Capstone design 1

First presentation

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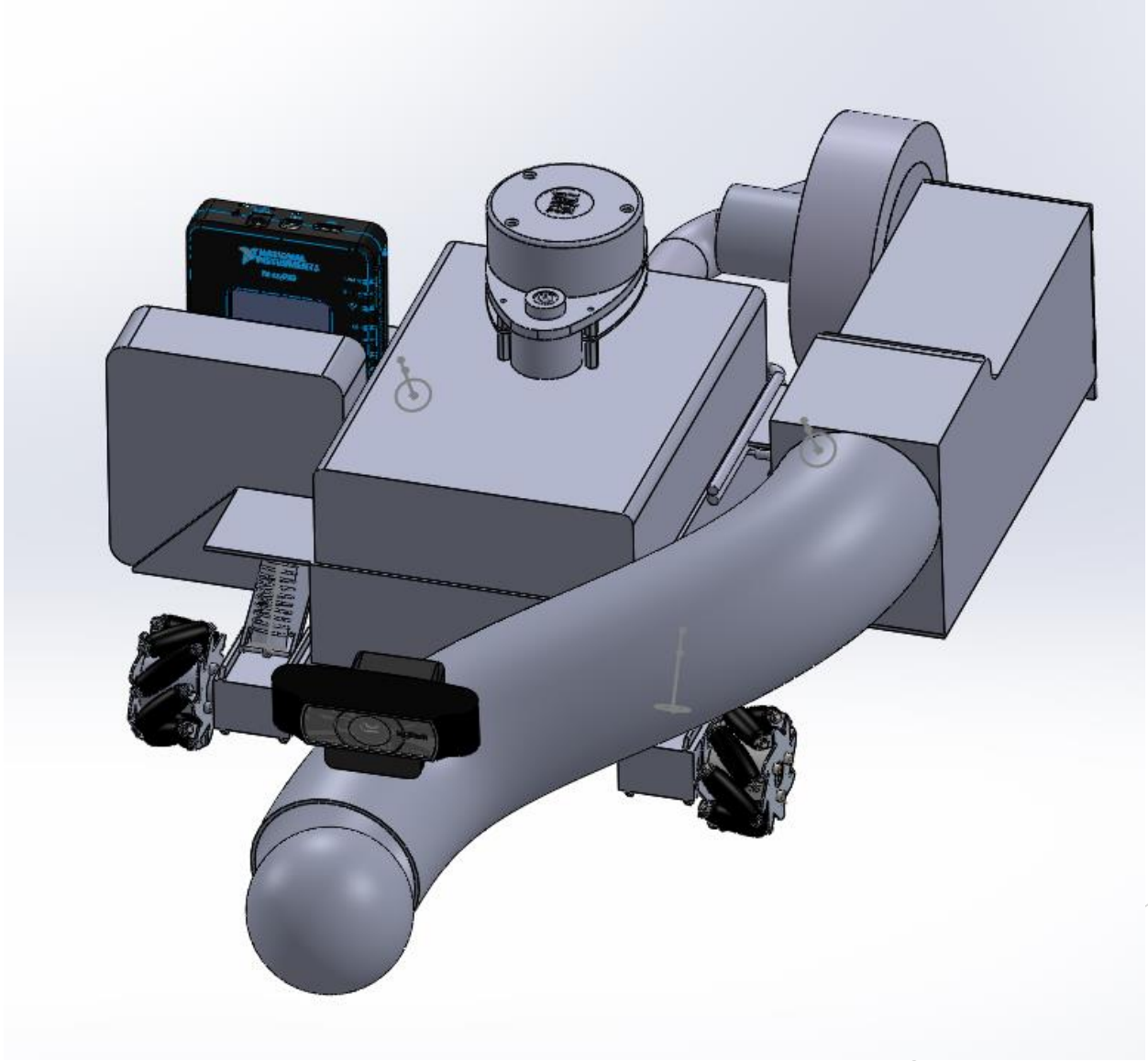
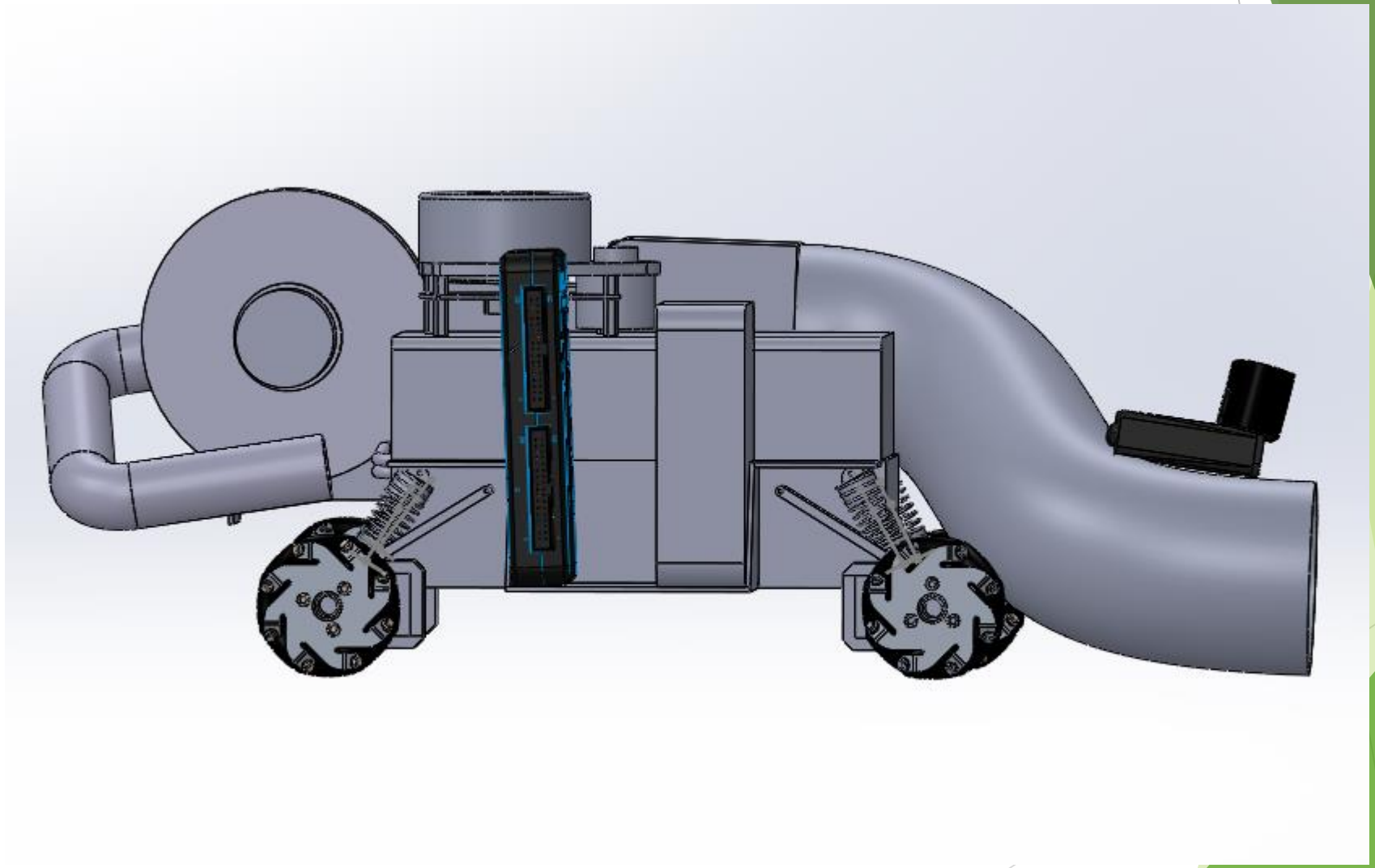
Overview

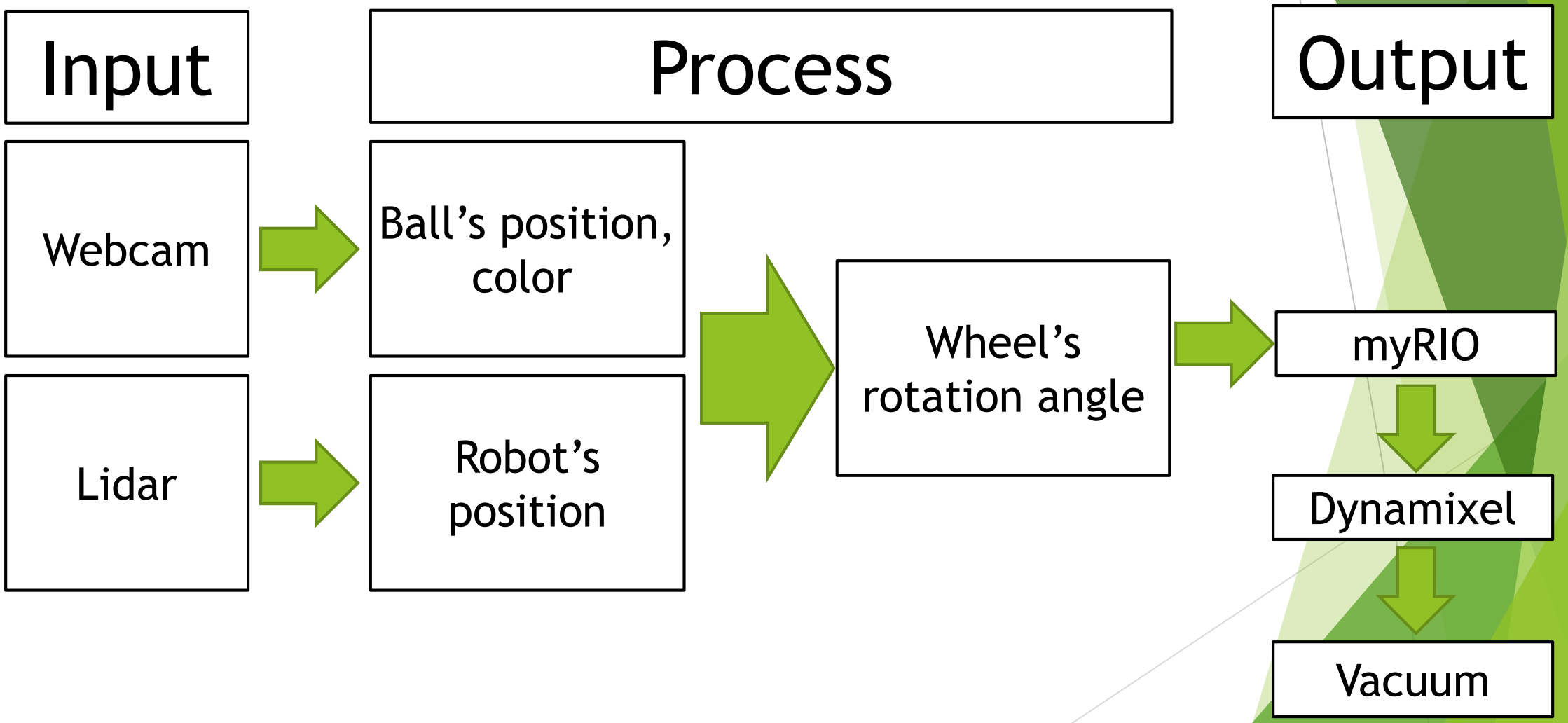
Latest design

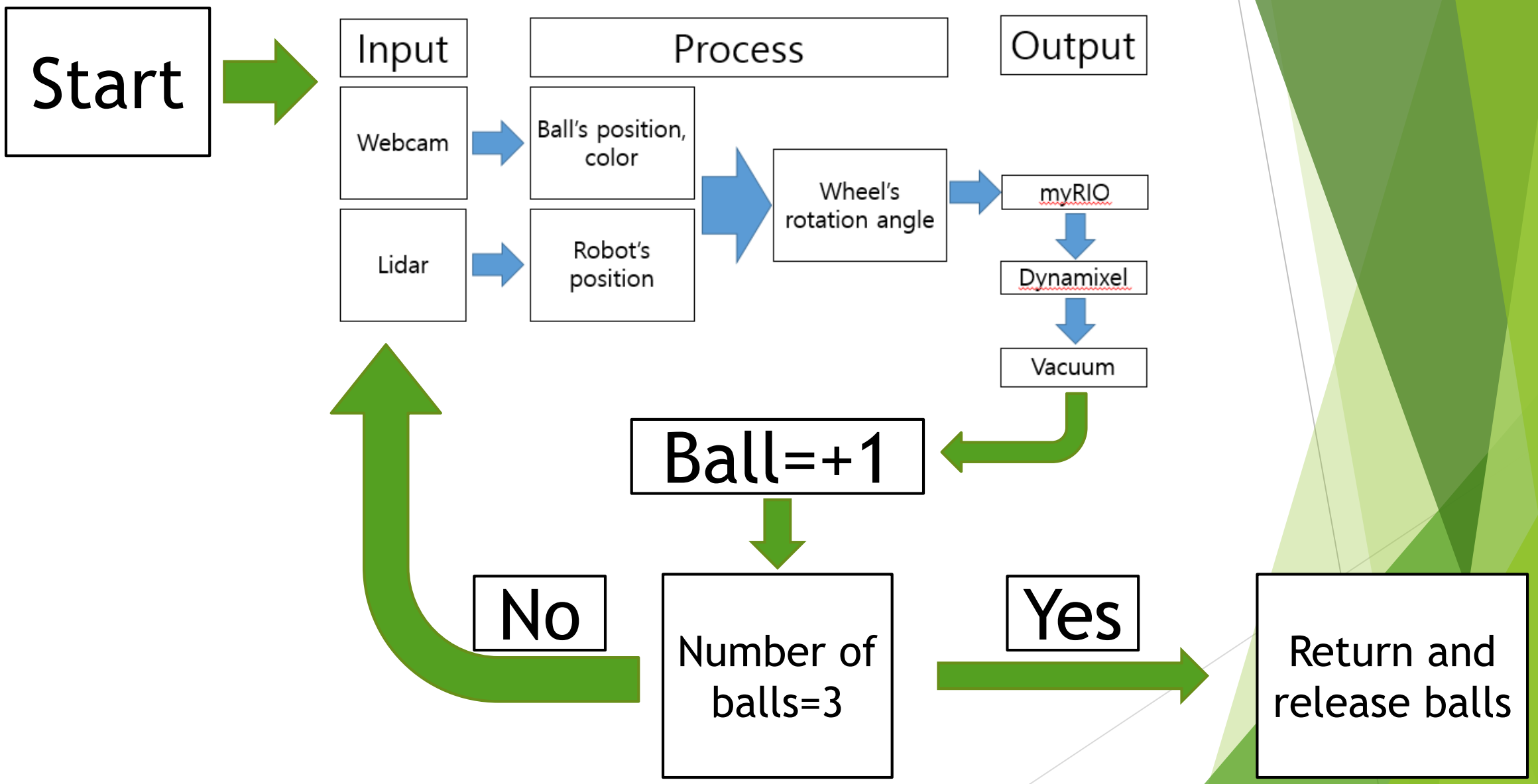


Latest design



Mechanism


Input
Process
Output
Webcam
Lidar
Ball's position, color
Robot's position
Wheel's rotation angle
myRIO
Dynamixel
Vacuum


Start
Input
Process
Output
Webcam
Lidar
Ball's position, color
Robot's position
Wheel's rotation angle
myRIO
Dynamixel
Vacuum
Ball=+1
No
Number of balls=3
Yes
Return and release balls

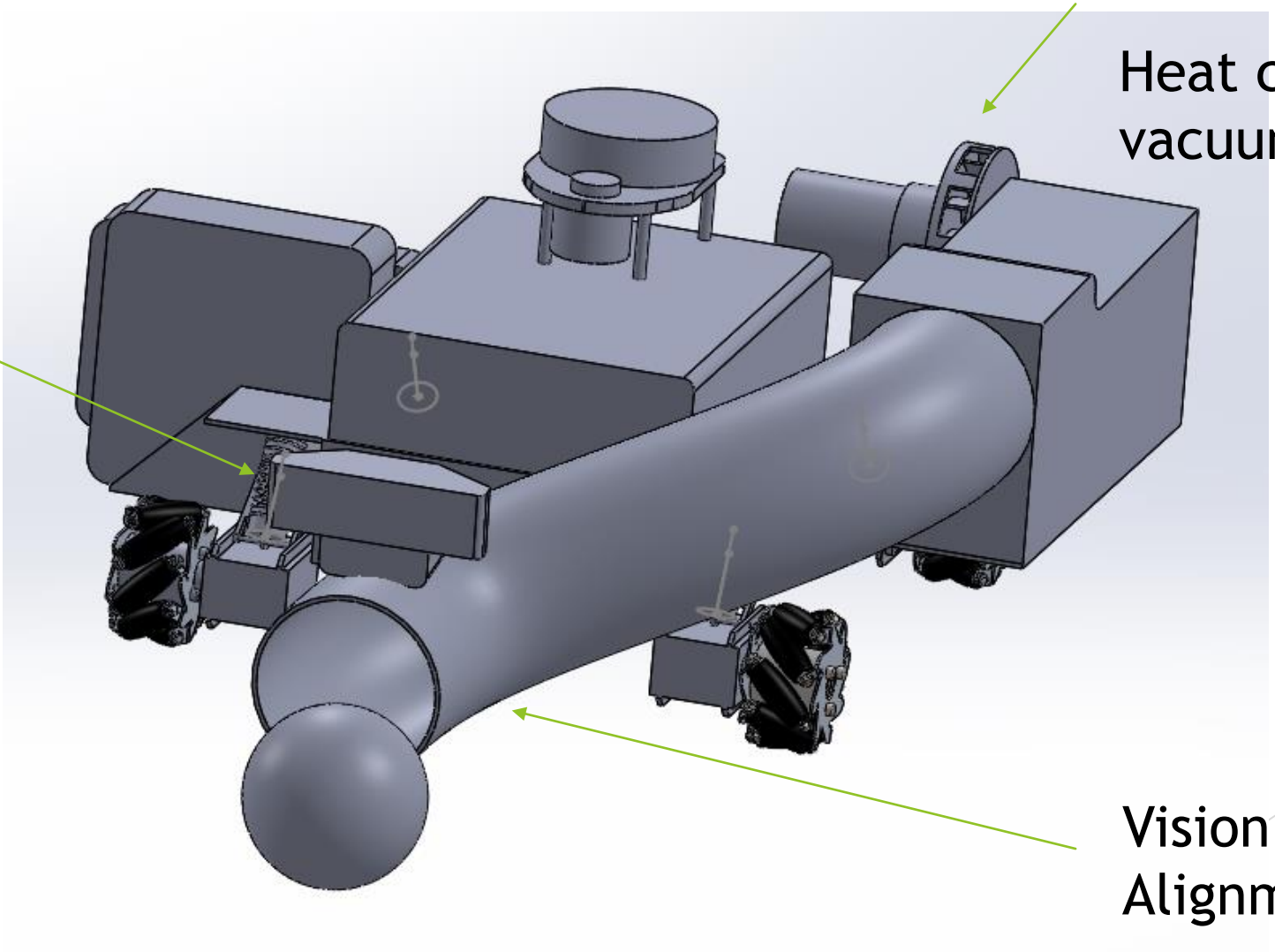
What's special?

Vacuum pump with suction

+

Heat control with vacuum pump

Suspension

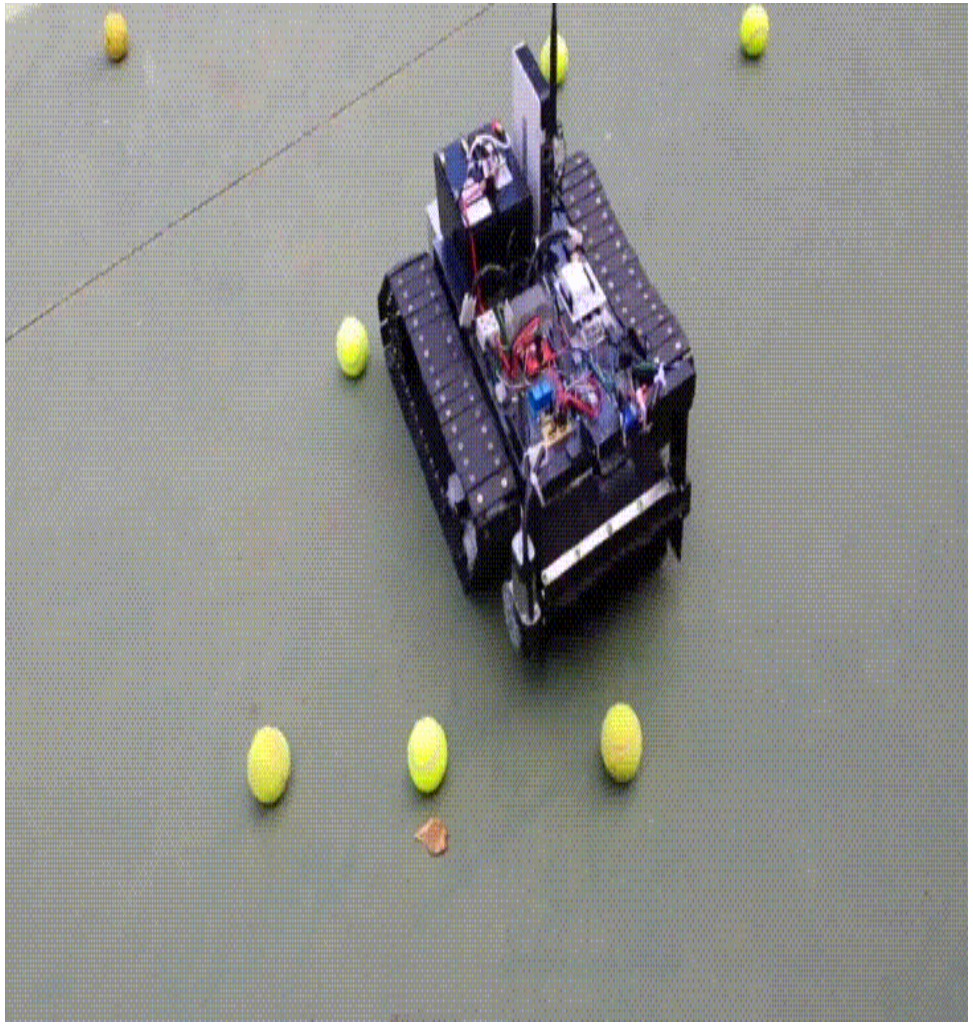


Vision Alignment

Why we choose these kind of design?

Pickup function part

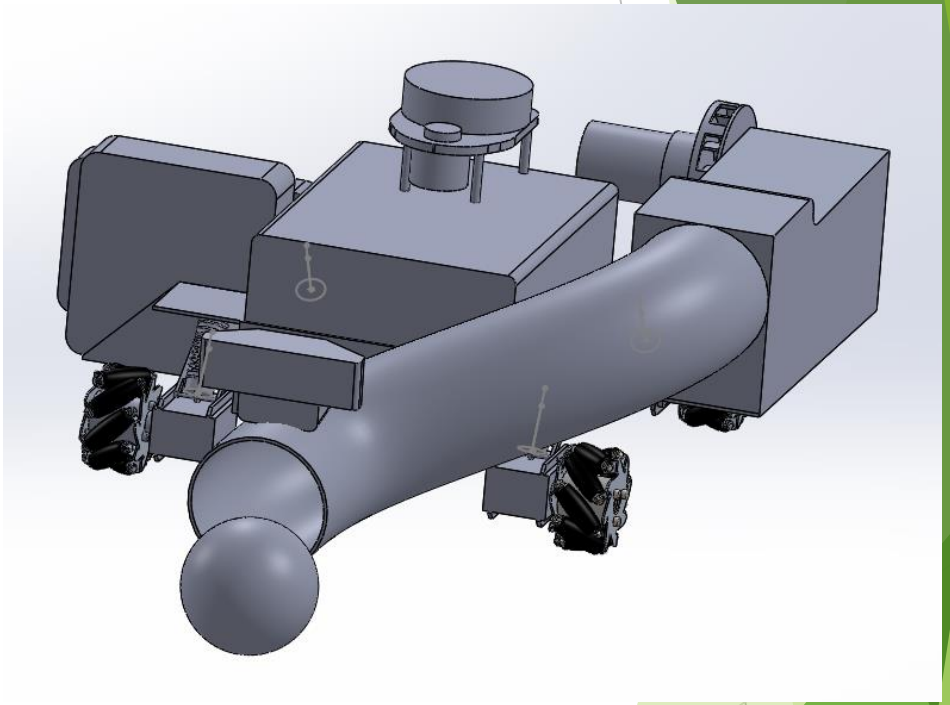
Other Ideas?



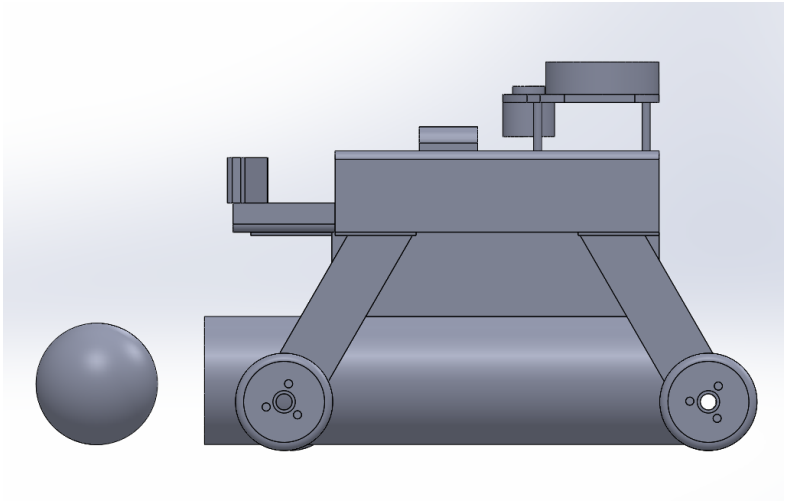
Why we choose suction?

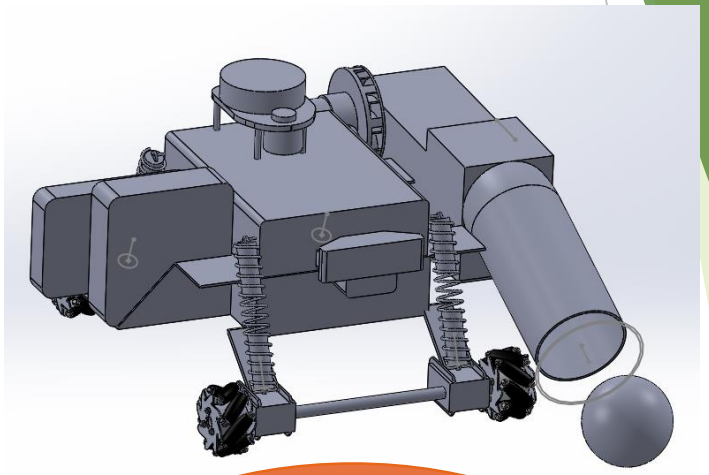
- Characteristics of ball
- Energy Efficiency

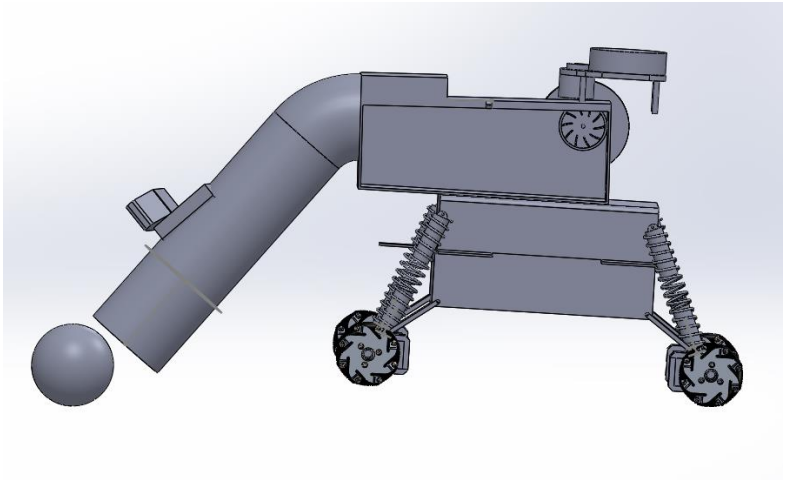
  Reduce moving parts
- Time Efficiency

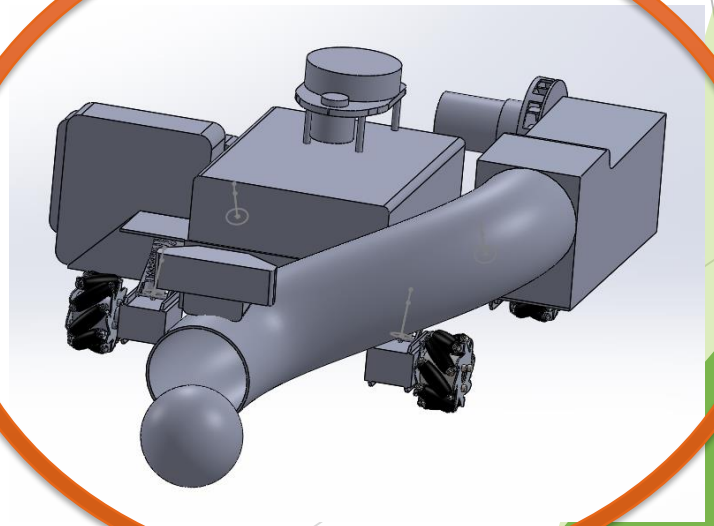


Variable designs









Is it possible?

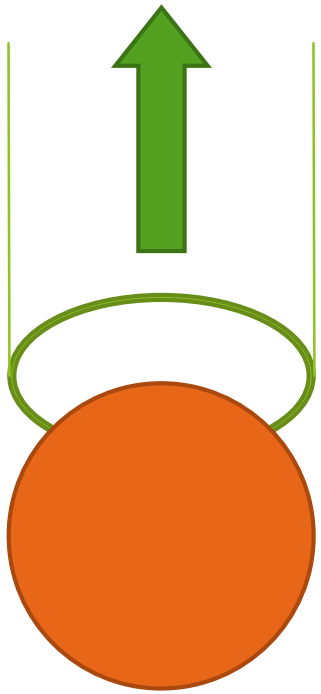
사양:
크기 : 31cmx10cmx10cm /
Weght : 797g12.2'x3.94'x3.94 "
소음 : 저소음
검정색
재질 : ABS (아크릴로 니트릴 부타디엔 스티렌 공중 합체)
유형 : 휴대용 건 습식 진공 청소기
정격 속도 : 45000 (r / min)
정격 전압 : 7.4 (V)
정격 입력 전력 : 120 (W)
진공 흡입 :> = 4000Pa
배터리 용량 : 2500mAh

Pressure : over than 4000Pa

Voltage : 7.4V

Specification

- Pressure required to attract balls



Force = Pressure x Area

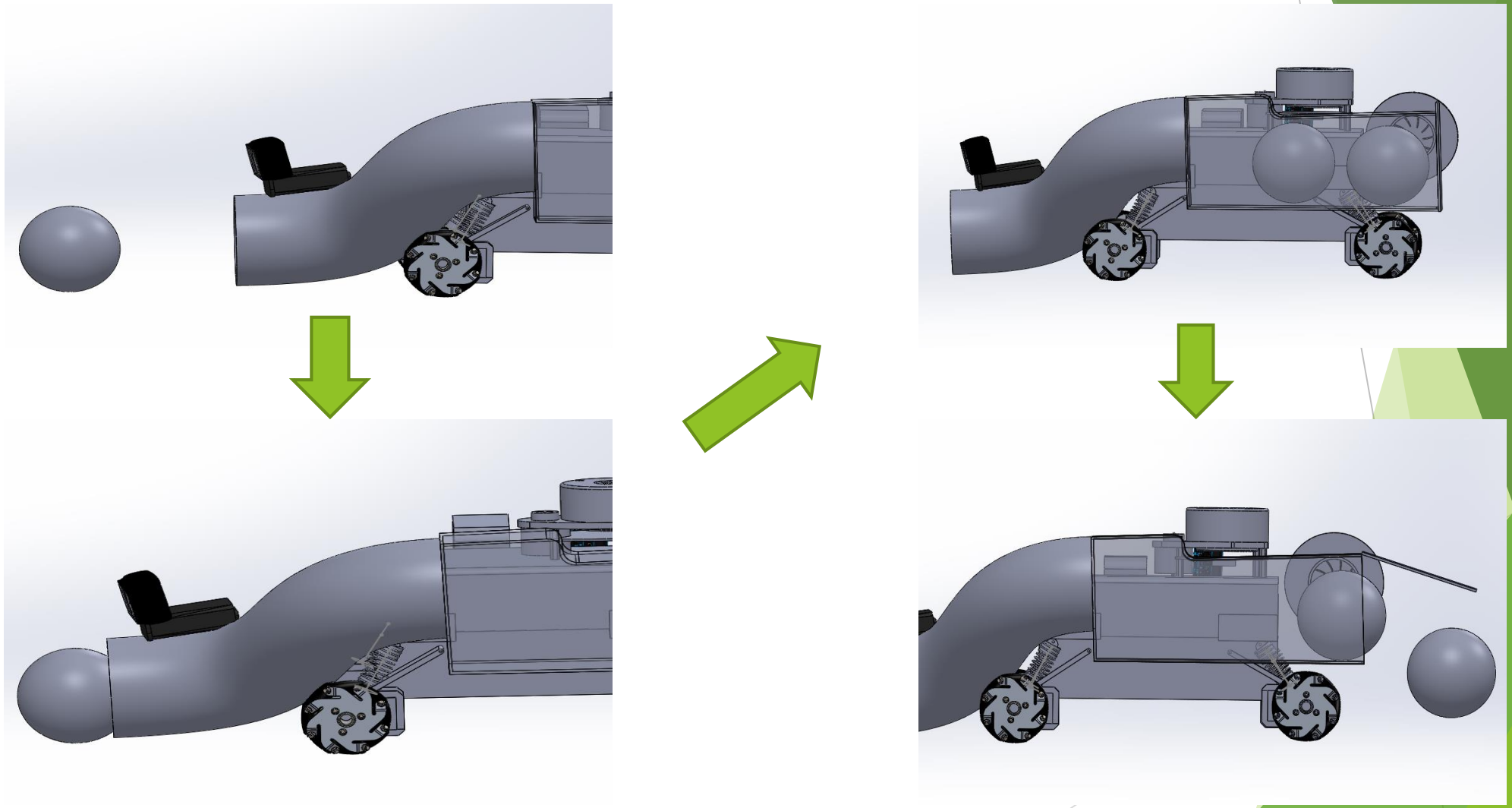
At least,

Vacuum Force > 3 times of gravity force

Vacuum Force : 4000Pa x $\pi(0.0375\text{m})^2 = 17.7\text{N}$

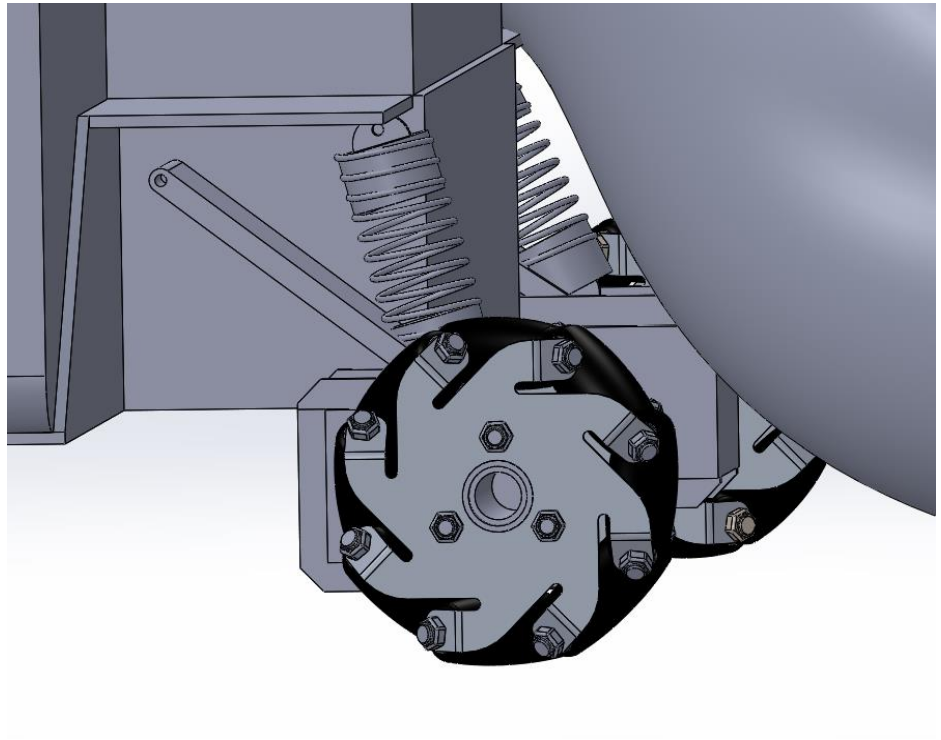
3xGravity Force : 0.013 x 9.8 x 3 = 0.39N

How it works?



Vibration Reduction Part

Why we use suspension?

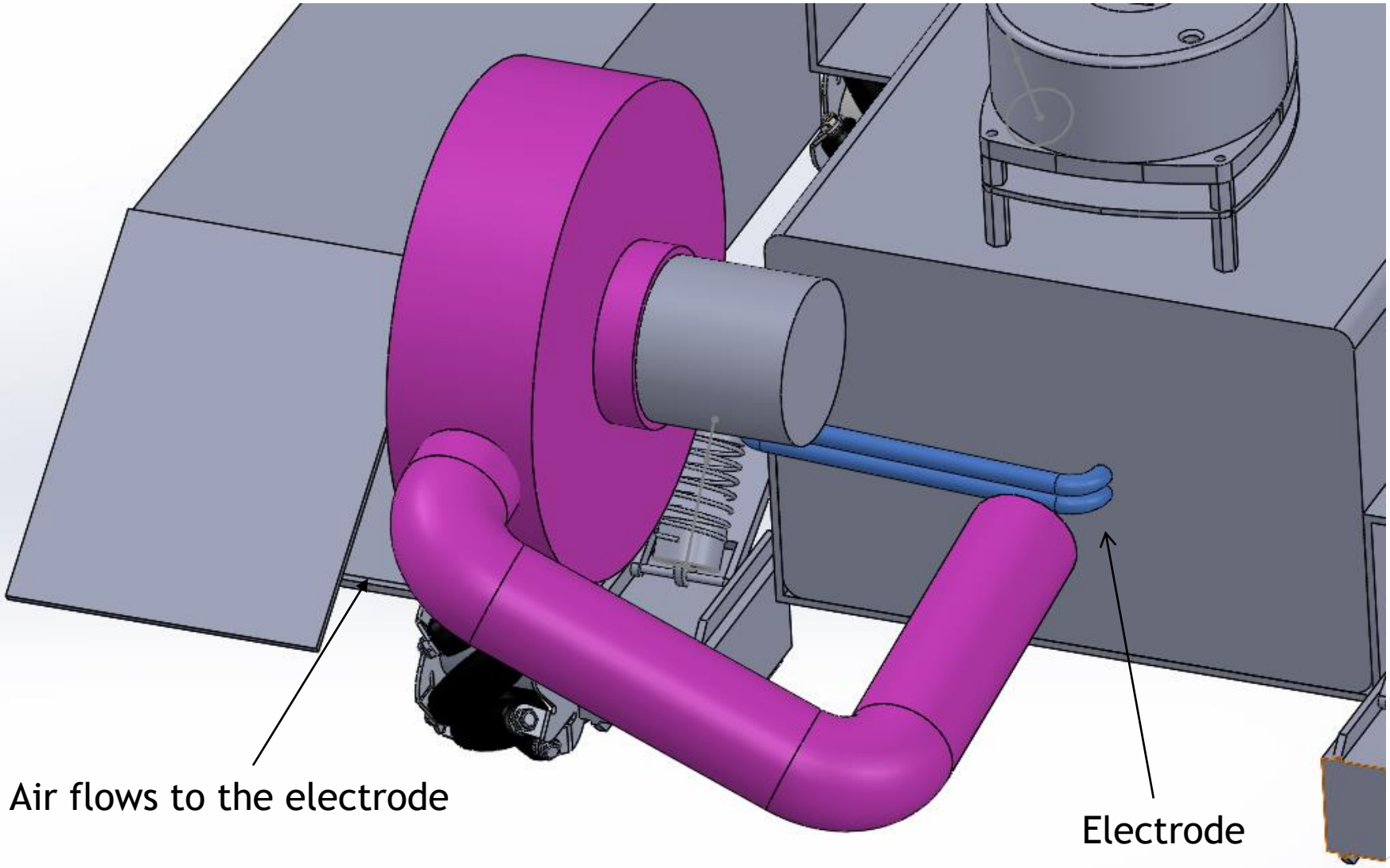


- Shape of the Mecanum
  - -> Generate wheels vibration
    - -> Bad for webcam and Lidar

Heat transfer part

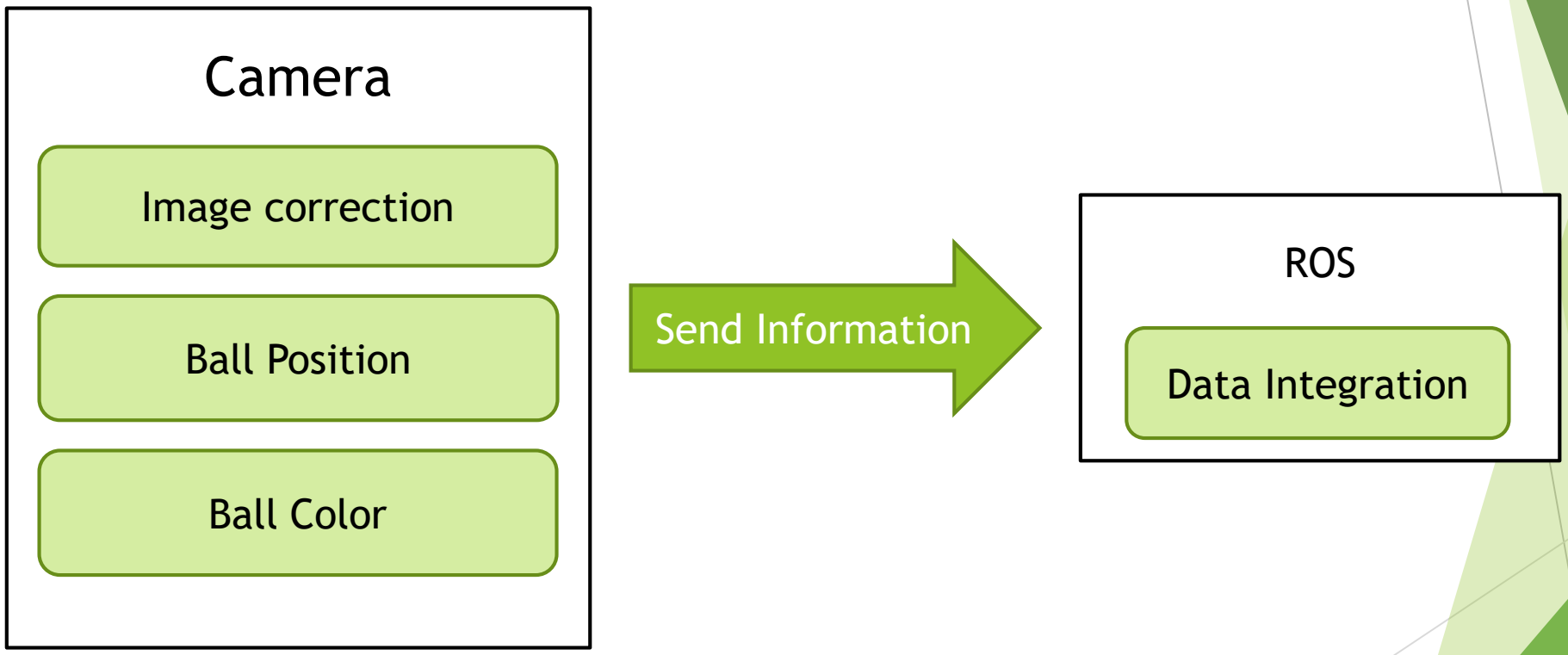
Cooling System

- Electric shock
- Fan
- Existing vacuum system


Air flows to the electrode
Electrode

Vision recognition part

Connection with ROS



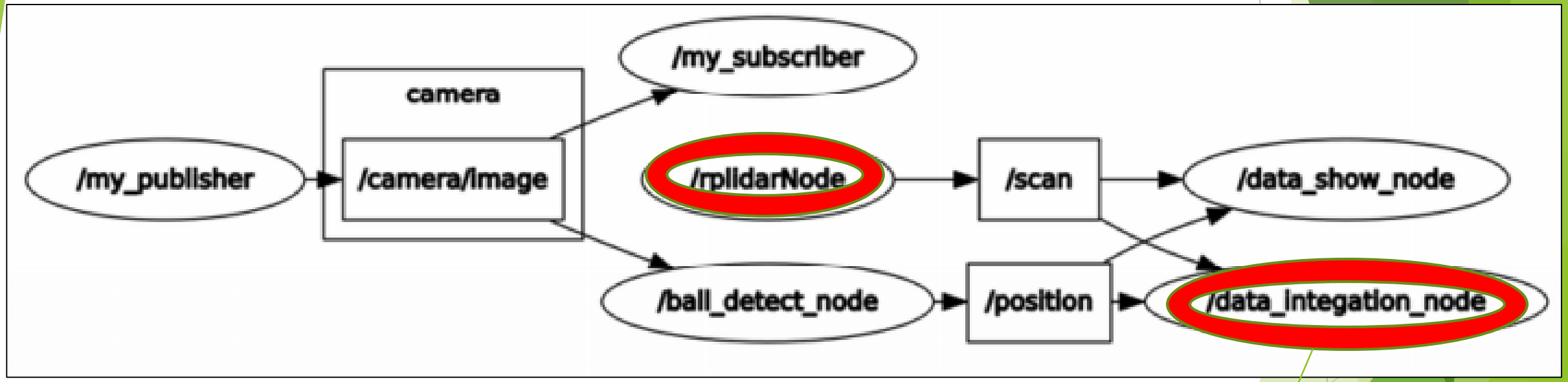
ROS part

Rplidar

✓ Functions

- 2D mapping
- Recognition of obstacles in 2D
- Autonomous movement of the robot

Process



Communication with myRIO

Future plan

- Heat transfer part
  - Temperature monitoring
- Vision recognition part
  - Recognition of ball and color of ball
  - measuring distance of ball
  - Send the data to the ROS part
- ROS part
  - Create autonomous moving code
  - Handle visualization by RVIZ
- Vibration Reduction Part
  - Suspension selection and purchase
- Pickup function part

  Purchase two motors for suction and storage mechanism

Thank you!