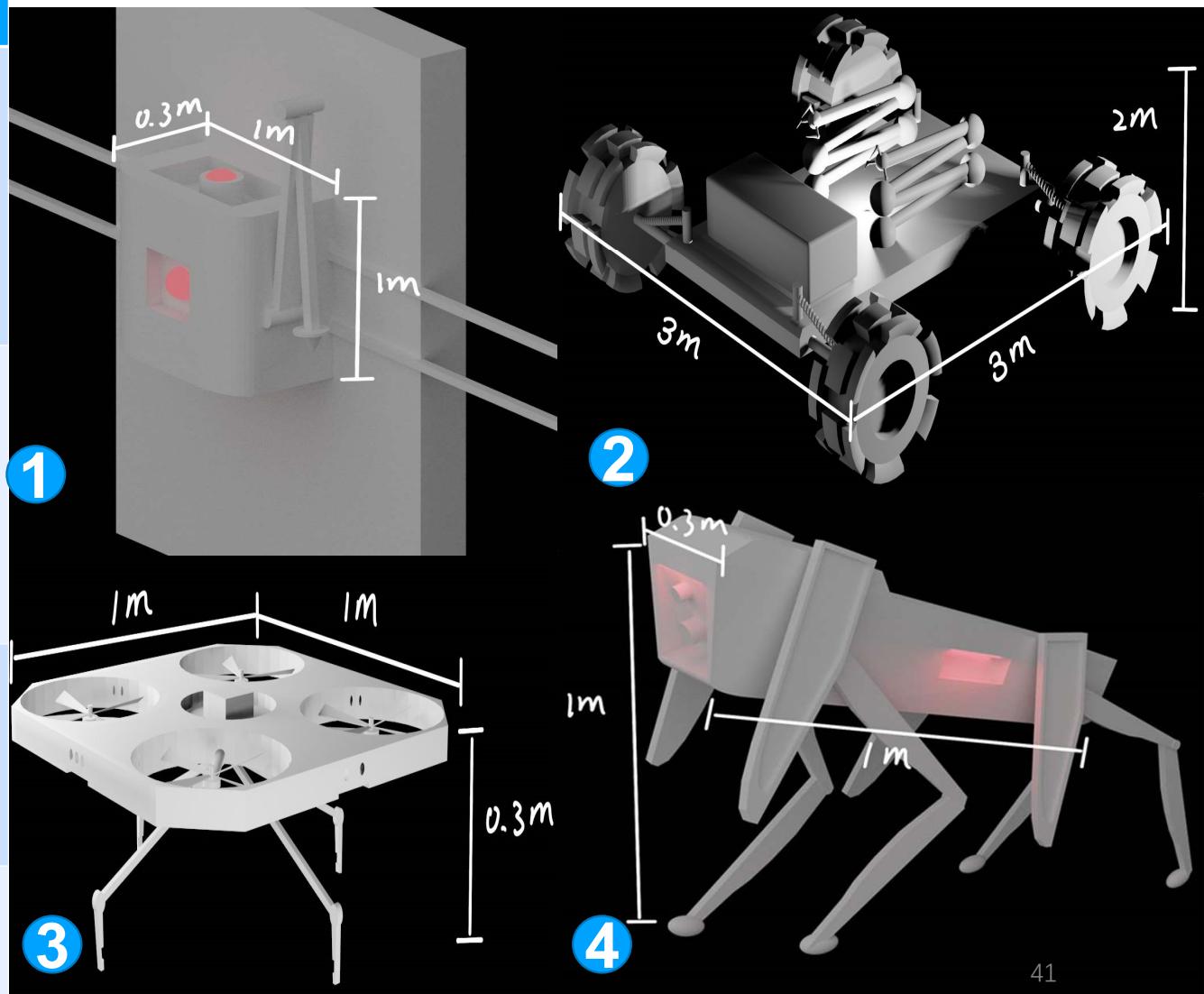
Modular Units



Property	Perimeter
Material	Aluminum-Iron Alloy
Mass	1020kg
Amount	4 40

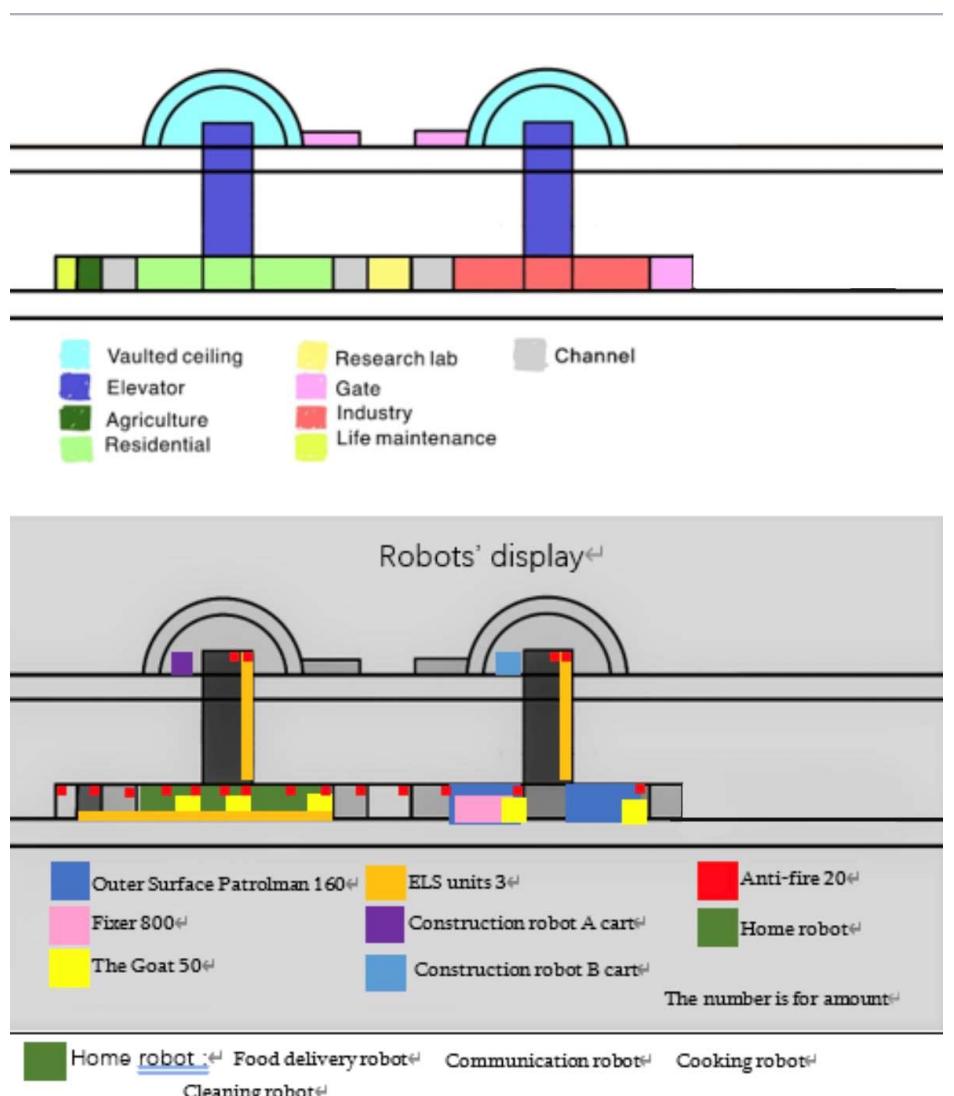
# 5.2 Maintenance & Emergency Reaction

Robots	Functions	Location & Source
Outer Surface Patrolman	Monitor the factory conditions 24/7 Fix Minor Harms	Operate on specific maintenance rails Built on Mars
Fixer	Check Industrial Areas Once A Week Repair Significant harms	Operate on designated tracks Built on Mars
Anti-Fire	Find Source of fire And put it out	Averagely distributed in All chambers Built on Mars
The Goat	Medic robots Provide fast medical aid	Stored in warehouses Built on Mars

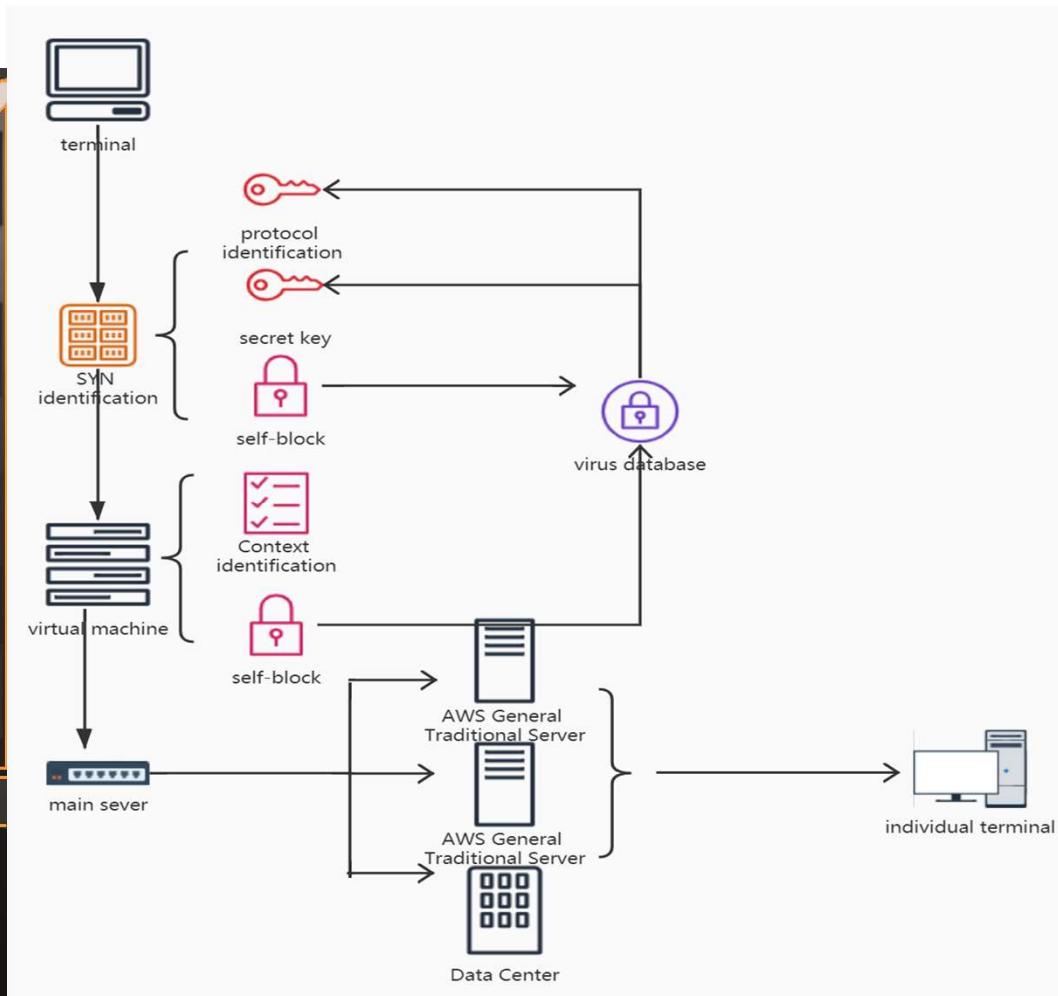
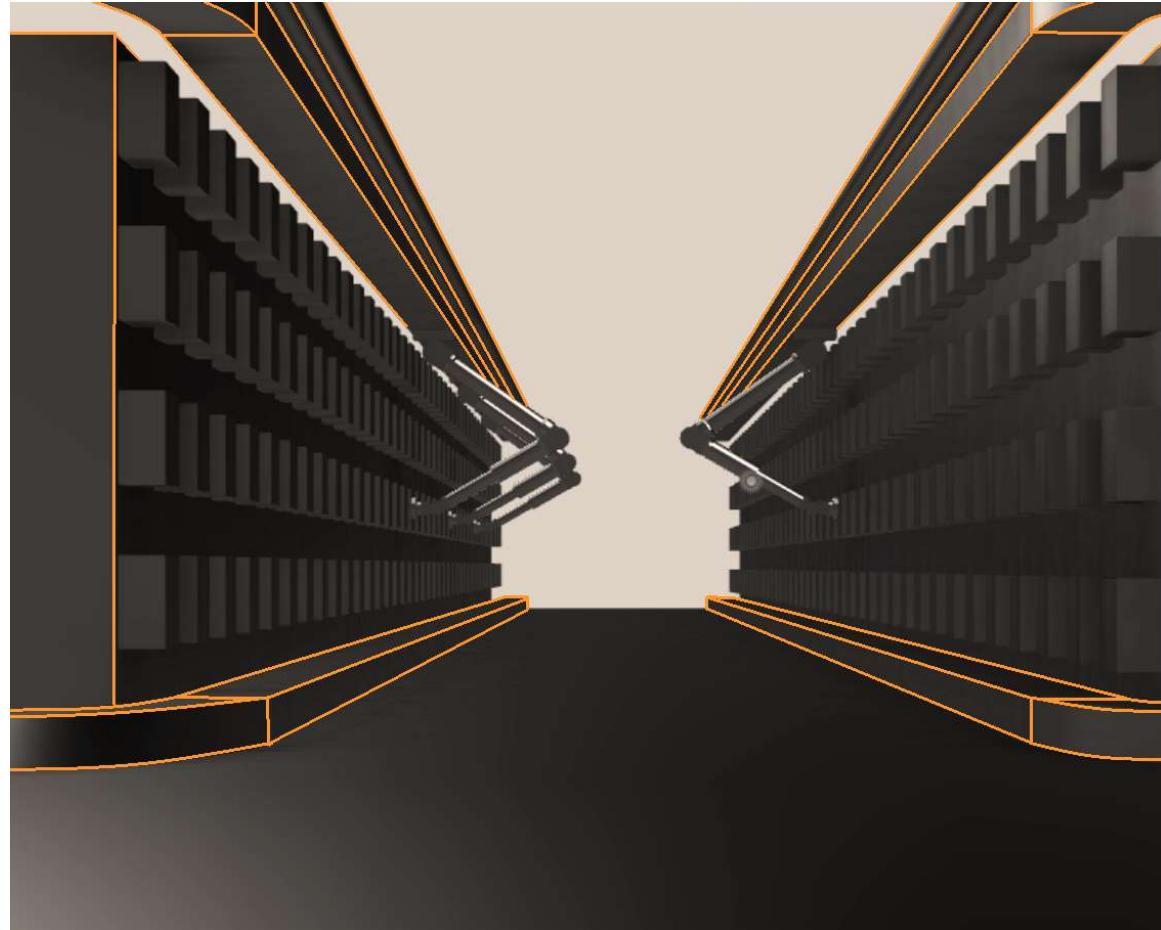


# Emergency system

Basement Function	Personal safety
Backup System	Life Supporting Units
Function: Excess Battery	Function: Personal Oxygen Supply

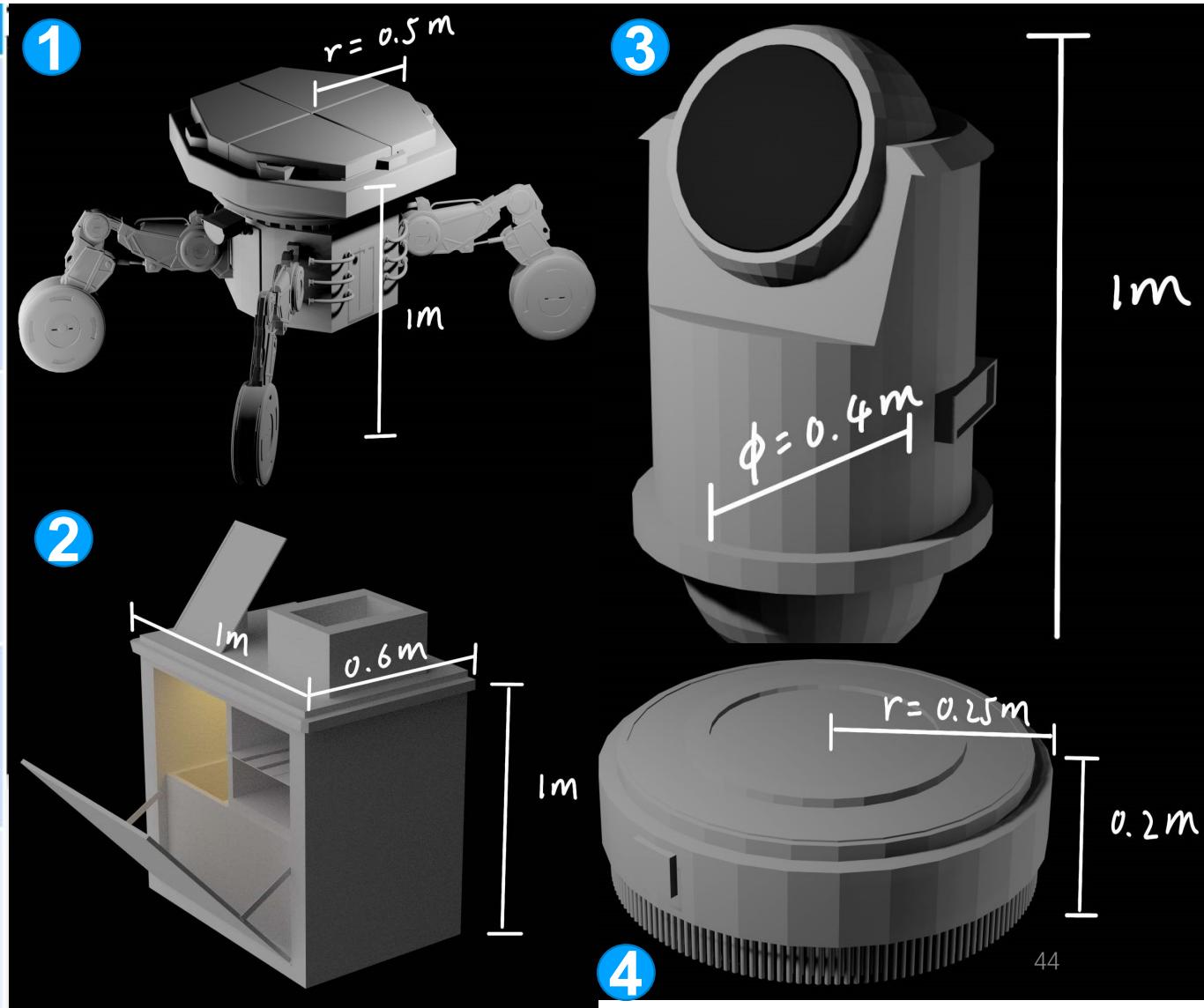


# Computer system

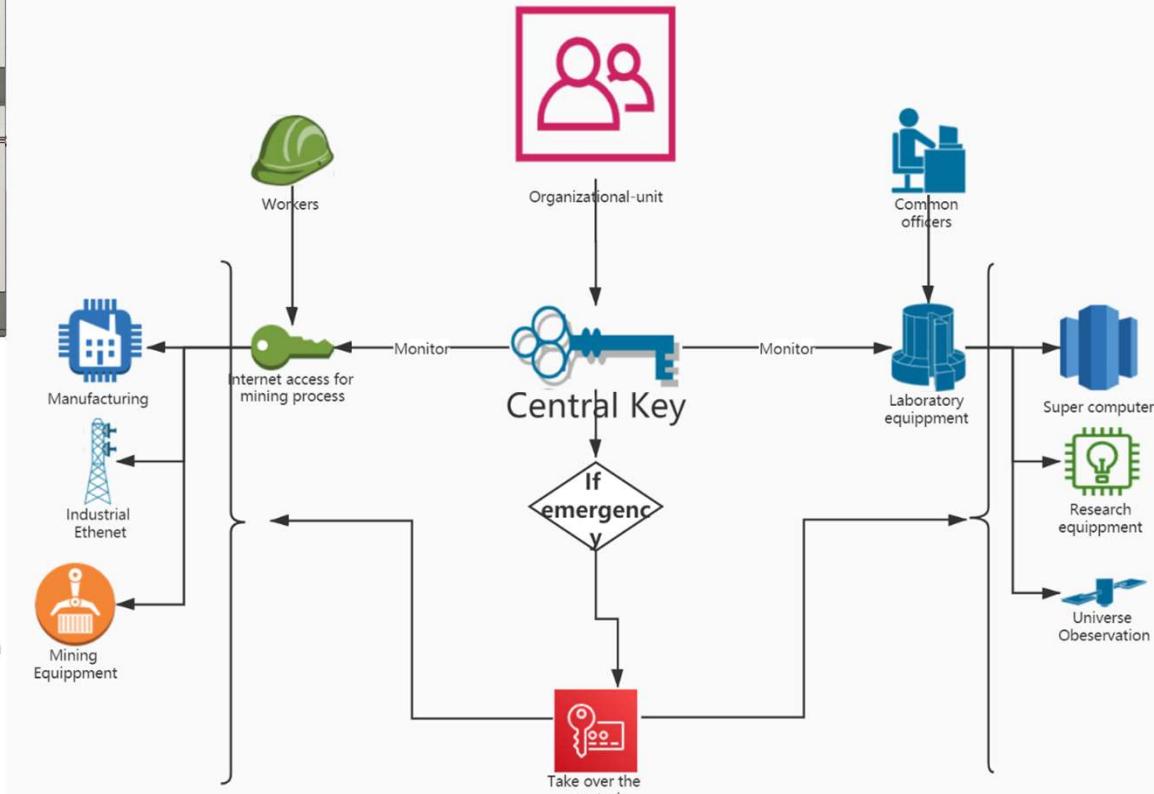
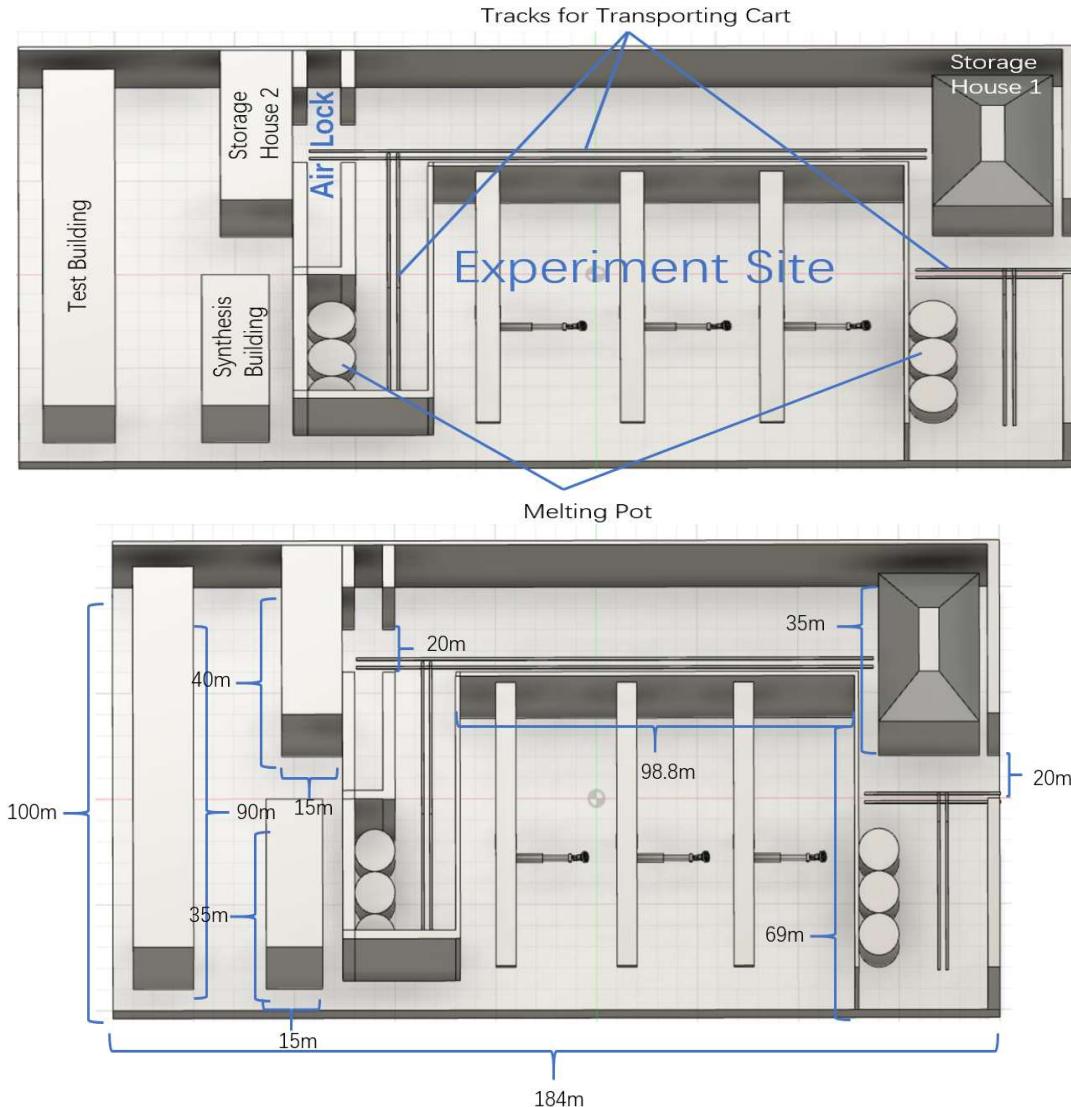


## 5.3.1 Home robots

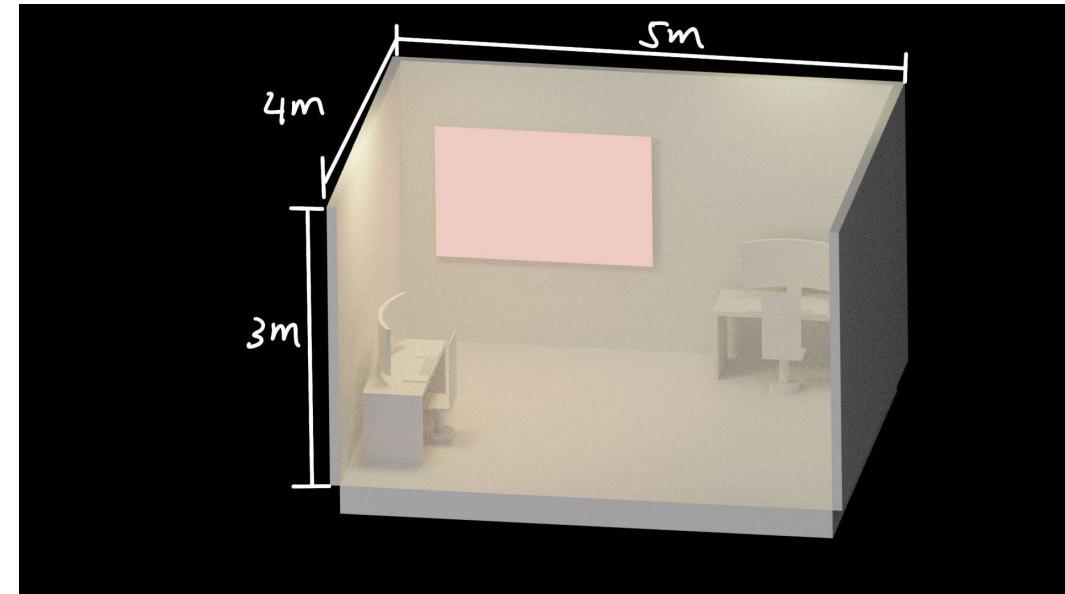
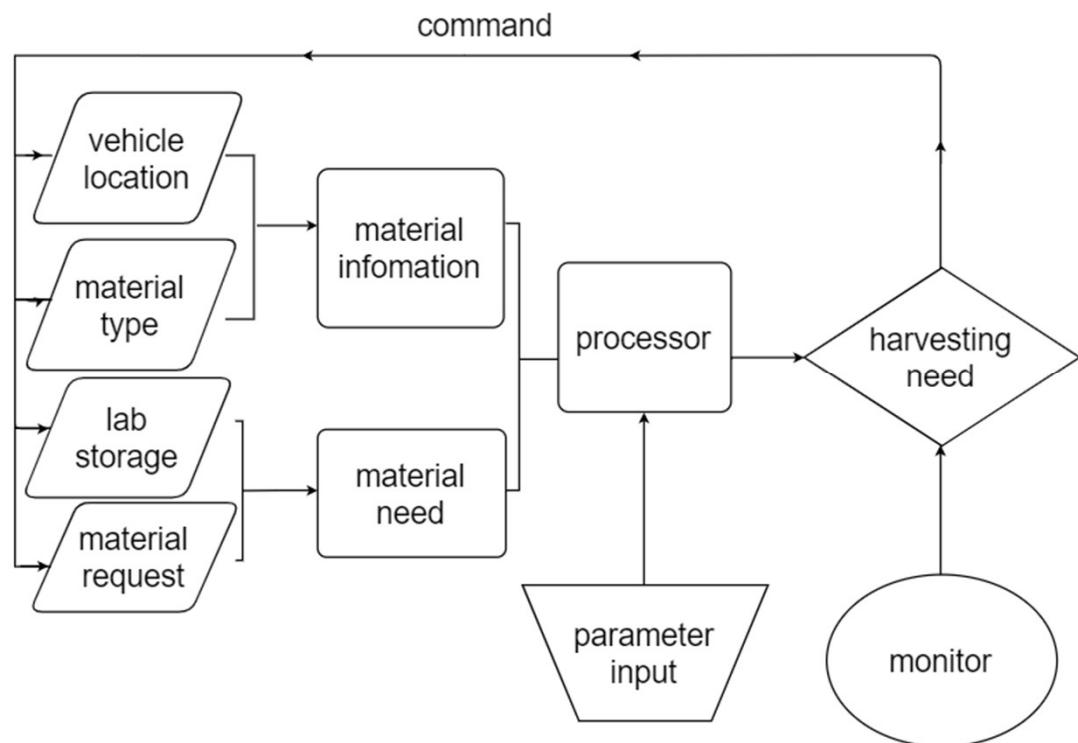
Robots	Functions	Number
Food Delivery Robots	Delivery food with great efficiency	50
Cooking Robots	Make delicious cuisine automatically	50
Communication robots	AI friends	100
Cleaning Robots	Maintain sanitation	300



## 5.3.2 Lab Automation



## 5.4 Control System



# 6 SCHEDULE AND COST

## 6.1 Schedule

## **Hard Roll Large print**

refine metal from ores  
build industry equipments

# THANKS