

Collision Avoidance

Learn in Depth

Mastring Embedded Systems Online Diploma



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Prepared For:
ENG / KEROLES

ABOUT:

Collision Avoidance System detects the distance between the vehicle and objects in front of it .

Then it decide whether to stop or to continue according to compare with the threshold value .

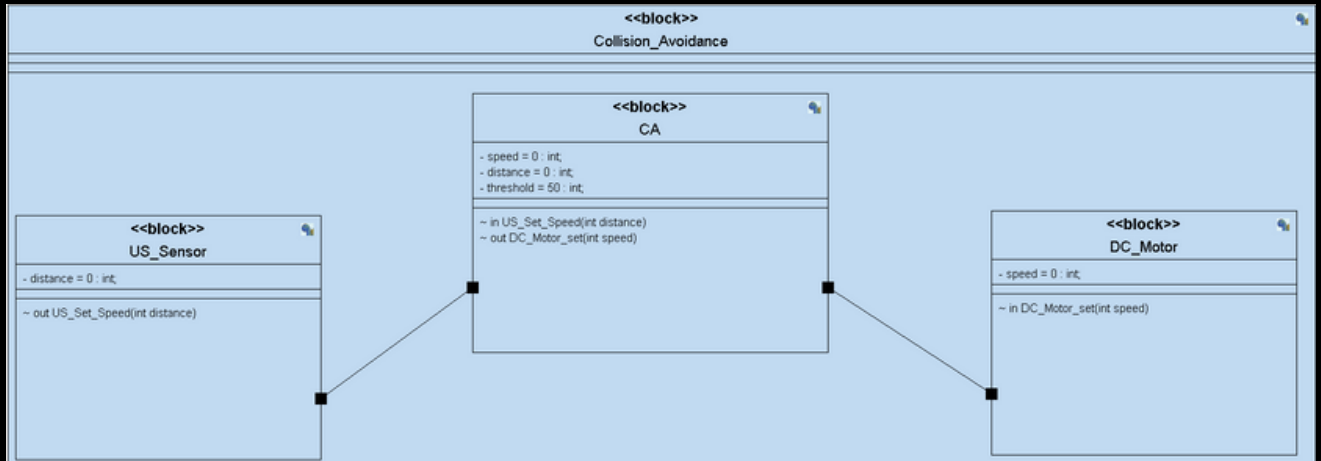
CASE STUDY:

A moving robot that avoids obstacles using ultrasonic sensor. When the obstacle is at a distance 50 cm or less, the robot must stop

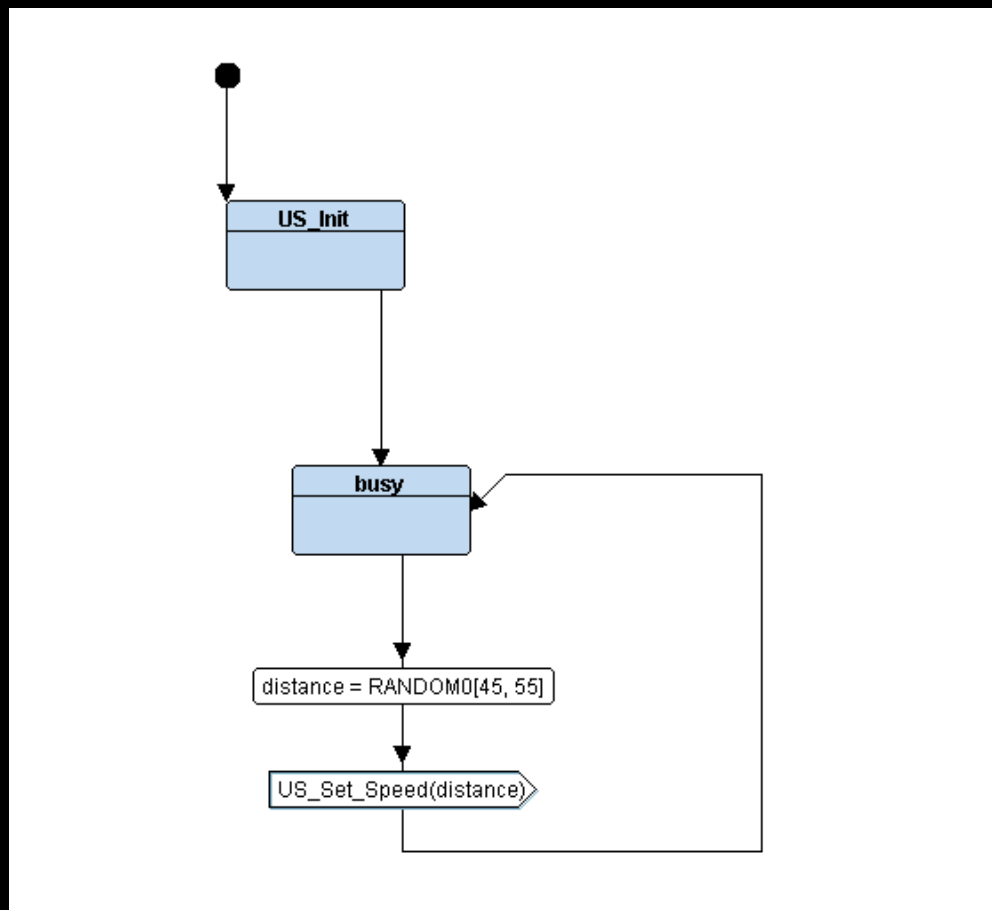
ASSUMPTIONS:

- The system setup and shutdown procedures are not modeled.
- The system maintenance is not modeled.
- The ultrasonic sensor never fails.
- The motors that drive the robot never fail.
- The system never faces power cut.

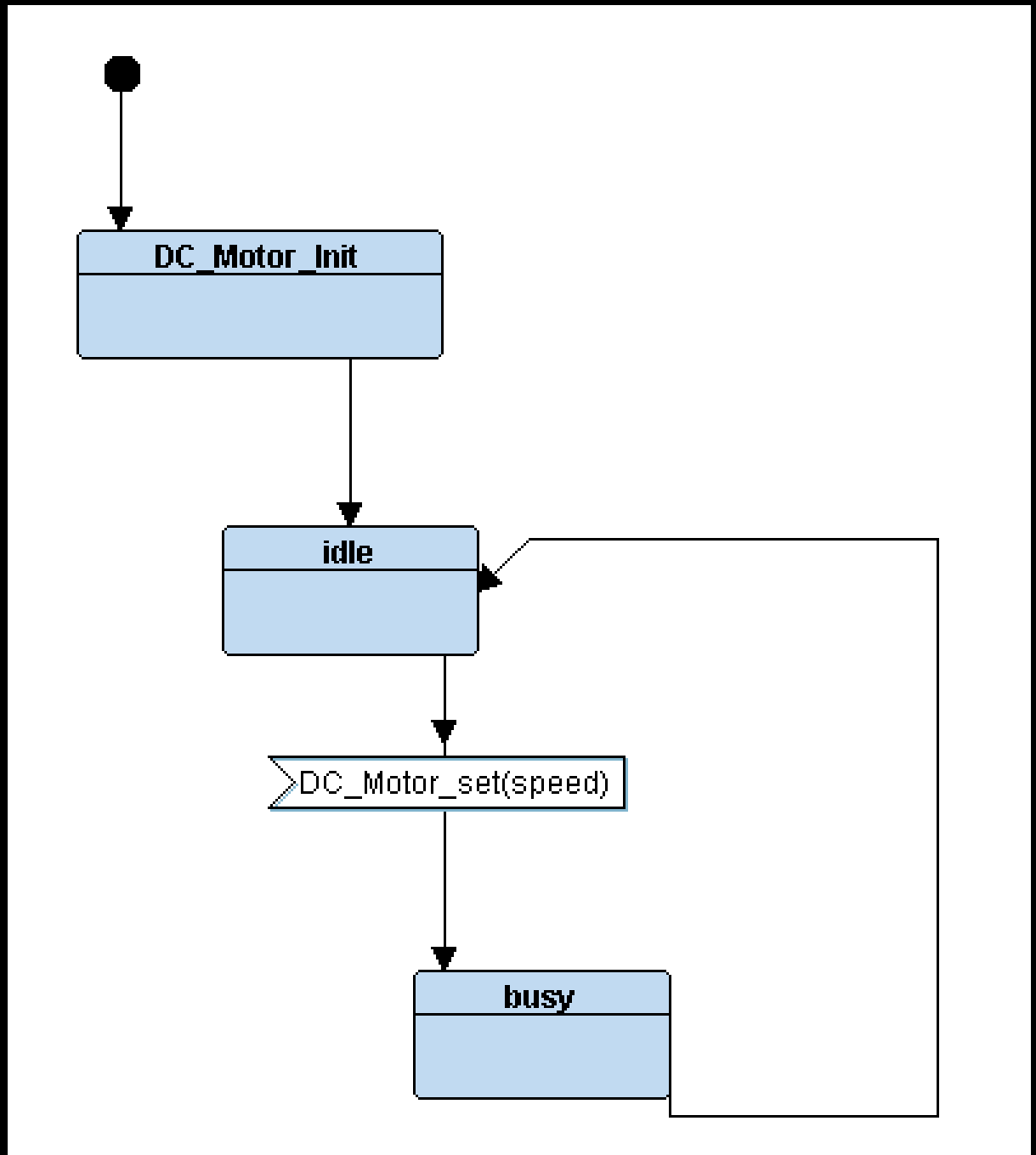
SYSTEM DESIGN:



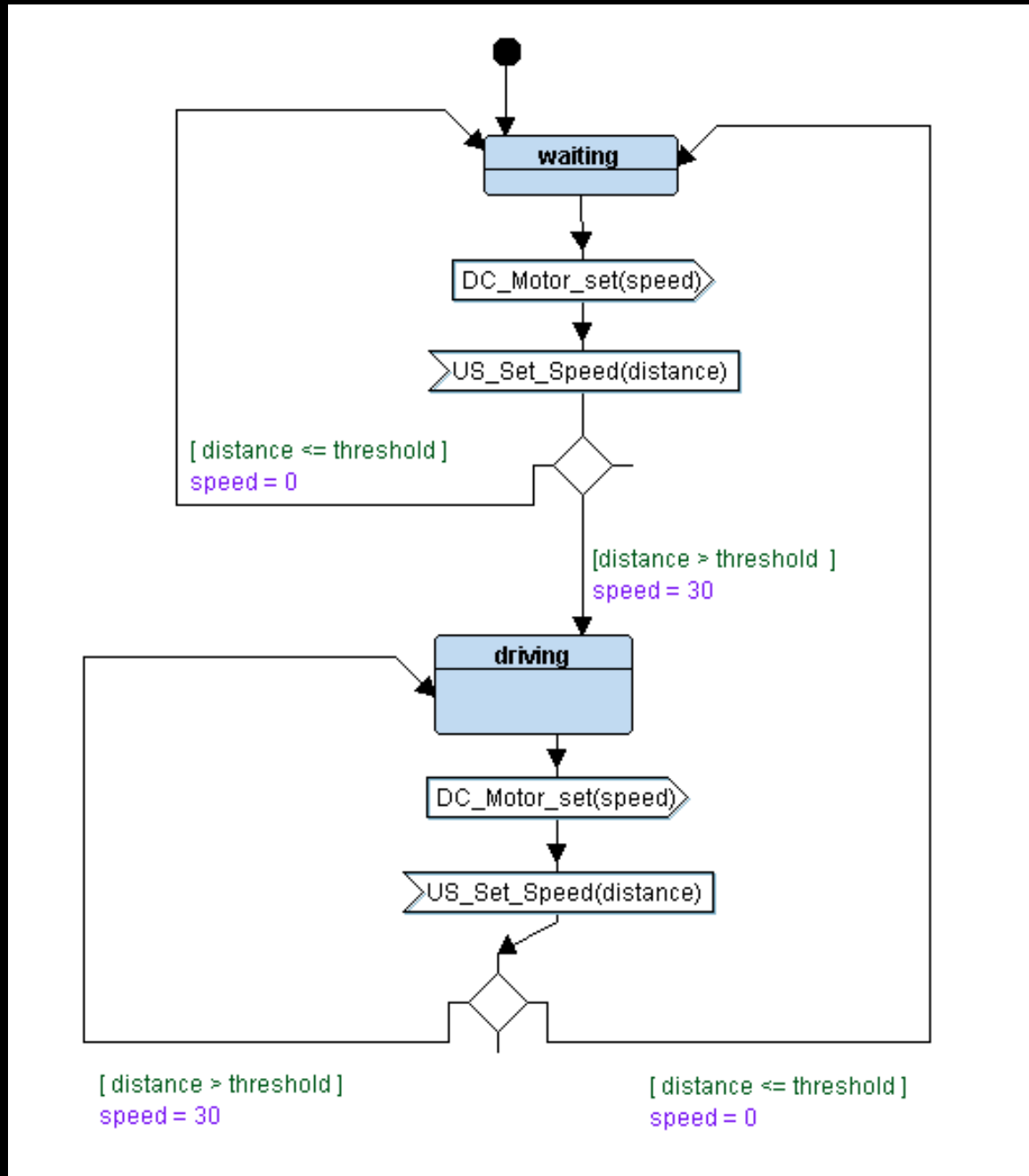
ULTRASONIC SENSOR STATE DIAGRAM:



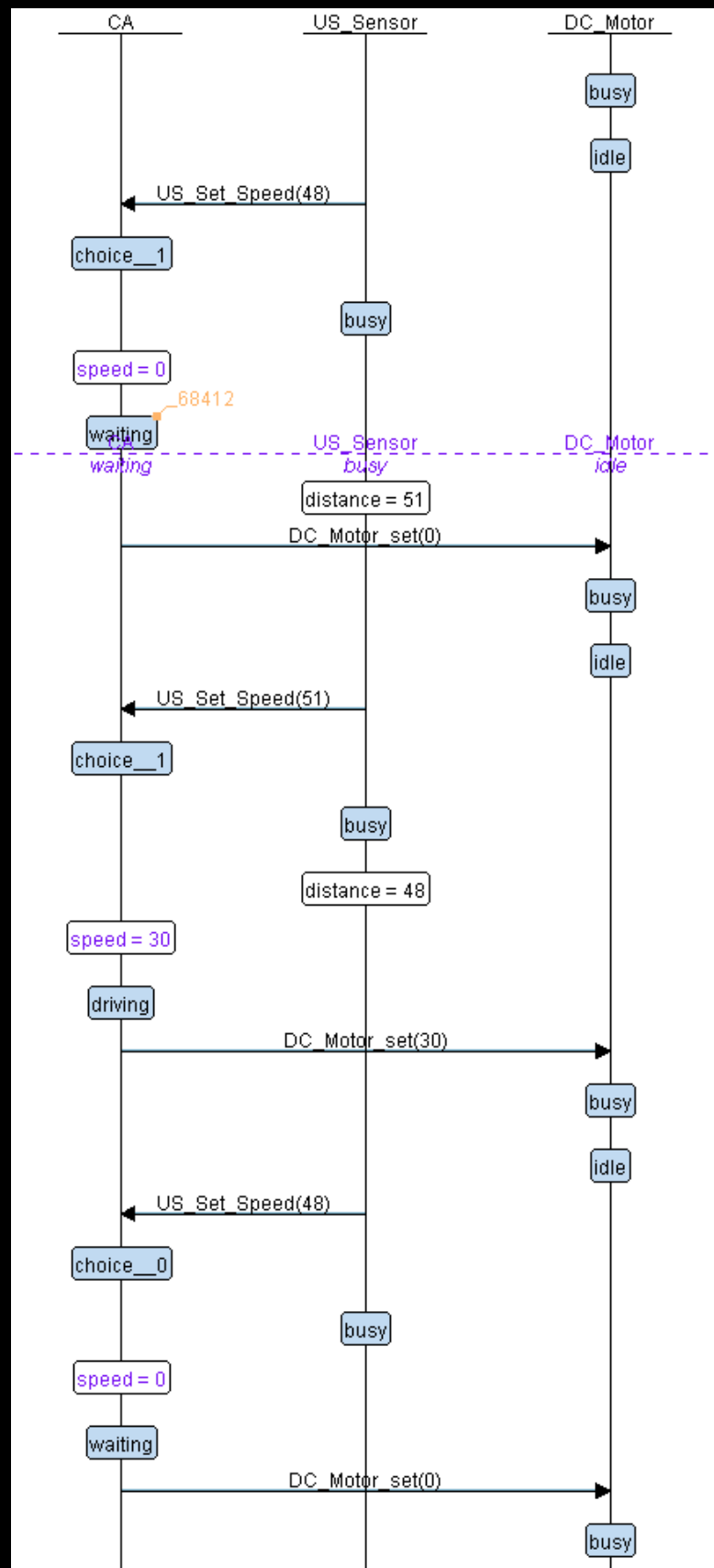
DC MOTOR STATE DIAGRAM:

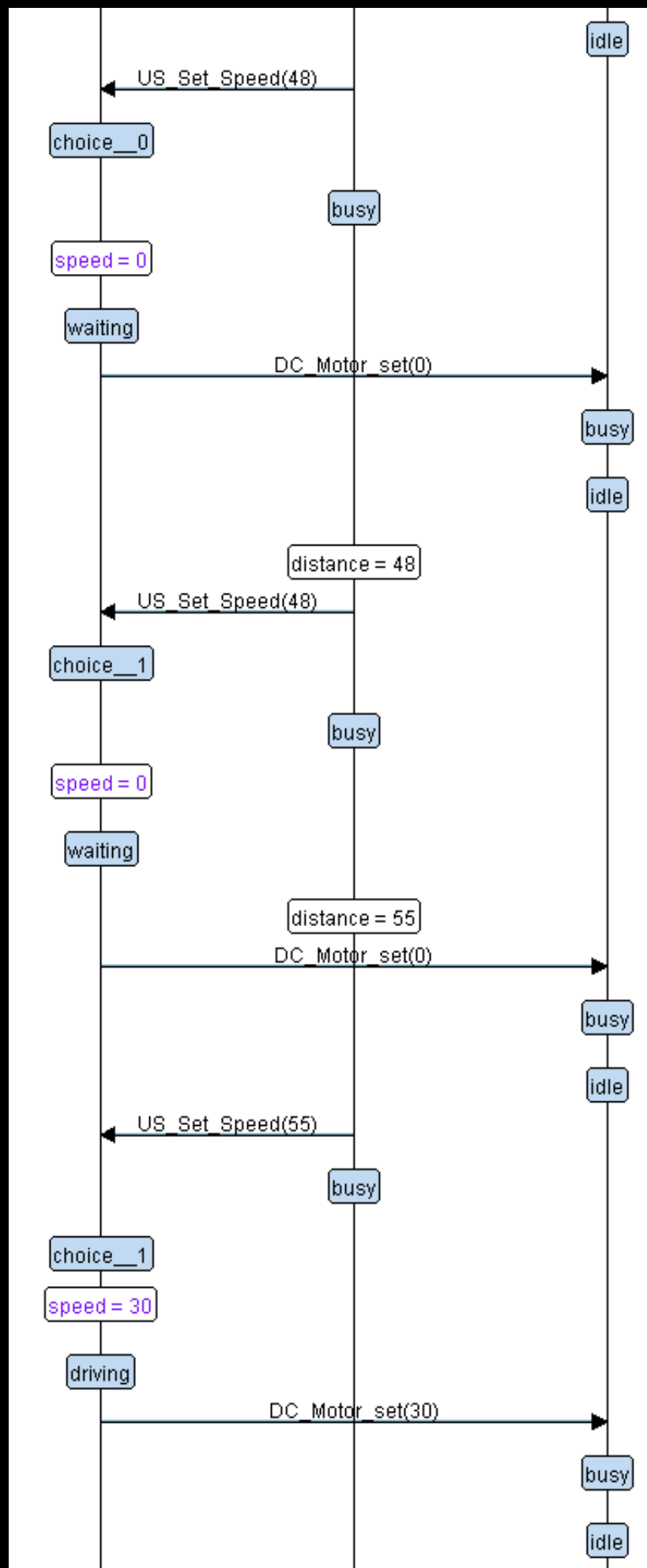


COLLISION AVOIDANCE (CA) STATE DIAGRAM:



SYSTEM DESIGN SIMULATION:





SOFTWARE SIMULATION:

```
Windows PowerShell
PS D:\00_Embedded System learn-in-depth\03_unit 4 Data Structure\Lesson 2\assignment\Collision_Avoidance_2\Debug> .\Collision_Avoidance_2.exe |tee log3.txt
DC_Init
DC_init
US_busy state => distance=53
US ===== distance=53 =====> CA
CA_driving State => (distance = 53) (Speed = 0)
CA ===== speed=30 =====> DC
DC_busy state => speed=30

US_busy state => distance=54
US ===== distance=54 =====> CA
CA_driving State => (distance = 54) (Speed = 30)
CA ===== speed=30 =====> DC
DC_busy state => speed=30

US_busy state => distance=54
US ===== distance=54 =====> CA
CA_driving State => (distance = 54) (Speed = 30)
CA ===== speed=30 =====> DC
DC_busy state => speed=30

US_busy state => distance=46
US ===== distance=46 =====> CA
CA_waiting State => (distance = 46) (Speed = 30)
CA ===== speed=0 =====> DC
DC_busy state => speed=0

US_busy state => distance=52
US ===== distance=52 =====> CA
CA_driving State => (distance = 52) (Speed = 0)
CA ===== speed=30 =====> DC
DC_busy state => speed=30

US_busy state => distance=50
US ===== distance=50 =====> CA
CA_waiting State => (distance = 50) (Speed = 30)
CA ===== speed=0 =====> DC
DC_busy state => speed=0

US_busy state => distance=50
US ===== distance=50 =====> CA
CA_waiting State => (distance = 50) (Speed = 0)
CA ===== speed=0 =====> DC
DC_busy state => speed=0

US_busy state => distance=55
US ===== distance=55 =====> CA
CA_driving State => (distance = 55) (Speed = 0)
CA ===== speed=30 =====> DC
DC_busy state => speed=30

US_busy state => distance=46
US ===== distance=46 =====> CA
CA_waiting State => (distance = 46) (Speed = 30)
CA ===== speed=0 =====> DC
```