Collision Avoidance project for a small vehicle or robot

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- Conclusion:

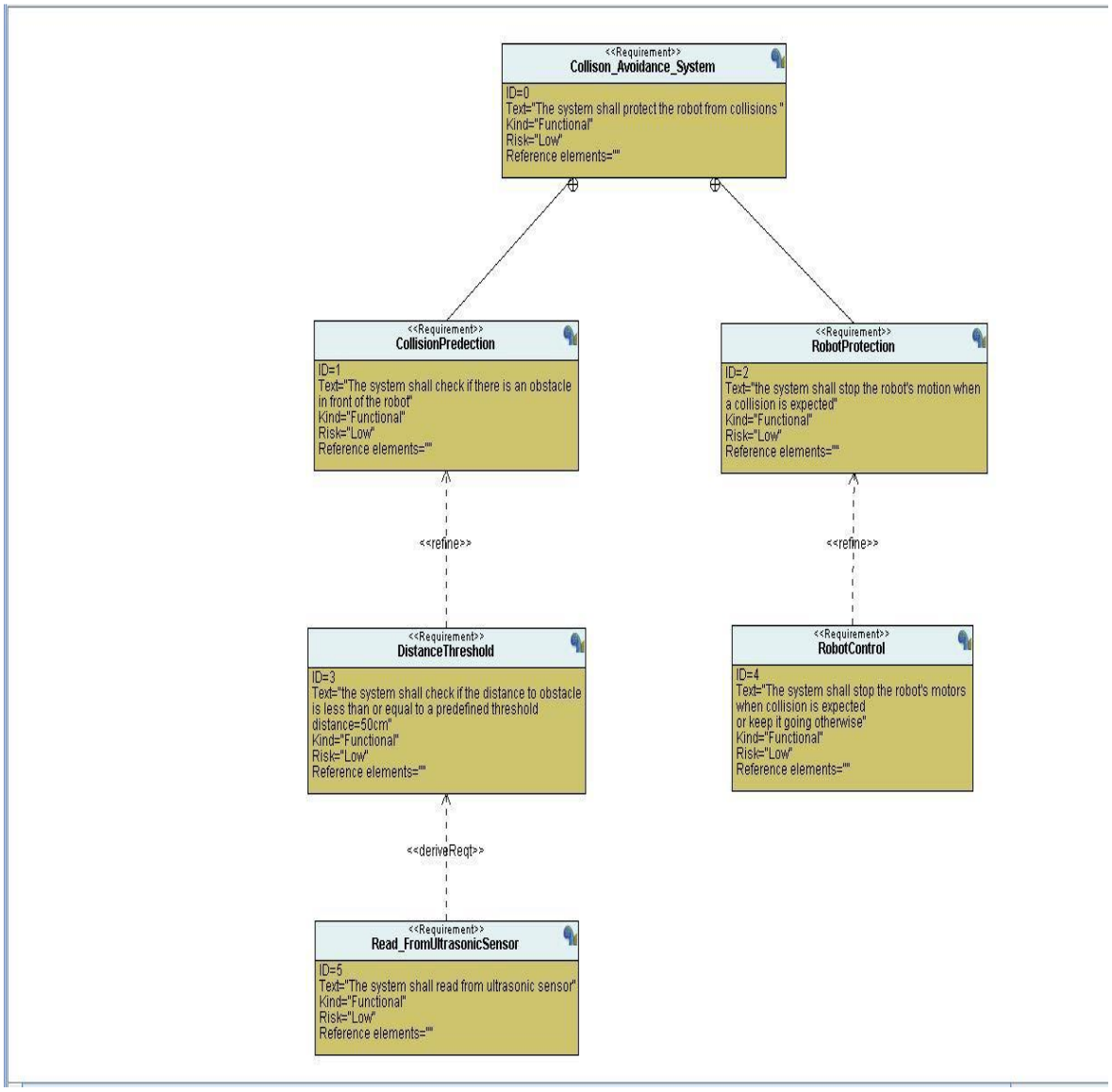
The collision Avoidance project contains of Actuator and Ultrasonic sensor connected to a microcontroller which we programmed it, the function of the system is to assure that the vehicle will never collide to any obstacles.

- Case study:
    - The system will check if there is any obstacle in front of it.
    - If the obstacle is at a distance less than 50 meters it will stop.

- Assumptions:
    - System setup and shutdown procedure are not modelled.
    - System maintenance is not modelled.
    - The ultrasonic sensor never fails.
    - DC motors never fail.
    - System never faces power cut

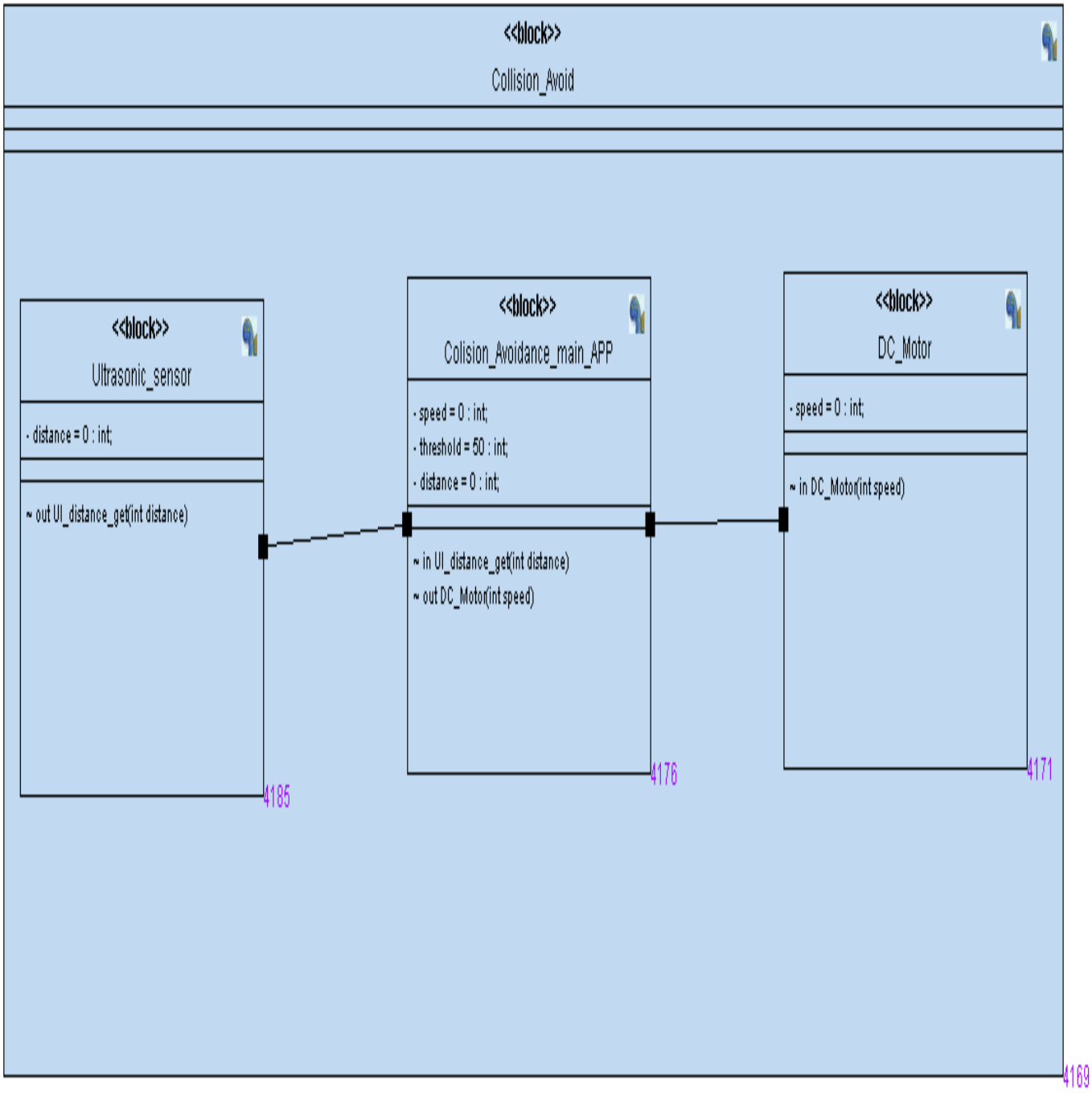
- Method: for our project development cycle Waterfall Model was found to be the most suitable because of the low time and suitably to be done by one.

- Requirements diagram:

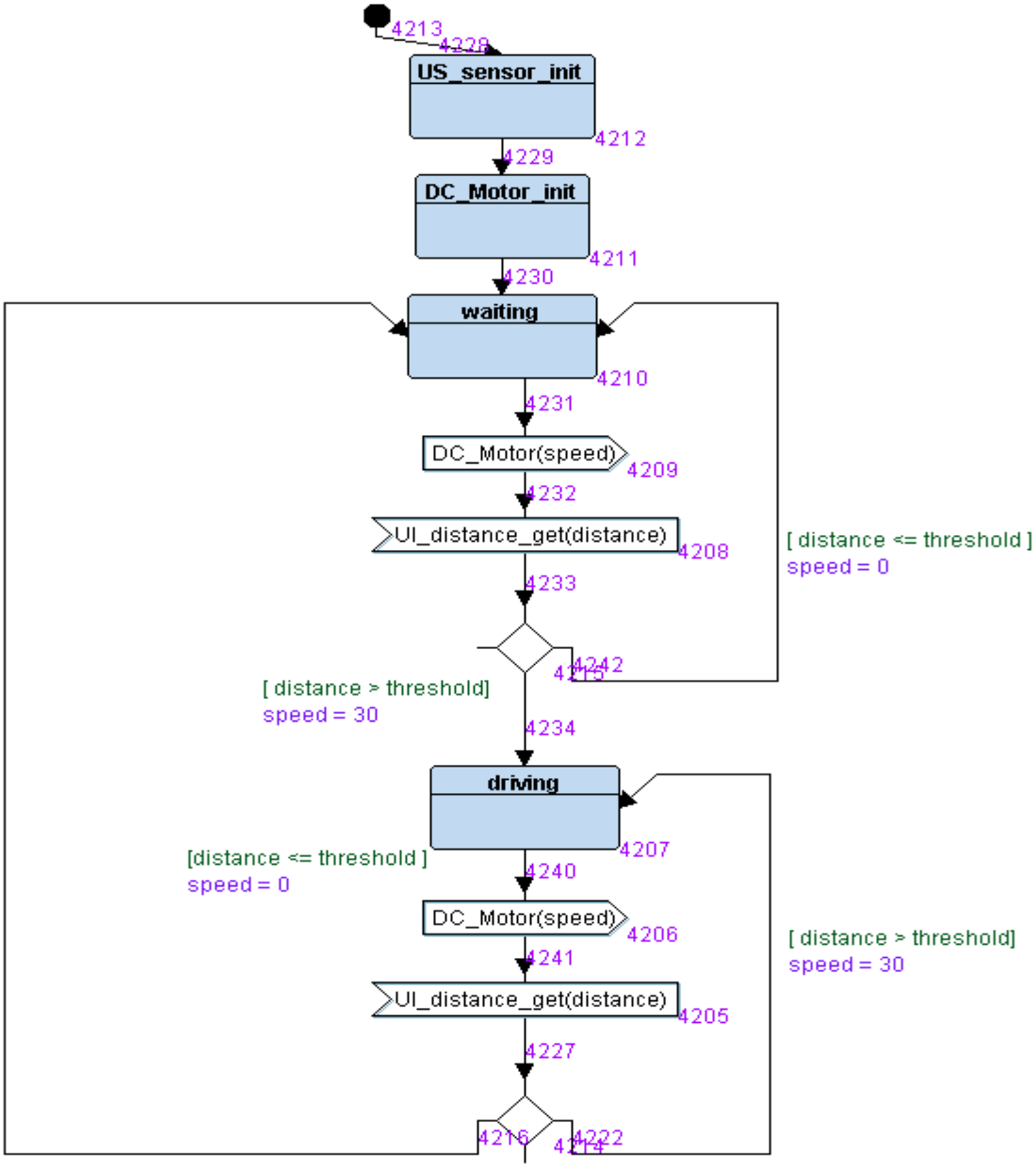


Space exploration: the project is quiet simple it doesn't require more than one ECU contains Ultrasonic sensor, DC motor driver, and ATMEGA was found suitable for this project.

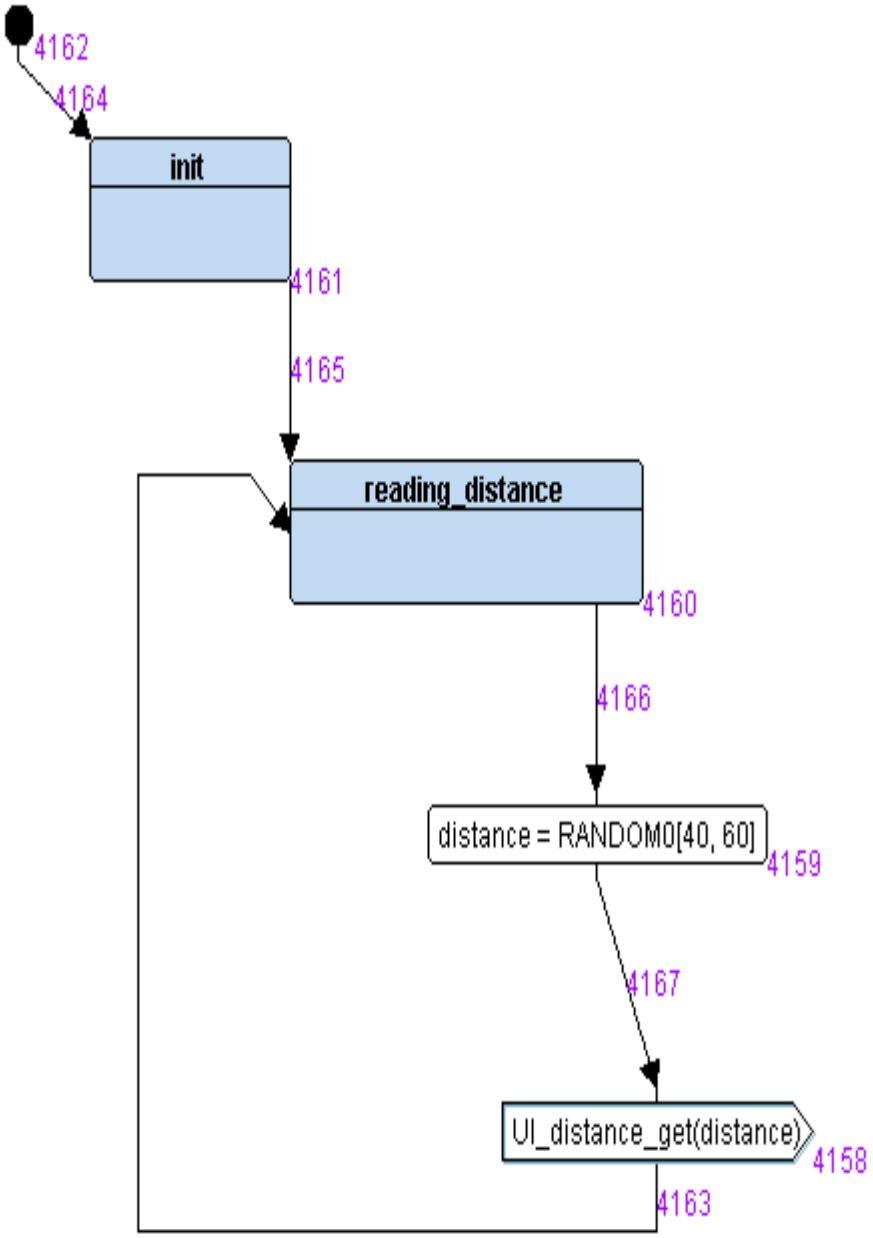
- Block


<<block>>
Collision_Avoid
<<block>>
Ultrasonic_sensor
- distance = 0 : int;
~ out UI_distance_get(int distance)
4185
<<block>>
Colision_Avoidance_main_APP
- speed = 0 : int;
- threshold = 50 : int;
- distance = 0 : int;
~ in UI_distance_get(int distance)
~ out DC_Motor(int speed)
4176
<<block>>
DC_Motor
- speed = 0 : int;
~ in DC_Motor(int speed)
4171
4169

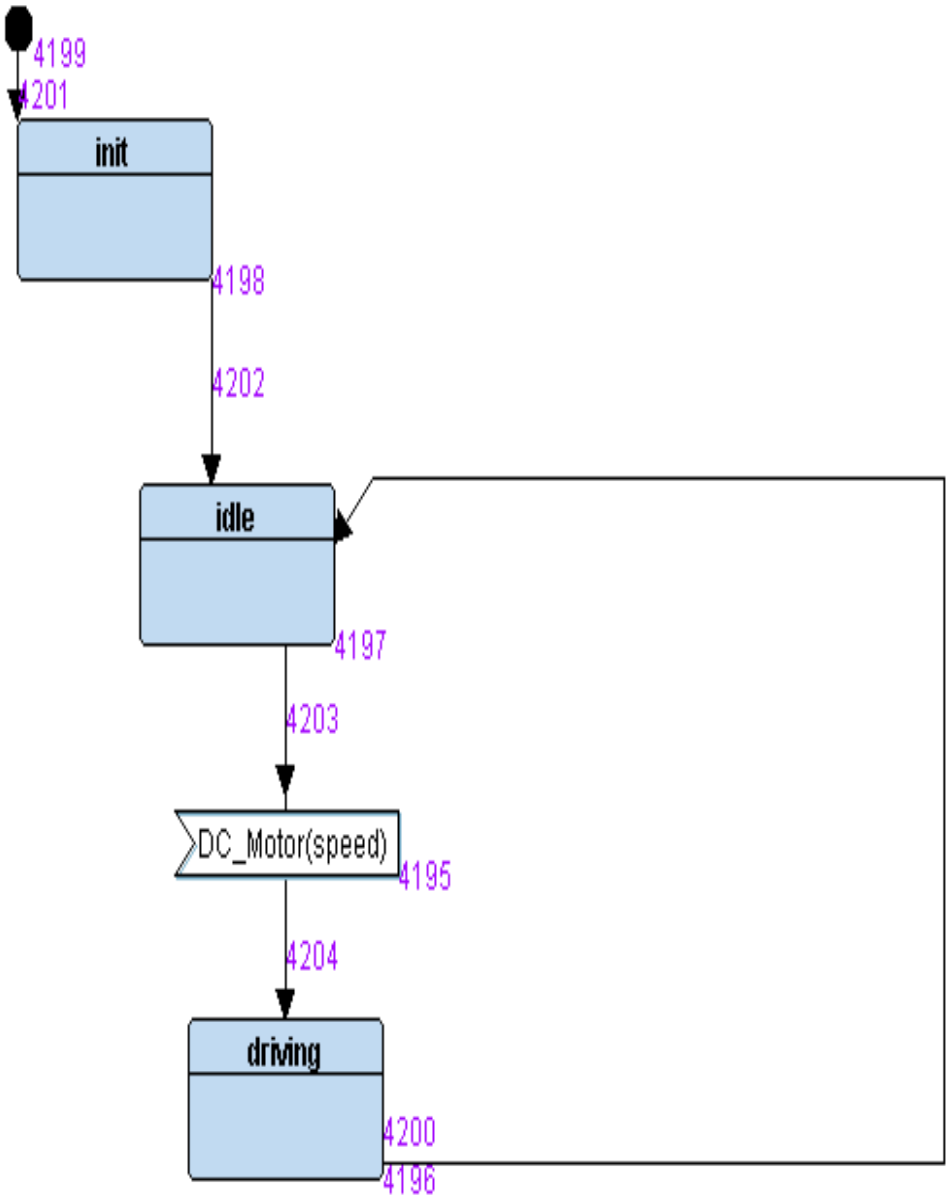
- machine for each block:
    - Collision Avoidance main:



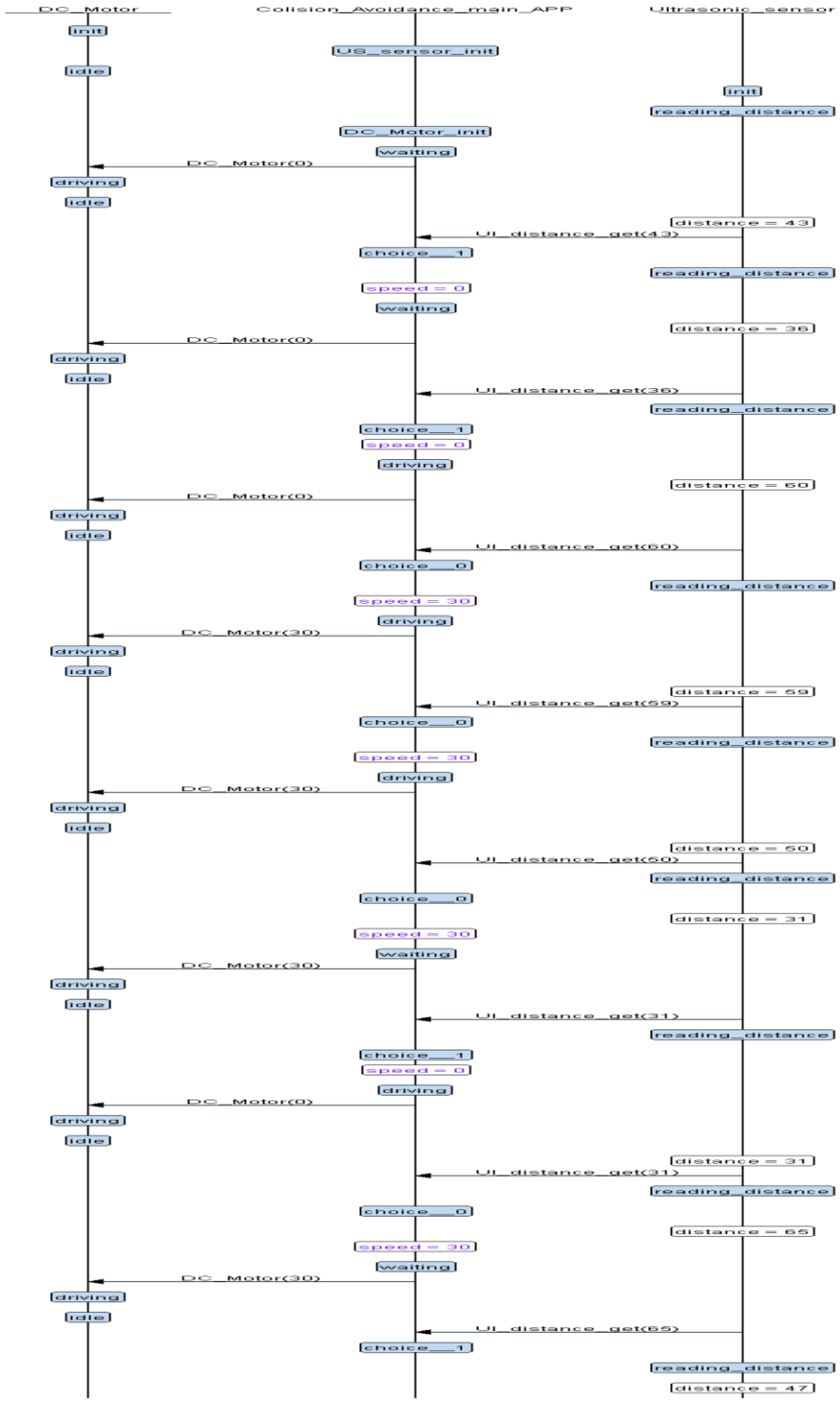
- Ultrasonic sensor:



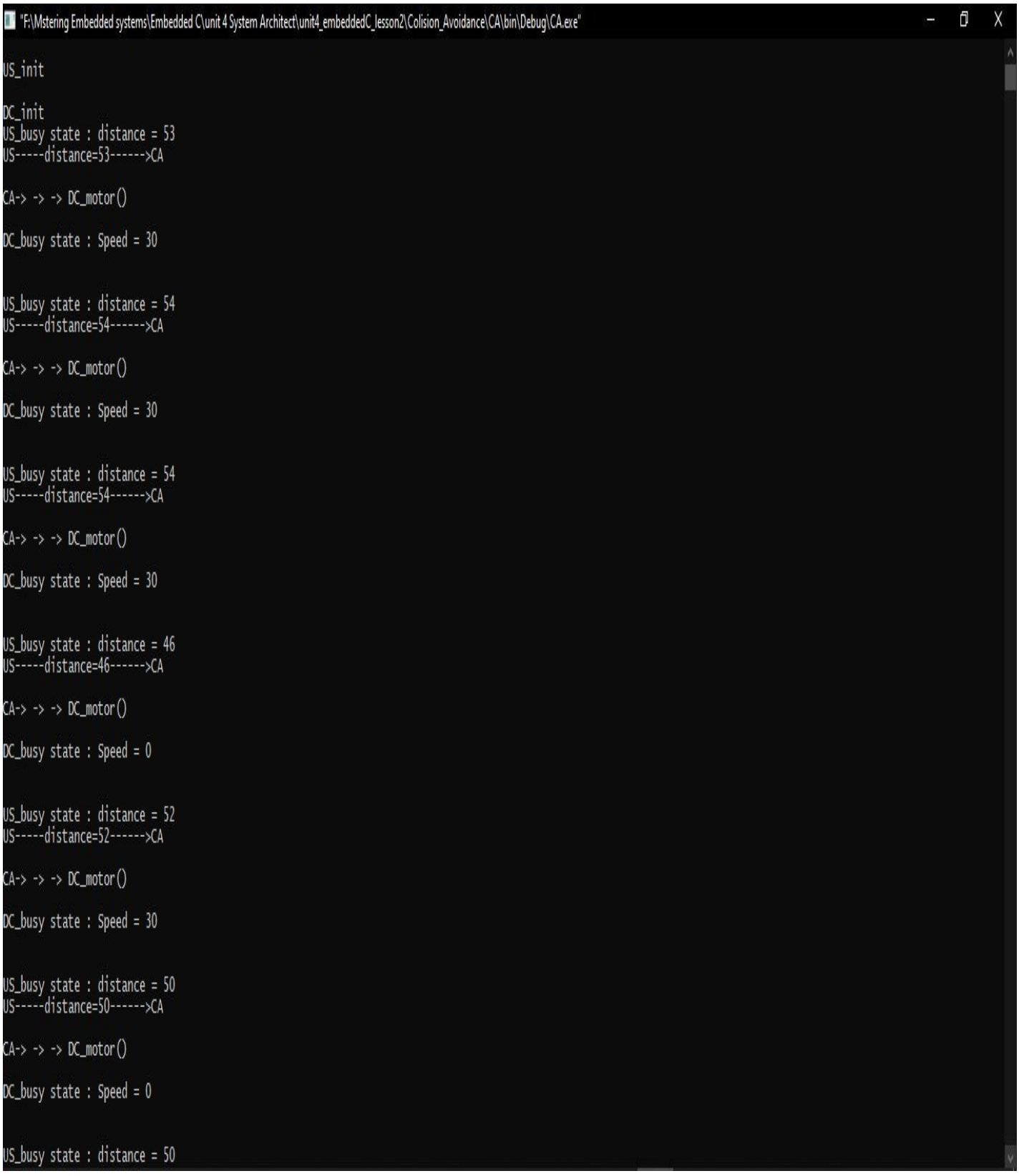
- DC Motor:


4199
4201
init
4198
4202
idle
4197
4203
DC_Motor(speed)
4195
4204
driving
4200
4196

- Results:
  - Simulation:



- Software:


"F:\Mstering Embedded systems\Embedded C\unit 4 System Architect\unit4_embeddedC_lesson2\Colision_Avoidance\CA\bin\Debug\CA.exe"
US_init
DC_init
US_busy state : distance = 53
US-----distance=53------>CA
CA-> -> -> DC_motor()
DC_busy state : Speed = 30
US_busy state : distance = 54
US-----distance=54------>CA
CA-> -> -> DC_motor()
DC_busy state : Speed = 30
US_busy state : distance = 54
US-----distance=54------>CA
CA-> -> -> DC_motor()
DC_busy state : Speed = 30
US_busy state : distance = 46
US-----distance=46------>CA
CA-> -> -> DC_motor()
DC_busy state : Speed = 0
US_busy state : distance = 52
US-----distance=52------>CA
CA-> -> -> DC_motor()
DC_busy state : Speed = 30
US_busy state : distance = 50
US-----distance=50------>CA
CA-> -> -> DC_motor()
DC_busy state : Speed = 0
US_busy state : distance = 50