Unit 8: Discussion

Making reference to the article by Fortino et al. (2015), consider the strengths and weaknesses of designing a metamodel to support object-oriented design of the IoT.

Design a smart model equivalent to that presented in Figure 6 which would instead support operation of a driverless car.

Fortino et al (2015) discuss a meta model approach to document the Internet of Things (IoT). The approach considers the levels of abstraction needed from system analysis to implementation. Each model is fir for purpose and provides enough information to be relevant for each view.
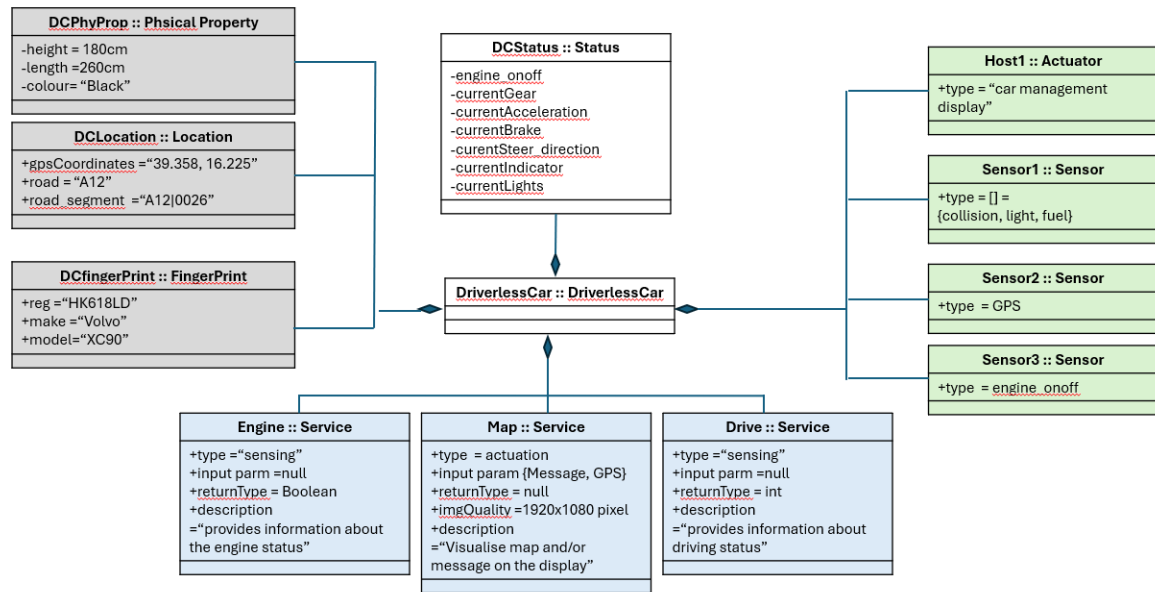
For example, the High-Level Smart Object Metamodel does no concern itself with any actions, or behaviour of the objects concerned. However, there is enough information to understand the core functions and physical properties and basic features.

The levels of abstraction evolve for each, more granular metamodels, such as the ELDA model, the behaviour is modelled which reveal details regarding events and resource management. This aids the design phase of the development cycle.

Finally, the JADE metamodel is used to describe the implementation phase with an emphasis on tasks.

The concepts can be applied to other areas of development, such as the driverless car. The example below shows a high-level metamodel to support the operation of a driverless car:

Driverless Car High-Level Model

DCPhyProp :: Phsical Property
-height = 180cm
-length =260cm
-colour= "Black"

DCLocation :: Location
+gpsCoordinates ="39.358, 16.225"
+road = "A12"
+road_segment ="A12|0026"

DCfingerPrint :: FingerPrint
+reg ="HK618LD"
+make ="Volvo"
+model="XC90"

DCStatus :: Status
-engine_onoff
-currentGear
-currentAcceleration
-currentBrake
-curentSteer_direction
-currentIndicator
-currentLights

DriverlessCar :: DriverlessCar

Host1 :: Actuator
+type = "car management display"

Sensor1 :: Sensor
+type = [] = {collision, light, fuel}

Sensor2 :: Sensor
+type = GPS

Sensor3 :: Sensor
+type = engine_onoff

Engine :: Service
+type ="sensing"
+input parm =null
+returnType = Boolean
+description ="provides information about the engine status"

Map :: Service
+type = actuation
+input param {Message, GPS}
+returnType = null
+imgQuality =1920x1080 pixel
+description ="Visualise map and/or message on the display"

Drive :: Service
+type ="sensing"
+input parm =null
+returnType = int
+description ="provides information about driving status"

References:

Fortino, G., Guerrieri, A., Russo, W. & Savaglio, C. (2015) Towards a development methodology for smart object-oriented IoT systems: A metamodel approach. In 2015 IEEE international conference on systems, man, and cybernetics (1297-1302). IEEE.