

Class Descriptions

The following are the class descriptions, as per the class diagram that has been prepared. Note that this is not the final list, hence there may be some changes as we progress with the development of the application.

AbstractClassState

This is an abstract class, used to define classes that would have some form of state.

- Variables:
 - valueOnOff (bool) : Stores the current state of the item
- Functions:
 - setValue() : sets a value into the variable
 - getValue () : returns the value of the variable in the class

AbstractClassDirection

This is an abstract class, used to define classes that would involve direction (like wheels).

- Variables:
 - valueDirection (int) : Stores the current value of the direction, like speed
- Functions:
 - setValue(int) : Saves the integer value passed in into the valueDirection variable
 - getValue() : Returns the current stored value in valueDirection

Lights:AbstractClassState

A parent class that is defined based on the AbstractClassState. Acts a parent class for all light related classes.

RearFogLights

Child of the Lights class. Represents the rear fog light in a car.

- Functions:
 - Turn_On_Lights() : Sets the valueOnOff to true, indicating it is on.
 - Turn_Off_Lights(): Sets the valueOnOff to false, indicating it is off.

Headlights

Child of the Lights class. Represents the headlights light in a car.

- Functions:

- Turn_On_Lights() : Sets the valueOnOff to true, indicating it is on.
- Turn_Off_Lights(): Sets the valueOnOff to false, indicating it is off.

RearFogLights

Child of the Lights class. Represents the rear fog light in a car.

- Functions:
 - Turn_On_Lights() : Sets the valueOnOff to true, indicating it is on.
 - Turn_Off_Lights(): Sets the valueOnOff to false, indicating it is off.

Highbeams

Child of the Lights class. Represents high beam light in a car.

- Functions:
 - Turn_On_Lights() : Sets the valueOnOff to true, indicating it is on.
 - Turn_Off_Lights(): Sets the valueOnOff to false, indicating it is off.

FrontFogLights

Child of the Lights class. Represents the front fog light in a car.

- Functions:
 - Turn_On_Lights() : Sets the valueOnOff to true, indicating it is on.
 - Turn_Off_Lights(): Sets the valueOnOff to false, indicating it is off.

FrontIndicatorLights

Child of the Lights class. Represents the front indicator in a car.

- Functions:
 - Turn_Hazard_On() : Sets the valueOnOff to true, indicating it is on.
 - Turn_Hazard_Off(): Sets the valueOnOff to false, indicating it is off.

RearIndicatorLights

Child of the Lights class. Represents the rear indicator in a car.

- Functions:
 - Turn_Hazard_On() : Sets the valueOnOff to true, indicating it is on.
 - Turn_Hazard_Off(): Sets the valueOnOff to false, indicating it is off.

Wipers:AbstractClassState

This represents the wipers in a car. Inherits from AbstractClassState.

- Functions
 - Sends_Power(): Sends power to the wipers, sets valueOnOff to true
 - Stop_Power() : Turns off wipers, sets valueOnOff to false

CruiseControl:AbstractClassState

This represents the cruise control system in a car. Inherits from AbstractClassState.

- Functions
 - Sends_Power(): Sends power to the cruise control system, sets valueOnOff to true
 - Stop_Power() : Turns off cruise control system, sets valueOnOff to false

AudioSystem:AbstractClassState

This represents the audio system in a car. Inherits from AbstractClassState.

- Functions
 - Sends_Power(): Sends power to the audio system, sets valueOnOff to true
 - Stop_Power() : Turns off audio system, sets valueOnOff to false

RearDefroster:AbstractClassState

This represents the rear defroster in a car. Inherits from AbstractClassState.

- Functions
 - Sends_Power(): Sends power to the rear defroster, sets valueOnOff to true
 - Stop_Power() : Turns off rear defroster, sets valueOnOff to false

CarAttachment:AbstractClassState

This represents an attachment that can be added to a car. Inherits from AbstractClassState.

- Functions
 - Check_Mounted(): Checks to see if there is an attachment mounted to the car.
 - Attach_To_Car(): Adds an attachment to the car
 - Unmount_Attachment(): Removes an attachment from the car

Trailer

Represents a trailer that can be added to the car as an attachment

- Functions
 - Add_Trailer(): Function to add the trailer and set it up

Towbox

Represents a towbox that can be added to the car as an attachment

- Functions
 - Add_Towbox(): Function to add the tow box and set it up

Program

This class represents the core for the simulation program.

- Functions
 - Engine_High_Temp() : Handles a situation where engine high temperature occurs
 - Engine_Shut_Down(): Shuts down engine
 - Validate_Headlight_Check() : Check to see if headlights have been left on

Battery:AbstractClassState

Represents the car battery in a car

- Functions
 - Electrical_Audio_Func(): Starts the audio system
 - Off_Audio_Func() : Disables the audio system
 - Cruise_Control_Func(): Starts the cruise control
 - Off_Cruise_func(): Disable the cruise control
 - Rear_Defrost_Func(): Starts the rear defrost
 - Stop_Rear_Defrost_Func(): Disables rear defrost
 - Light_Rear_Foglights_func(): Enables rear foglight
 - Off_Rear_Foglights(): Disable rear foglights
 - Lights_foglight_func(): Enable front foglight
 - Off_foglights() : disable front foglights
 - Hazard_Lights_Func(): Enable hazard lights
 - Off_Hazard_Lights_Func(): Disable hazard lights
 - Lights_Headlights_Func() : Enable headlights
 - Off_Headlights_Func(): Disable headlights
 - Light_Highbeams_Func(): Enable highbeams
 - Off_Highbeams(): Disable highbeams
 - On_Wiper_Func(): Enable wipers
 - Off_Wiper_Func(): Disable wipers
 - Get_Power(): Provide power to electrical item
 - Request_Stop_Power() : Terminate power supply

MessageCenter

Acts as a message center for the simulation.

- Functions
 - Display_Message(): Display messages that are pending
 - Remove_Message() : Clear off messages that have been displayed

FuelTank

Represents the fuel tank of a car.

- Variables
 - int rateCombust : Stores the current combustion rate
 - int fuelLevel : Stores the current fuel level in the tank
- Functions
 - InclinedCombFunc(): Adapts for providing fuel in an inclined road
 - setFuelLevel() : Stores new fuel level into fuelLevel variable
 - getFuelLevel() : Returns current fuel level of tank
 - Low_Fuel_Func() : Invokes low fuel warning
 - Fuel_Empty() : Invokes empty tank warning
 - Wrong_Fuel_Func() : Invokes incorrect fuel in tank warning
 - Check_Fuel() : Returns type of fuel in tank
 - RequestFuel() : Supplies fuel out of tank
 - Hybrid_Fuel_Func() : For use in a hybrid car
 - Higher_Altitude_Comb() : Adapts for providing fuel in a high altitude situation

Dashboard

Represents the dashboard in the car.

- Variables:
 - int fuelLevel: Stores the fuel level returned from fuel tank
 - int currentSpeed: Stores the current speed of the car
 - int engineTemp : Stores the current engine temperature returned
- Variables
 - setFuelLevel(): Sets the current fuel level from tank into the fuelLevel variable in the dashboard
 - setCurrentSpeed(): Set the current speed obtained into the currentSpeed variable
 - setEngineTemp(): Sets the engine temperature obtained into the engineTemp variable
 - getFuelLevel(): Query the fuel level from the fuel tank
 - getCurrentSpeed(): Query the current speed
 - getEngineTemp(): Query the current engine temperature
 - Light_Up_Dash(): Lights up the dash when headlights are turned on
 - Display_Wrong_Fuel(): Handles the necessary responses when wrong fuel is filled into the car
 - Show_Overheat(): Handles the necessary responses when the car overheats
 - Display_Check_High_Temp(): Displays the check engine and high temperature warning
 - Display_Defrost_Rear(): Enable the rear defrost symbol on the dashboard
 - Remove_Defrost_Rear(): Disable the rear defrost symbol on the dashboard
 - Display_Rear_Foglights(): Enable the rear fog light symbol on the dashboard
 - Remove_Rear_Foglights(): Disable the rear fog light symbol on the dashboard

- Display_Foglights(): Enable the front fog light symbol on the dashboard
- Remove_Foglights(): Disable the front fog light symbol on the dashboard
- Display_Hazard(): Enable the hazard light symbol on the dashboard
- Remove_Hazard(): Disable the hazard light symbol on the dashboard
- Display_Headlights(): Enable the headlights symbol on the dashboard
- Remove_Headlights(): Disable the headlight symbol on the dashboard
- Display_Highbeams(): Enable the highbeam symbol on the dashboard
- Remove_Highbeams(): Disable the highbeam symbol on the dashboard
- Display_Handbrake(): Enable the handbrake on symbol on the dashboard
- Remove_Handbrake() : Disable the handbrake on symbol on the dashboard

FuelPump: AbstractClassState

Represents the fuel pump in a car. Inherits from the AbstractClassState.

- Variables
 - pressure: Sets the pressure in which the fuel pump gets fuel from the tank
- Functions
 - Send_Fuel(): Gets the fuel from the tank and sends it to the engine

Engine:AbstractClassState

Represents the engine in a car. Inherits from the AbstractClassState.

- Variables
 - int temperature: Stores the engine temperature
- Functions:
 - Pumps_Fuel(): Engages the fuel pump to get fuel
 - Combust_Fuel(): Burns fuel to produce power
 - fwd_func(): Send power to front wheels
 - rwd_func(): Send power to rear wheels
 - 4wd_func(): Send power to all wheels
 - Normal_Temp_func(): Prepares for simulation of a normal operating temperature
 - Set_Initial_Temp(): Sets the value of the temperature variable
 - Needs_Coolant(): Checks to see if the engine needs coolant
 - Request_Coolant(): Request coolant from the coolant system
 - Send_Coolant_Back(): Pushes coolant out of engine back into the cooling system
 - High_Temp_Func(): Prepares for simulation of an overheat
 - Sends_Signal(): Sends out warning to dashboard
 - Stop_Signal(): Disables warnings that have been sent out

Inclinement

Class to handle driving on an incline.

- Variables:

- int inclinementValue: stores the incline of the road
- Functions:
 - setInclinement(): Set the inclinementValue variable
 - getInclinement(): Return the value in the inclinementValue variable
 - Increase_Inclinement(): Increase the value in the inclinementValue variable
 - Decrease_Inclinement(): Decrease the value in the inclinementValue variable

HybridBattery

Class to represent the battery part of the hybrid system in a hybrid car.

- Functions:
 - Send_Power(): Sends out power from the battery to the motor

ElectricBattery

Class to represent the battery as part of the electric drive system in an electric car

- Functions:
 - Electric_Fuel_Funct(): Prepare for electric car simulation
 - Send_Electricity(): Sends electricity to motor

HydrogenTank

Class to represent the hydrogen tank in a hydrogen car

- Function:
 - Send_Fuel(): Send fuel to the fuel stack

FuelStack

Class to represent the fuel stack in a hydrogen car

- Function:
 - Send_Signal_To_Tank(): Sends a signal to the hydrogen tank to get hydrogen out
 - Produces_Electricity(): Produces electricity and sends to the motor

FrontMotor

Represents the motor for the front wheels in an electric/hybrid/hydrogen car

- Function
 - Combine_Power(): Combines power it receives (in the form of electricity) to produce the propulsion to drive the wheels

Radiator

Represents the radiator in the car

- Functions:
 - Coolant_Flow(): Handles the flow of coolant into the radiator and out of the radiator.

TemperatureGauge

Represents the temperature gauge that measures the engine temperature

- Functions:
 - Check_Temp_Periodically(): Periodically check the engine temperature
 - Send_Temperature(): Returns the temperature the gauge obtains

CoolantTank: AbstractClassState

Represents the coolant tank in the cooling system of a car.

- Functions:
 - Send_Coolant(): Sends coolant out to the engine

FrontDriveShaft

Represents the front drive shaft in a car.

- Variables
 - bool poweredByEngine : True if the engine is powering this driveshaft. False if it is not.
- Functions:
 - Send_Power(): Sends power to the wheels
 - getPoweredByEngine(): returns the value of the poweredByEngine variable
 - setPoweredByEngine(): sets the value of the poweredByEngine variable

RearDriveShaft

Represents the rear drive shaft in a car.

- Variables
 - bool poweredByEngine : True if the engine is powering this driveshaft. False if it is not.
- Functions:
 - Send_Power(): Sends power to the wheels
 - getPoweredByEngine(): returns the value of the poweredByEngine variable
 - setPoweredByEngine(): sets the value of the poweredByEngine variable

FrontWheels:AbstractClassDirection

Represents the front wheels in a car. Inherits from AbstractClassDirection

- Functions:
 - Rotate_Wheels(): Rotates the wheels
 - Turn_Wheels_Left(): Angles the wheel to the left
 - Turn_Wheels_Right(): Angles the wheels to the right
 - Stop_Wheels(): Reduce the speed of the wheels to 0
 - Move_Wheels(): Speed up the movement of the wheels
 - Slow_Down(): Reduce the speed of the wheels

RearWheels

Represents the rear wheels in a car

- Functions:
 - Rotate_Wheels(): Rotates the wheels
 - Stop_Wheels(): Reduce the speed of the wheels to 0
 - Move_Back_Wheels(): Speed up the movement of the wheels
 - Slow_Down(): Reduce the speed of the wheels
 - Lock_Wheels(): Lock the rear wheels when parking brake is engaged
 - Unlock_Wheels(): Unlock the rear wheels when the parking brake is disengaged

SteeringWheel:AbstractClassDirection

Represents the steering wheel in the car. Inherits from the AbstractClassDirection

- Functions:
 - Left_Steer_Func(): Turns the steering wheel to the left. Will turn the steering rod to the left as well.
 - Right_Steer_Function(): Turns the steering wheel to the right. Will turn the steering rod to the right.

SteeringRod

Represents the steering rod in the car.

- Functions:
 - Turn_Rod_Left(): Turn the steering rod to the left. Will cause the steering rack to move to the right
 - Turn_Rod_Right(): Turns the steering rod to the right. Will cause the steering rack to move to the left

SteeringRack

Represents the steering rack in the car.

- Functions:
 - Turn_Rack_Left(): Turn the steering rack to the left, allowing the car to turn to the right
 - Turn_Rack_Right(): Turns the steering rack to the right, allowing the car to turn to the left

BrakePump:AbstractClassState

Represents the brake pump, as part of the braking system in a car. Inherits from the AbstractClassState.

- Functions:
 - Send_Brake_Fluid(): Pumps brake fluid to the brake system

Brakes

Represents the brakes in the car

- Functions:
 - Send_Brake_Signal(): Sends out signal that brakes are being engaged
 - Hybrid_Brakes_Func(): Run the regenerative version of the braking system for hybrid cars
 - Electric_Brakes_Func(): Run the regenerative version of the braking system for electric cars (higher regenerative rate)

Handbrakes:AbstractClassState

Represents the handbrake inside the car interior. Inherits from AbstractClassState.

- Functions:
 - Engage_Handbrake(): Engages the parking brake in the car
 - Disengage_Handbrake(): Disengage the parking brake in the car

ParkingBrakes

Represents the parking brakes located in the braking system of the car

- Functions
 - SendSignal(): Sends out a signal that parking brakes are being engaged
 - GivePower(): Sends out power to the brakes in the rear wheels to lock them
 - StopPower(): Stops sending power to the brakes in the rear wheels hence unlocking them

Use Cases

Over the last few weeks of discussion and brainstorming the functionalities of our application, we have come up with a number of use cases that should be present in the application we are developing.

Use case diagrams help as a quick checklist to ensure all functionalities have been implemented. In addition, the use case descriptions also assist in the development process as they act as a step-by-step guide on how each use case should run. This would help in the development process as it acts like pathway that a user needs to take to do something, hence it becomes like pathway on how a function should work.

The following pages show the use case diagram for our application, in addition to the use case descriptions. As this is a draft manual, there are some changes that can be expected to this section, as the development of the application is under way.