**Learn in Depth**

**Mastering Embedded Systems Online Course**

**Unit 4 – System Architecture**

**Assignment 2**

**Collision Avoidance Report**


**To: Eng. Keroles Shenouda**
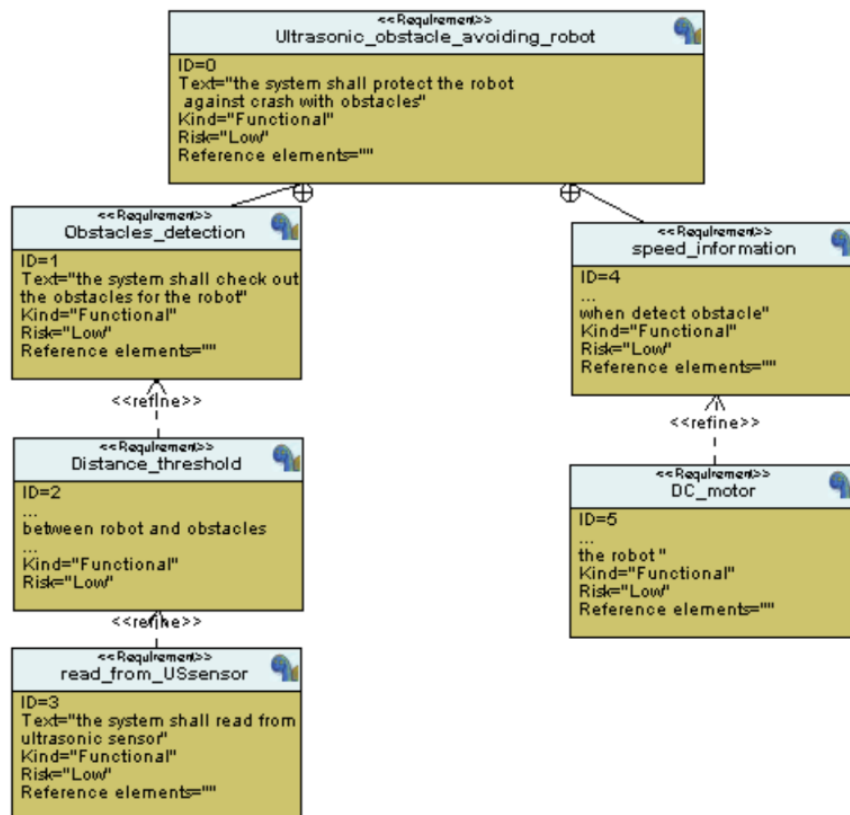
**By: Youssef Arnaouty**

# Abstract:

The system is called Collision Avoidance System. It detects if an object is ahead of the robot by a certain distance. If the distance threshold is exceeded, the robot must decide to decrease its speed. Otherwise, the robot should remain moving.
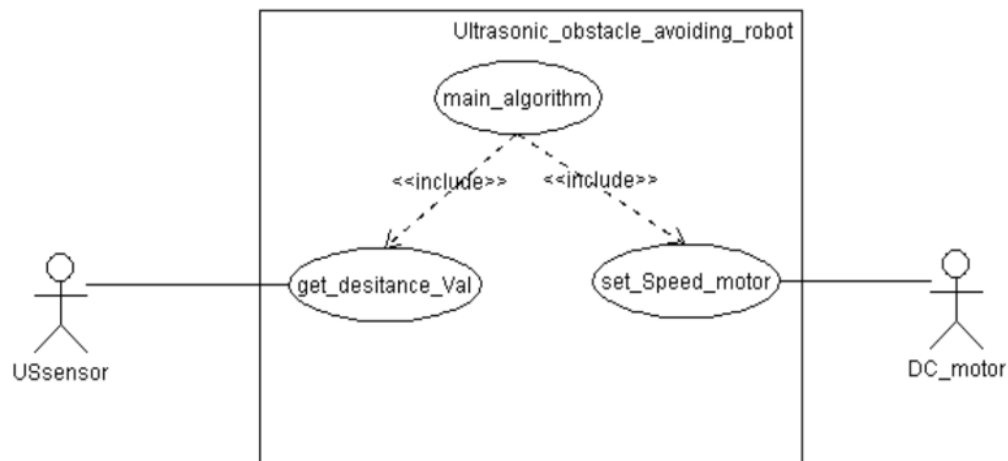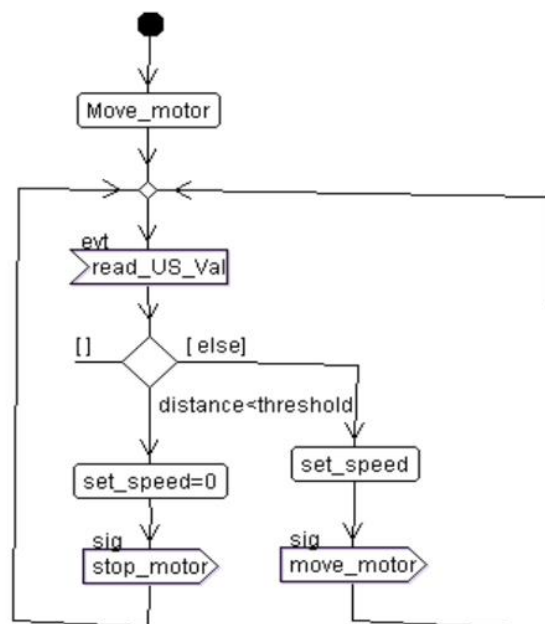
# Method Used:

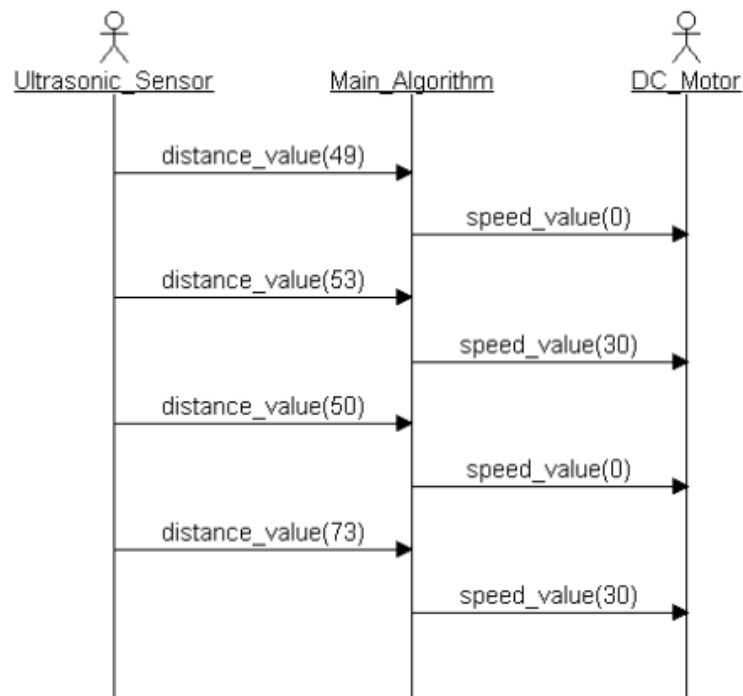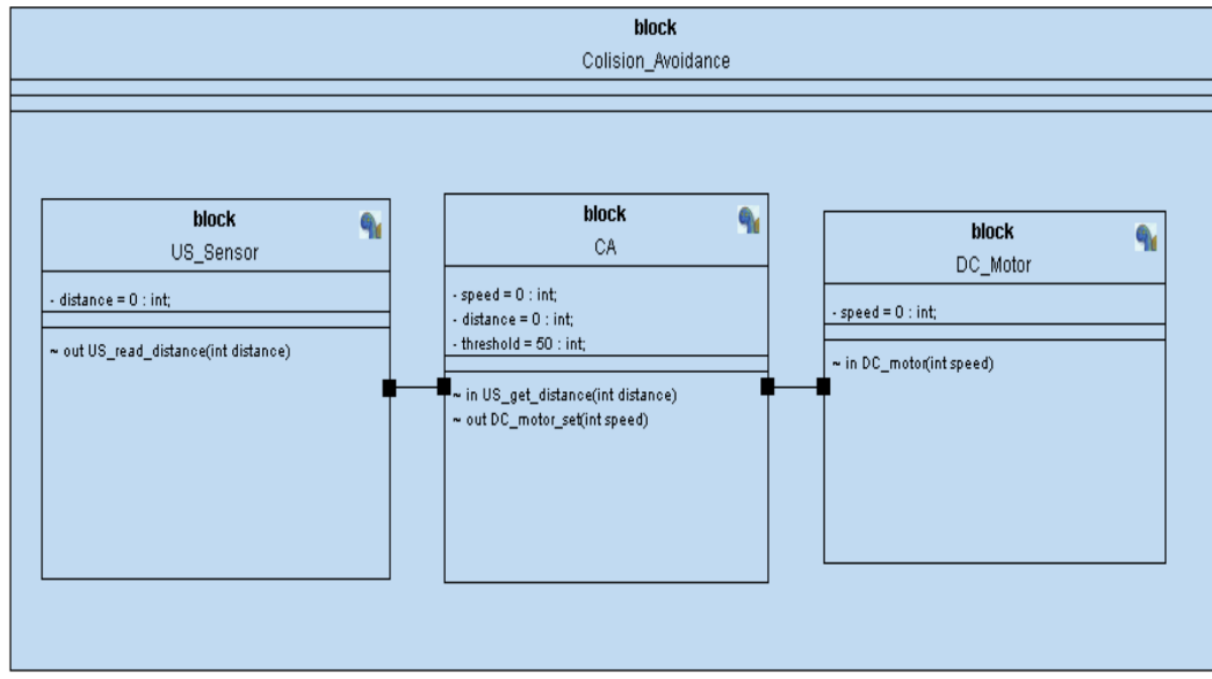V-Model SDLC

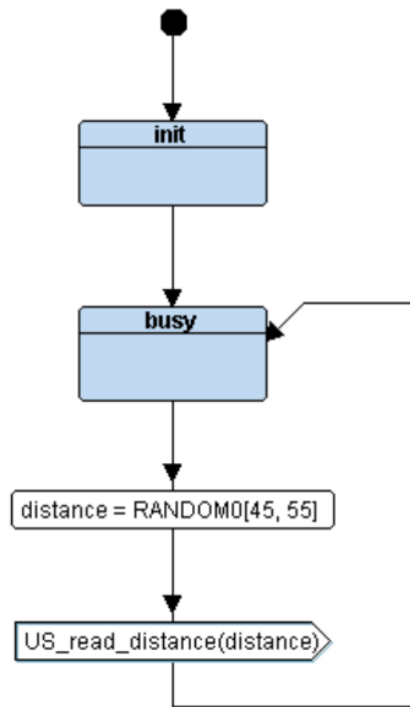# Requirements:

# System Analysis:
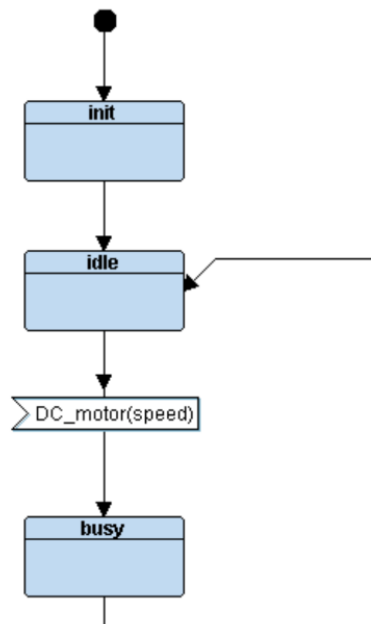
Use Cases:



Activity Diagram:

## Sequence Diagram Example:



## Block Diagram

Ultrasound (Sensor) State Diagram:

```
            ●
            │
            ▼
        ┌───────┐
        │  init │
        ├───────┤
        │       │
        └───────┘
            │
            ▼
        ┌───────┐◄──────────┐
        │  busy │           │
        ├───────┤           │
        │       │           │
        └───────┘           │
            │               │
            ▼               │
  ┌──────────────────────┐  │
  │ distance = RANDOM0[45, 55] │
  └──────────────────────┘  │
            │               │
            ▼               │
  ┌──────────────────────┐  │
  │ US_read_distance(distance) ⟩
  └──────────────────────┘  │
            └───────────────┘
```

DC Motor (Actuator) State Diagram:

```
            ●
            │
            ▼
        ┌───────┐
        │  init │
        ├───────┤
        │       │
        └───────┘
            │
            ▼
        ┌───────┐◄──────────┐
        │  idle │           │
        ├───────┤           │
        │       │           │
        └───────┘           │
            │               │
            ▼               │
    ⟨ DC_motor(speed) │     │
            │               │
            ▼               │
        ┌───────┐           │
        │  busy │           │
        ├───────┤           │
        │       │           │
        └───────┘           │
            └───────────────┘
```

Collision Avoidance Algorithm State Diagram:

waiting

DC_motor_set(speed)

US_get_distance(distance)

[distance <= threshold]
speed = 0

[distance > threshold ]
speed = 30

[ distance < threshold]
speed=0

Driving

DC_motor_set(speed)

US_get_distance(distance)

[distance >= threshold ]
speed = 30