Capstone Design 1 2nd Presentation

Group : **JYP**

박영진 지도교수님

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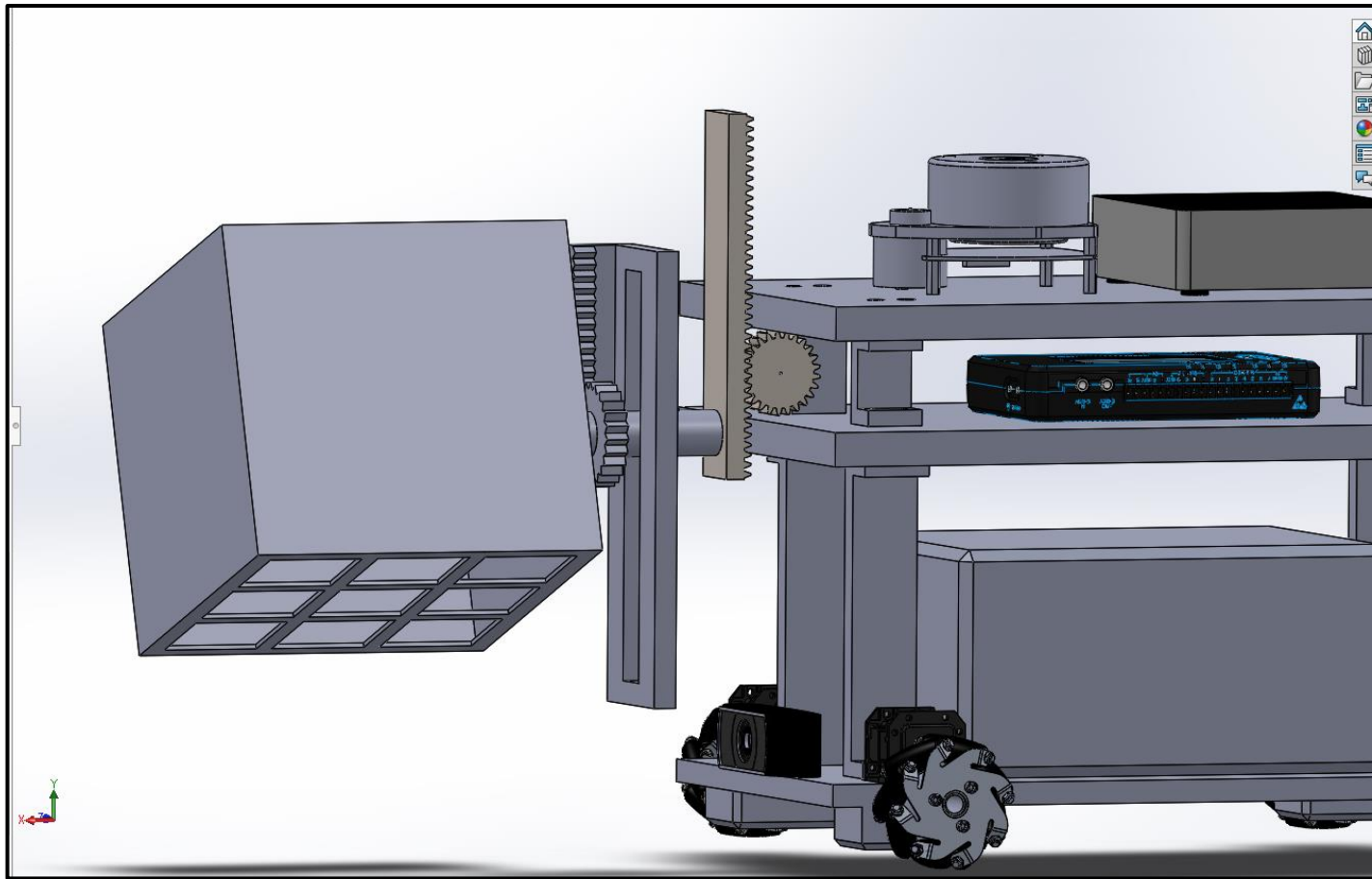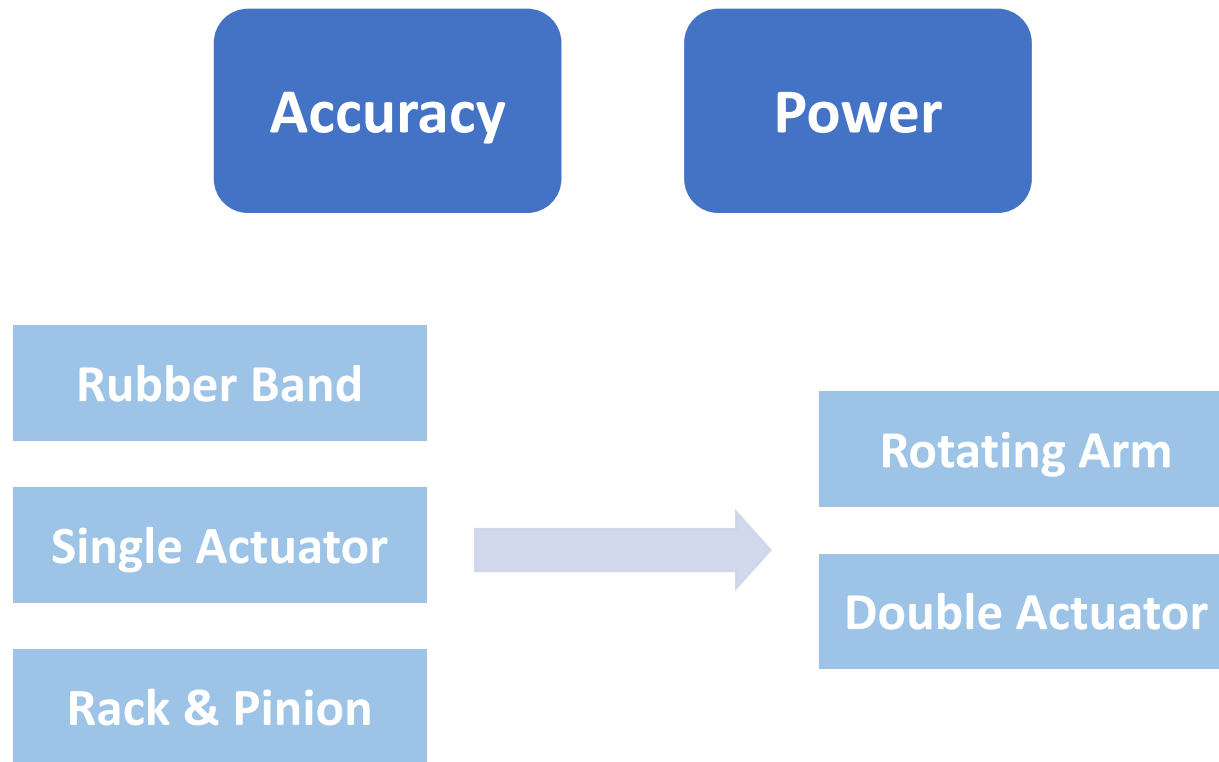
장신원 부준호 김경서 손기영

Outline

New Concept

Subsystem Integration
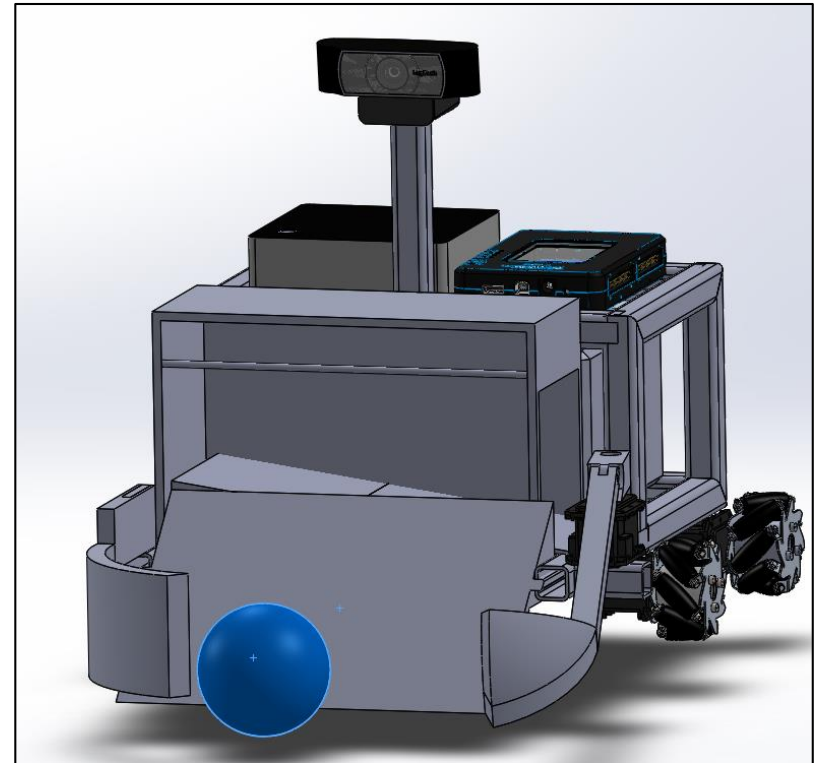
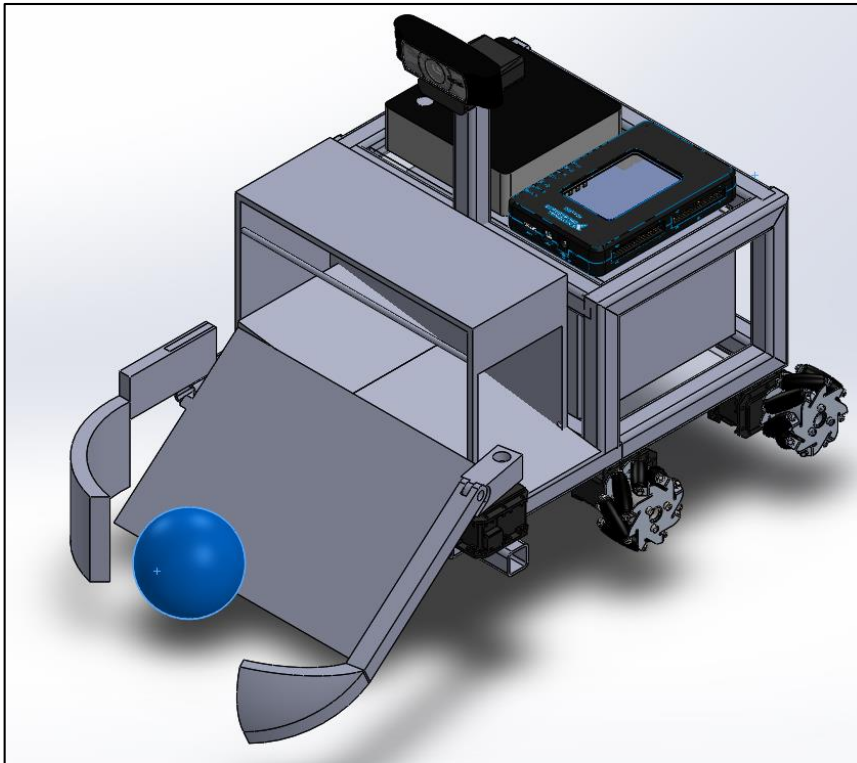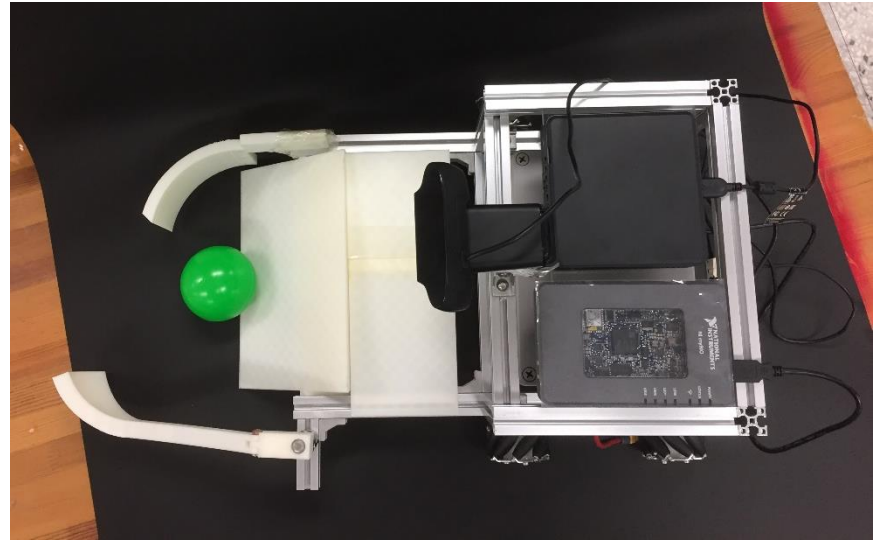Engineering Problems

Plans Ahead

New Concept

Previous Concept

Why change though?

Accuracy　　　**Power**

Rubber Band

Single Actuator　　→　　Rotating Arm

Rack & Pinion　　　　　Double Actuator

New Concept

Assembly

Subsystem Integration
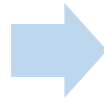
Subsystems
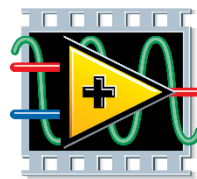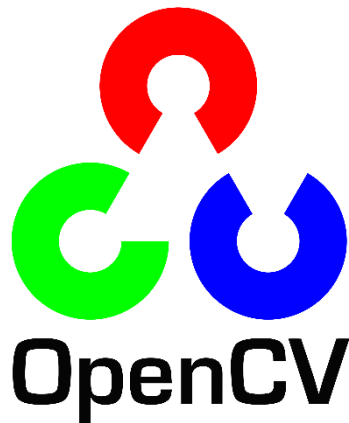
Subsystem Integration
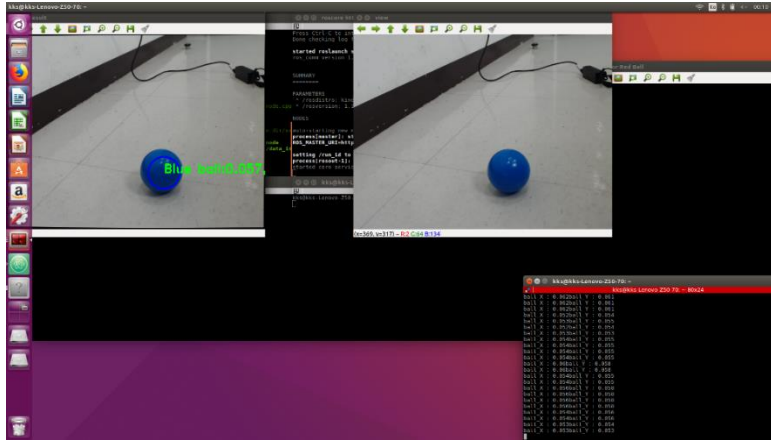
Subsystem Integration

Search Blue Ball ➡ **Move Toward Blue Ball**

Engineering Problems throughout the Project

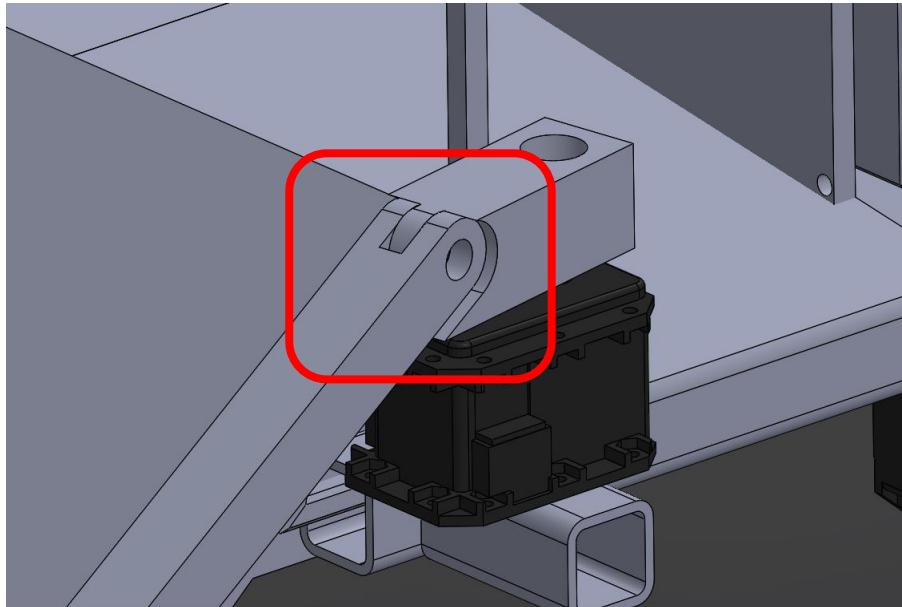# Engineering problems

Ball Collecting Arm Design

Component Assembly
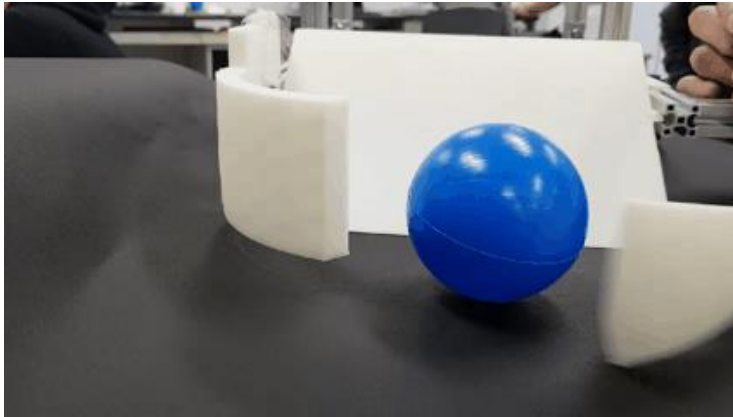
Heat Management

Vibration Management

Engineering problems

Engineering problems

Ball Collecting Arm Design

Front View
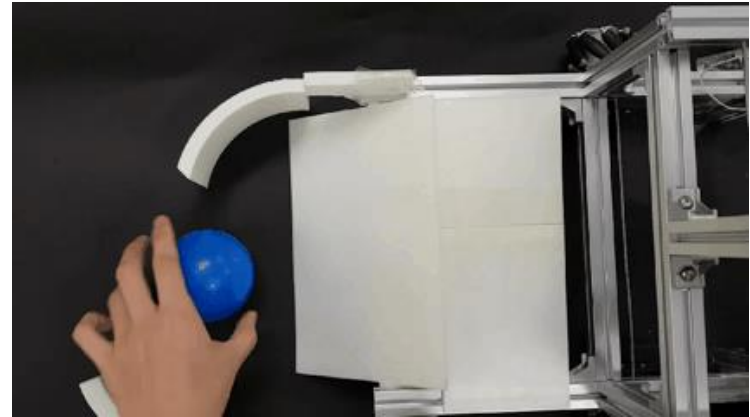
Top View

Engineering problems

Component Assembly

wall

Webcam

h

d

<side view of the worst case>
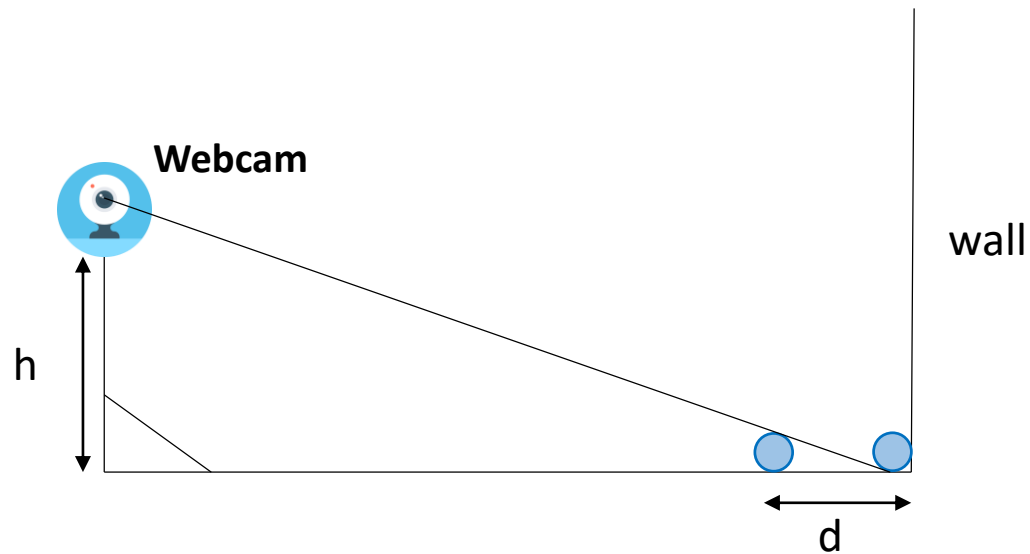
Condition : d ≥ 50cm, r(ball radius) = 3.75cm, webcam angle = 78°

Assumption : detecting distance ≅ 4m

$$h \geq 34.35cm$$

Engineering problems

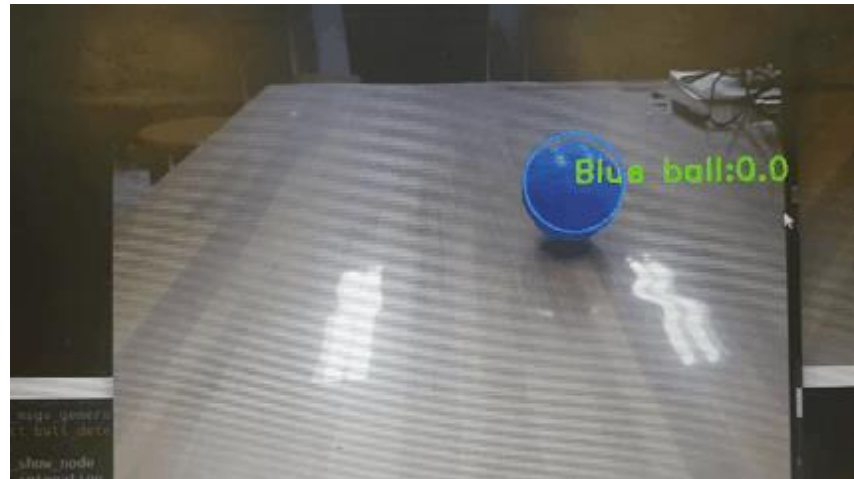**Component Assembly 2**
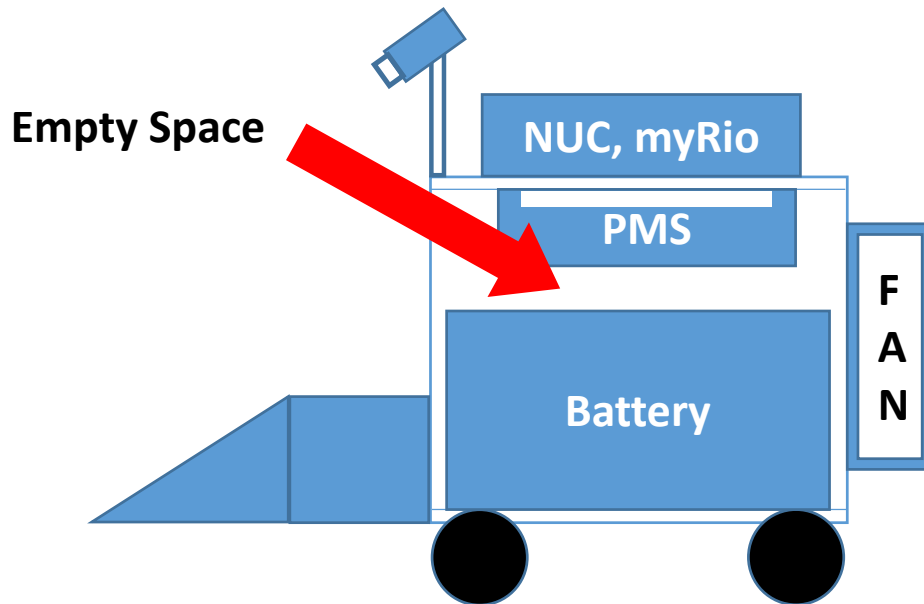
Engineering problems

Heat Management

Engineering problems

Vibration Management

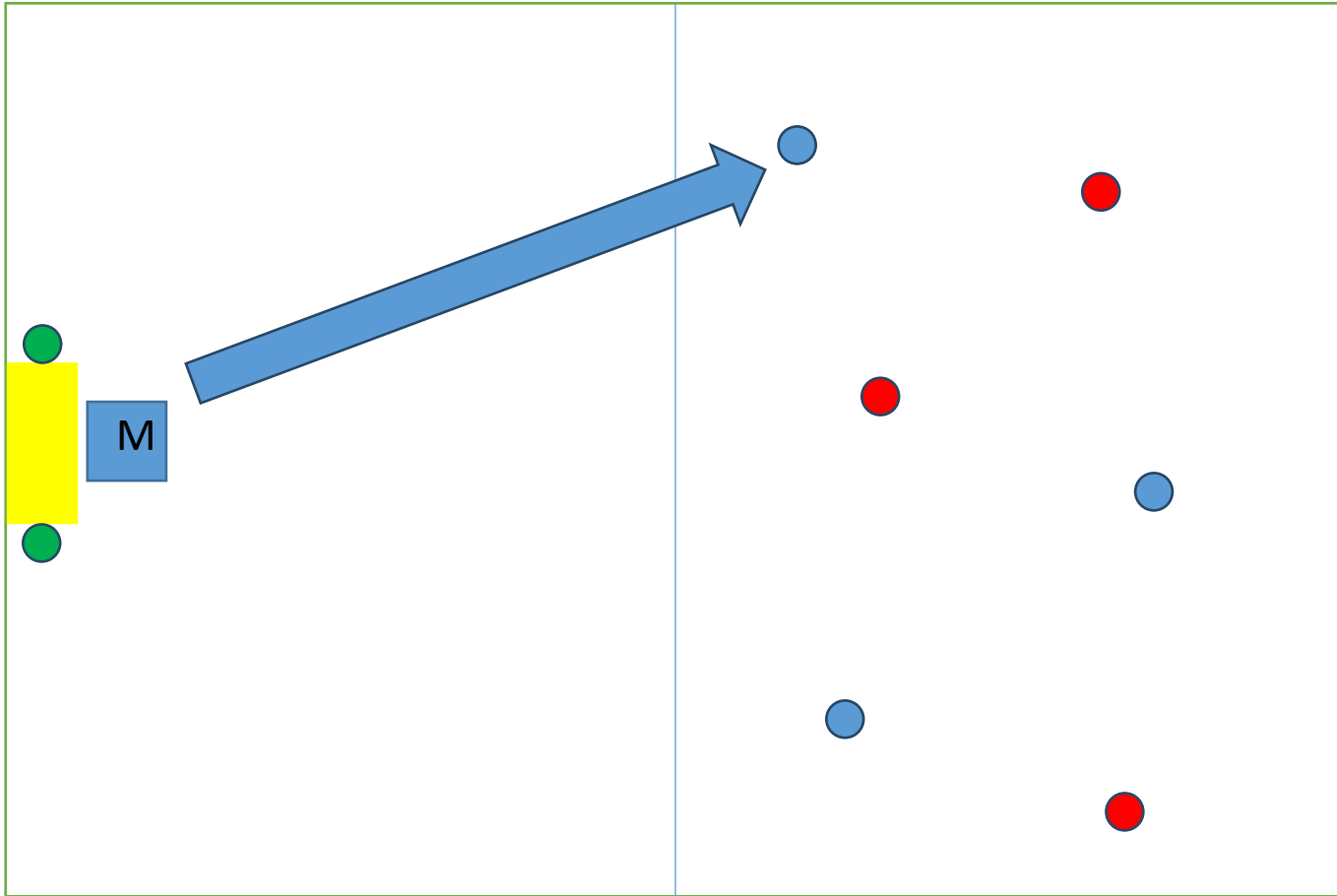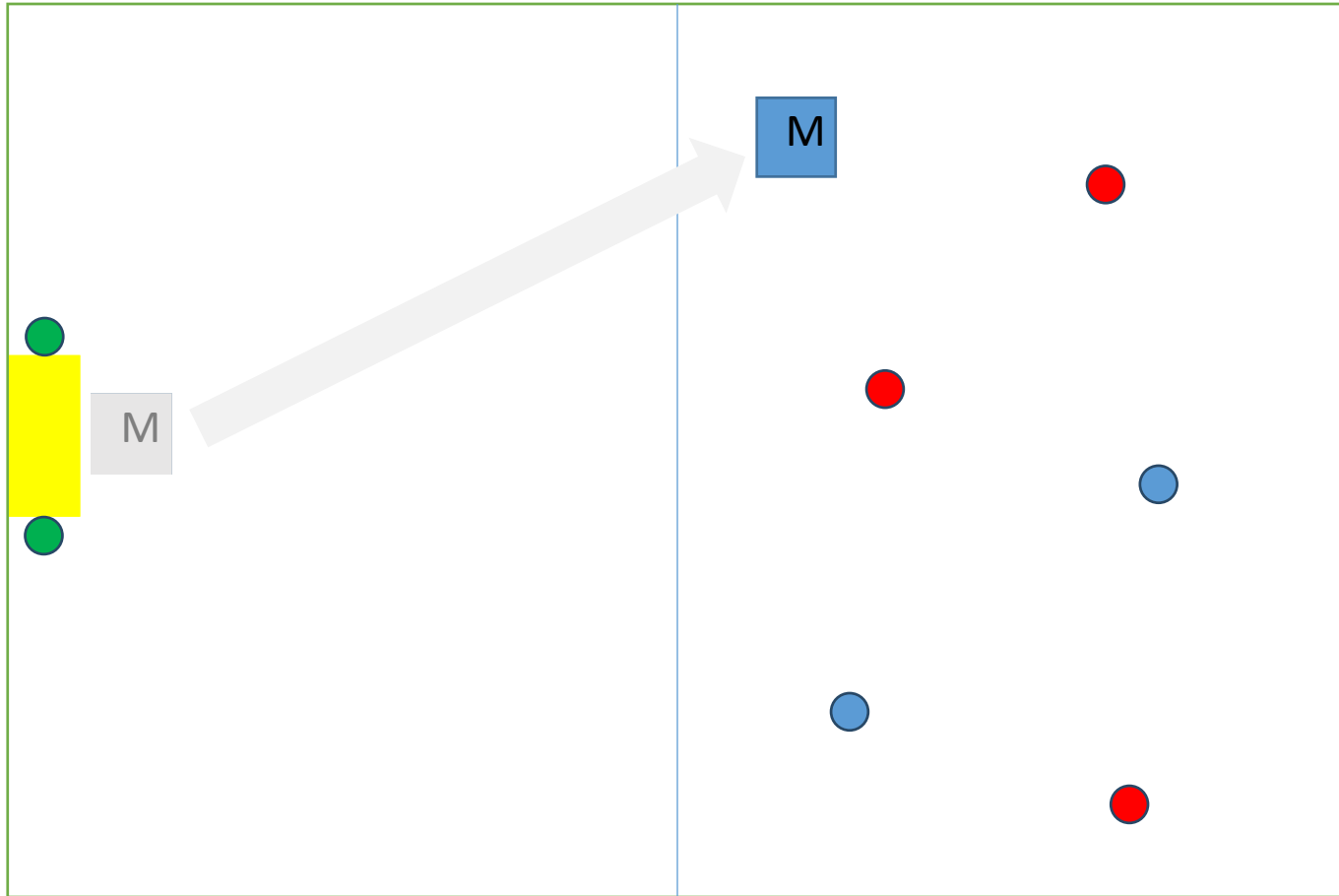# Engineering problems

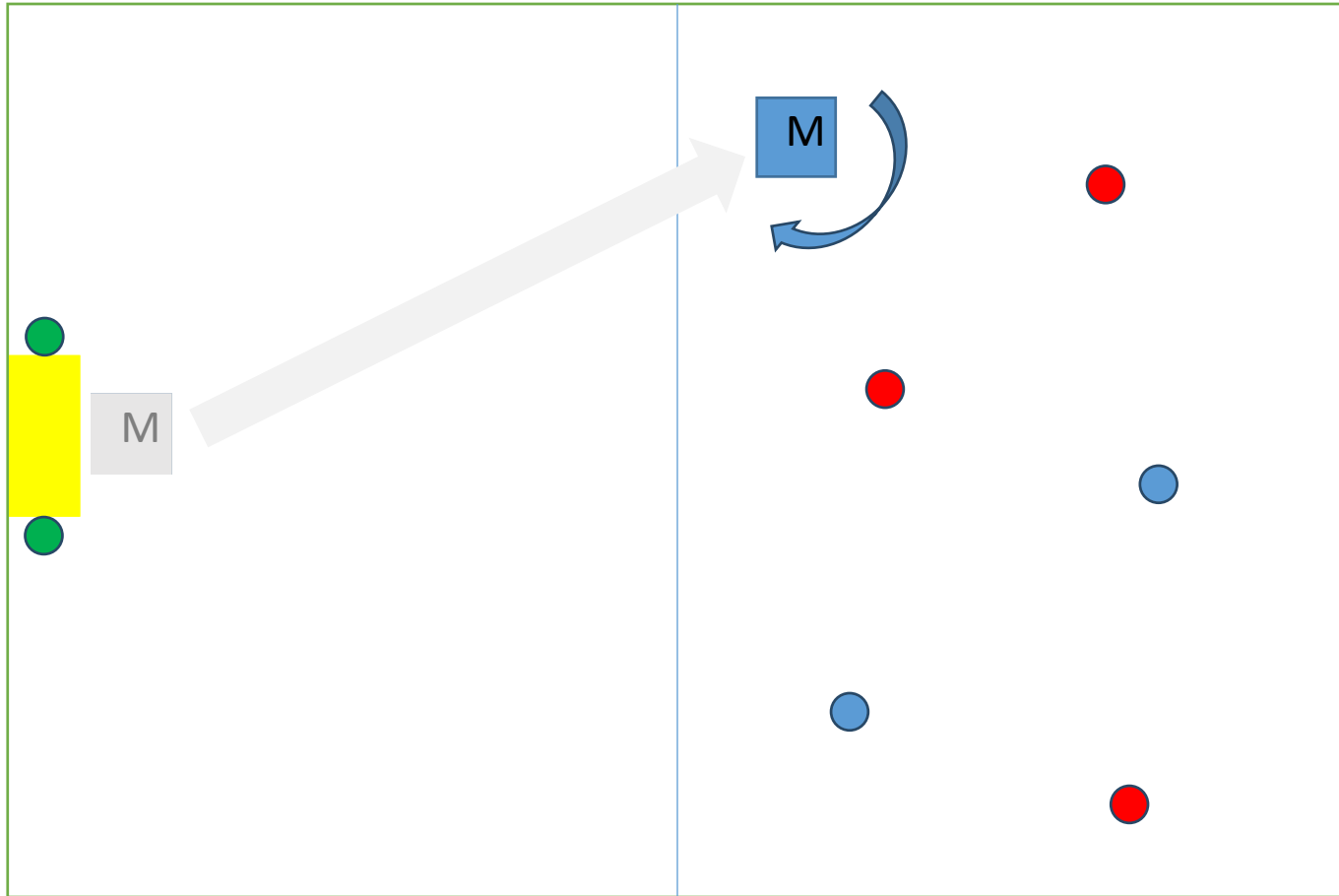**Vibration Management**

Plans Ahead

Mobile Platform Algorithm

Mobile Platform Algorithm

Mobile Platform Algorithm

Mobile Platform Algorithm
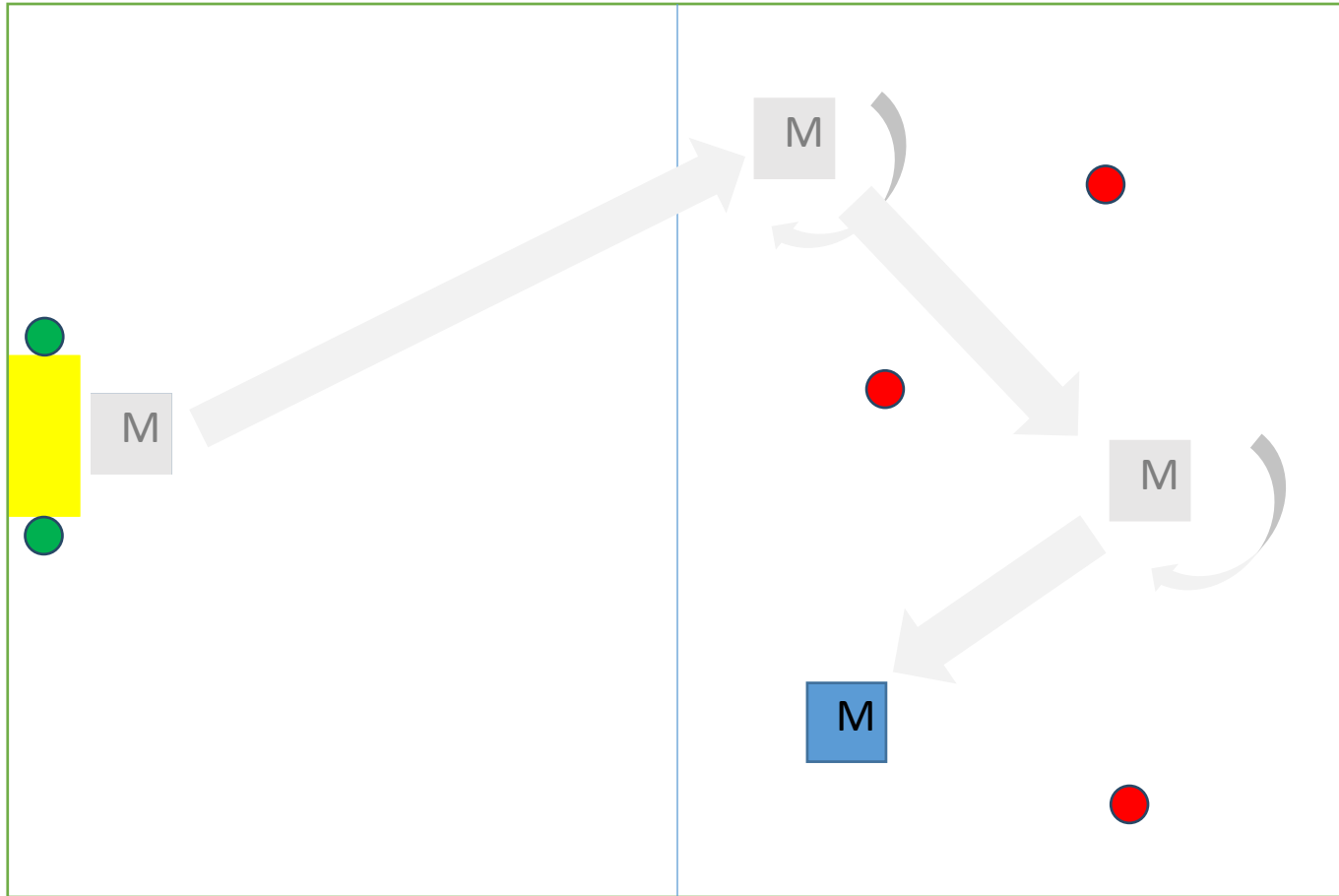
Mobile Platform Algorithm
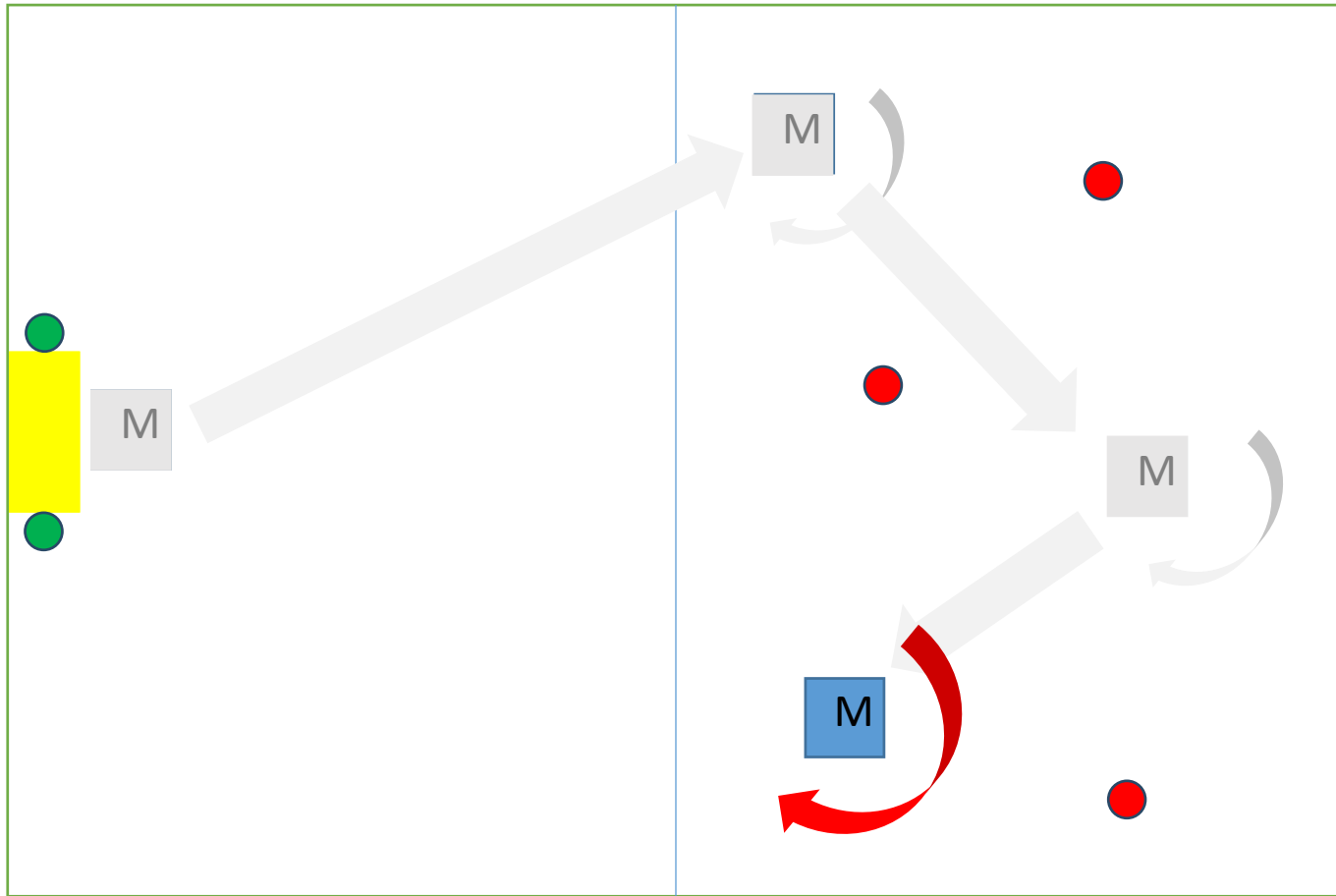
Plans Ahead

Practice & Improvement

1) Collection Accuracy

2) Submission Accuracy

3) Automation

Thank You

Appendix

What is the minimum height of webcam?

5m

start

robot

3m

d

<map>

h

wall

d

<side view of the worst case>

Condition : d ≥ 50cm, r = 3.75cm, webcam angle = 78°

Assumption : detecting distance ≅ 4m
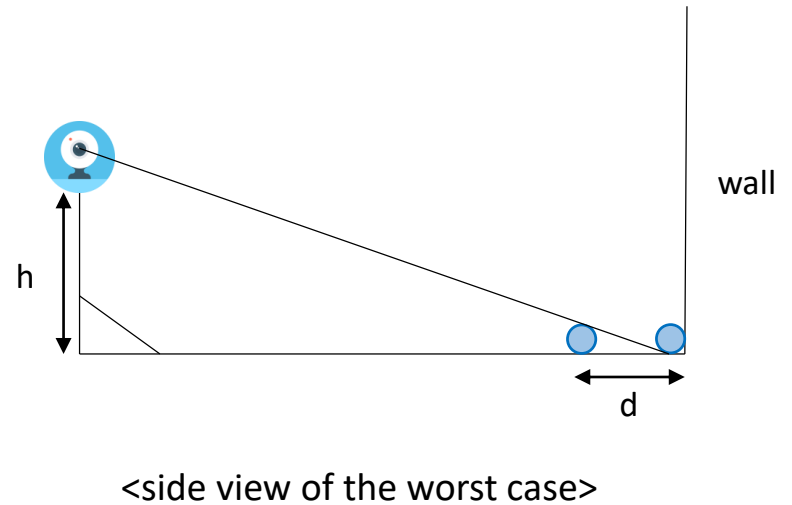
$h \geq 34.35cm$

Proof of minimum height from the worst case

(0, h)

y=ax+h
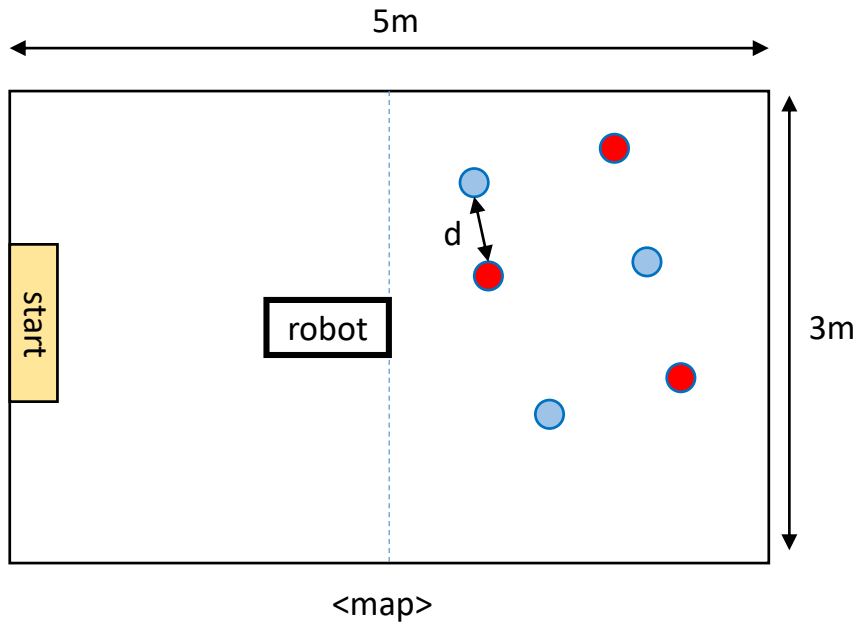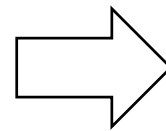
wall

h

d

x

y
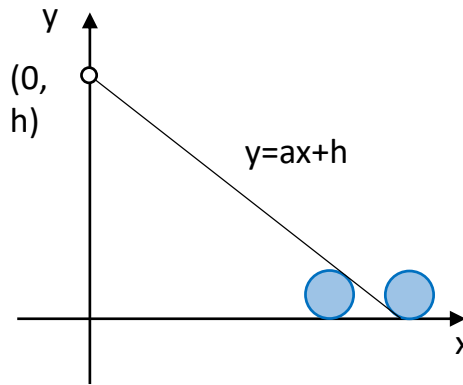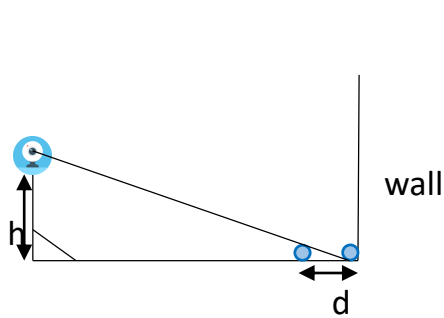
Circles' equations
$: (x - x_1)^2 + (y - r)^2 = r^2,$
$(x - x_2)^2 + (y - r)^2 = r^2$

Tangent line equation
$: y - ax - h = 0$

$$\frac{|ax_1 - r + h|}{\sqrt{a^2 + 1}} = \frac{|ax_2 - r + h|}{\sqrt{a^2 + 1}} = r$$

$$h = \frac{r(x_1 + x_2)}{\sqrt{(x_2 - x_1)^2 - 4r^2}} + r$$

$$x_1 = 202cm, x_2 = 259cm, r = 3.75cm$$

$$\therefore h = 34.35cm$$

Data integrate

```
blue_ball_detect;
robot_move;
ball_collect;

int i=0;
while(1)
{       if(i<2)
        {       robot_rotate_blue;   //rotate with blue_ball_detect
                robot_move;
                ball_collect;
                i++;}
        else
        {       robot_rotate_full; //rotate once
                if(blue_ball>=1)
                {       robot_rotate_blue;   //rotate with blue_ball_detect
                        robot_move;
                        ball_collect;}
                else
                {       robot_rotate_green;   //rotate with green_ball_detect
                        robot_move;
                        ball_submit;
                        break;
                }
        }
}
```

Distinguish the balls in a ball