INDUSTRY 4.0

Lab-4

Task 4.1

Smart Connected Product (SCP):

1.Amazon Alexa

2.Self Driving and Self-Parking Cars

Amazon Alexa	Self-Driving and Self-Parking Cars
Experience: The use case to Monitor, Control, optimize and Automate the input and output based on customers voice request is identified in this phase.	**Experience:** The use case to Monitor, Control, optimize and Automate the input and output based on data from vehicle output is identified is identified in this phase.
Model: It is a core component where the data Architecture and process involved in voice interaction is identified.	**Model:** I It is a core component where the data Architecture and process involved in Automatic driving is identified.
Connect: The Device such as speaker microphone and chip are connected to the model	**Connect:** The Device such as ECU, sensors are connected to the model
Analyze: this is the phase where the programs rules everything comes into place.	**Analyze:** this is the phase where the programs rules everything comes into place.
Build: Amazon Alexa App is the use to control and interact with the end users.	**Build:** apps from Tesla to control the speed, vehicle temperature is built to interact with the end users is built

Task 4.2

Smart Connected Product Capabilities

fulfilling the four smart connected product capabilities

Monitoring

- Monitor the time taken to take an order and to delivery of order using point of sale app.
- Monitor the time-taken to bake.
- Monitor the temperature in Owen for baking.
- Monitoring the assembling time, temperature and state of the food products.

Controlling

- Analyze and control the delivery time to reduce the waiting time.
- Control and adjust the baking temperature automatically to acquire good quality of product.
- Control the product used to reduce the excess use.

Optimize

- Based on monitoring and control capabilities enable the algorithms to optimize product use and raw materials use.
- Enhance the performance of working products in the Bakery.

Automate:

- Combining of Monitoring, Controlling and Optimizing Automate the process involved in manufacturing or preparing of required food material.
- Self-Coordination with other systems can be implemented to manufacture the product can be done In Automation of the system.

Task 4.3

Basic Deployment Architecture:

The way we have modeled our physical device in digital thing is called Basic Deployment Architecture.

Products:

1)Owen and cake maker

Digital Representation

General Information:
• Name: Owen and Cake Maker
• Description: This Prepares the cakes and baked products as per the design and parameters.
• Documentation.
• Base Template.
• Tags
• Identifier
	Services:
	Programs which performs the specified operation as mentioned in method of a program.
	Eg:
	If(owen_temp >40)
	{
	Function.SendMessage(“Owen Working”)
	}
	Else{ Function.SendMessage(“Owen Not Working)
	}

Properties: • Datatype name is String • Datatype of heating capacity is Float. • Datatype of timing is Time. • Datatype of Designer timing is Time.	Events: Things Create events for Example refilling of cream in the machine, switching the machine on etc.
Value Stream: Value Stream Comprise of Data's of identifier variable which can be used to analyze and also to interact in the form of graph.	Subscription: It ties the Services and events. When the Owen is in off state then the temperature is less than 40 degrees the Machine switching on program is called to do the specified task.

Task 4.4

Four types of Analytics in Autonomously driving car:

Descriptive Analysis: When the infrared sensor measures the distance of obstacles in-front of vehicle while driving and sends the measured distance as data. if there is sudden change in the obstacle distance then based on the descriptive analysis the ECU of car is notified with "Obstacle Found message"

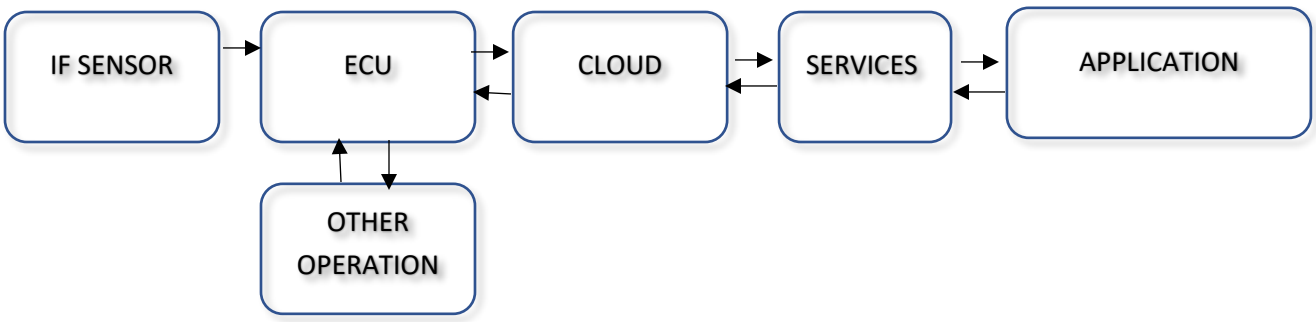
Diagnostic Analysis: In this situation the Diagnostics analysis is done on the historical data and Suggest to the ECU to invoke a program to reduce the speed from 60kmph to 0kmph.

Predictive Analysis: After that with predictive analysis the brake applying time to reduce the is speed is notified (i.e. If the brake is not applied when the distance between the vehicle and obstacle is 30m then the vehicle will collide with the obstacle)

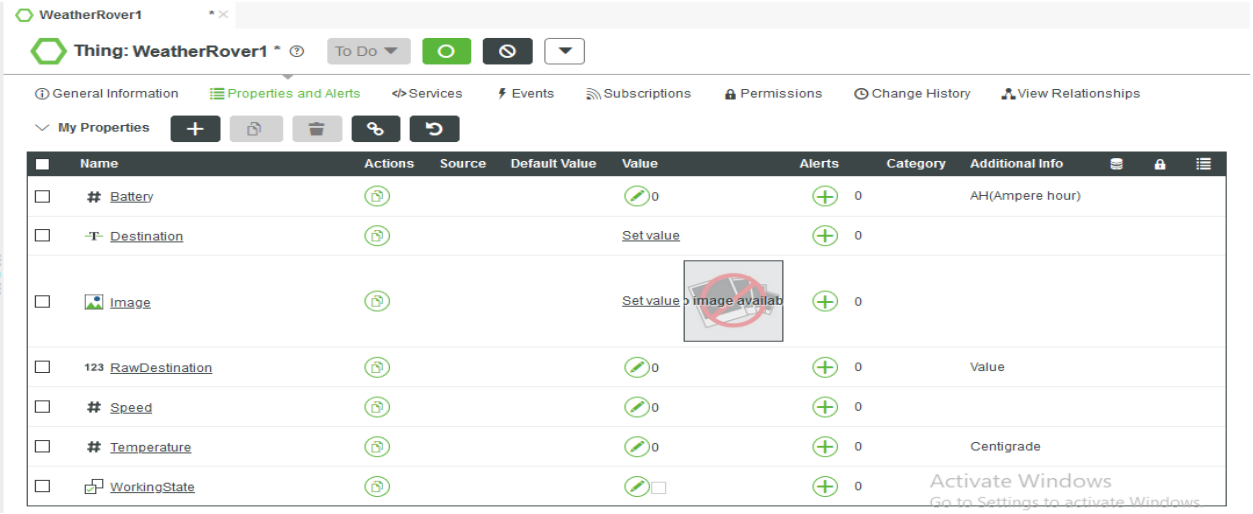
Prescriptive Analysis: Then with the prescriptive analysis the solution is prescribed to apply the brake before 30m distance from obstacle. Then program to apply the brake Is invoked to stop the vehicle.

Task 4.5

Data Value Ladder

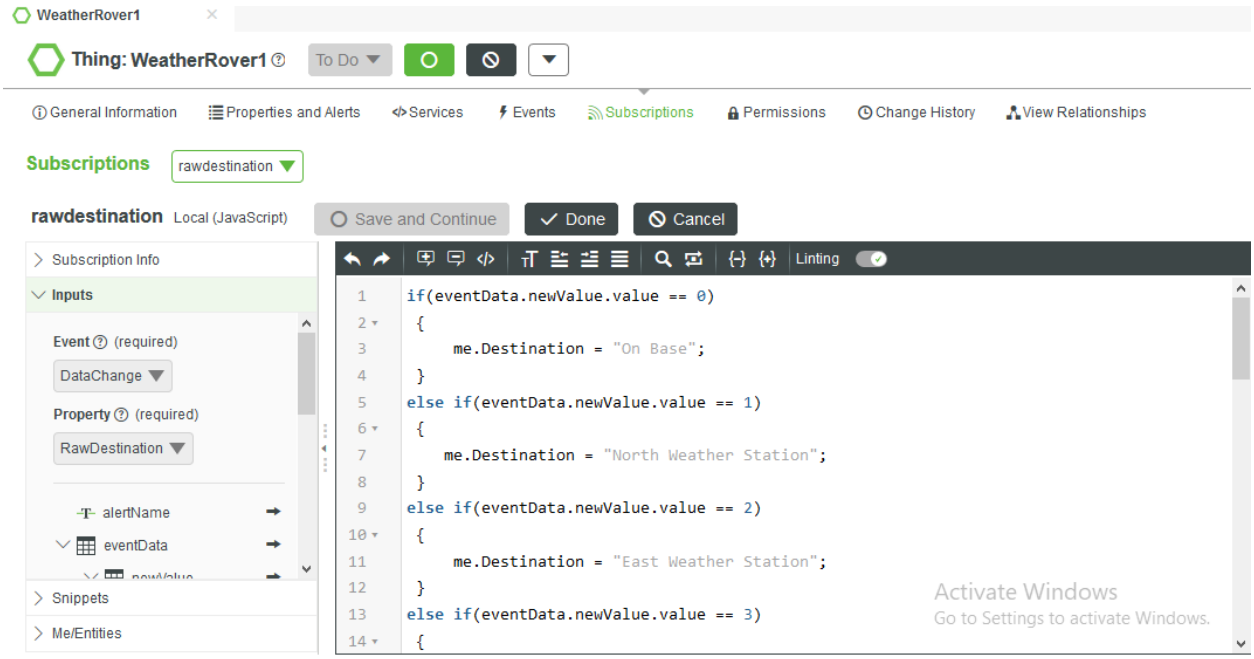


Task 4.6 Creating **Things**



Properties	Datatypes	Reasons
Battery	Number	The unit of the battery capacity is AH and it is represented in number
Destination	String	The name of place is alphabets and its is String data Type
Image	Image	The Rover Captured Image is sent to the base station in a Binary image code format
Raw-Destination	Integer	The GPS Co-ordinates of the rover position will be in Integer based on this actual co-ordinate is found.
Speed	Number	The Unit of speed which the rover move is Kmph and it is represented in number datatype
Temperature	Number	The temperature unit is Centigrade or Fahrenheit and the values are represented in number datatype.
Working State	Boolean	Boolean is True or False if the Value is True then the Rover is in ON state if it is False the Rover is in OFF state.

4.7 Subscriptions



Actual Code	Code Explanation

```
if(eventData.newValue.value == 0)
 {
    me.Destination = "On Base";
 }
else if(eventData.newValue.value == 1)
 {
          me.Destination = "North Weather Station";
 }
else if(eventData.newValue.value == 2)
 {
    me.Destination = "East Weather Station";
 }
else if(eventData.newValue.value == 3)
 {
    me.Destination =  "South Weather Station";
 }
else if(eventData.newValue.value == 4)
 {
    me.Destination =  "West Weather Station";
 }
else if(eventData.newValue.value == 5)
 {
```

When the rover is in any weather station it will connect with the transmitter in that station and sends the Co-ordinate value to the space station to determine its current location.

Note:

i) eventData.newValue.value = Raw destination value.

ii) me.Destination = Destination.

Condition:

For the event when the Raw Destination Coordinates is found to same as below mentioned table co-ordinates then the Destination Event is determined.

Raw destination value	Destination
0	On Base
1	North Weather Station
2	East Weather Station

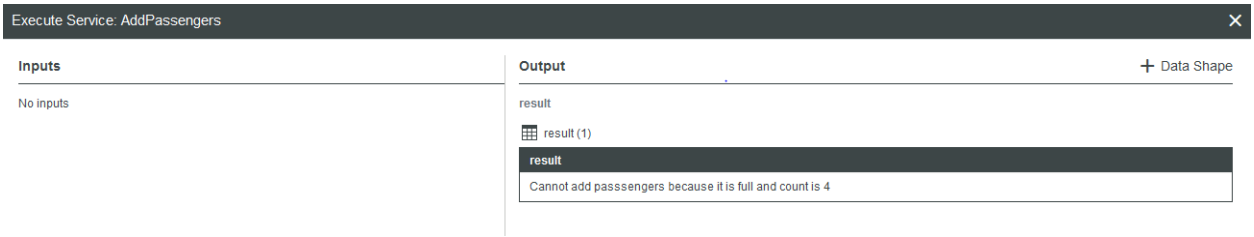
```
    me.Destination =   "Dust Storm";
 }
else if(eventData.newValue.value == 6)
 {
    me.Destination =   "North East Weather
Station";
 }
else if(eventData.newValue.value == 7)
 {
    me.Destination =   "North West Weather
Station";
 }
else if(eventData.newValue.value == 8)
 {
    me.Destination =   "South West Weather
Station";
 }
else if(eventData.newValue.value == 9)
 {
    me.Destination =   "South East Weather
Station";
 }
else if(eventData.newValue.value == 10)
 {
    me.Destination =   "In Space not reached
Mars";
 }
else
{
    me.Destination = "unknown";
}
```

3	South Weather Station
4	West Weather Station
5	Dust Storm
6	North East Weather Station
7	North West Weather Station
8	South West Weather Station
9	South East Weather Station
10	In Space not reached Mars
No Condition	No Location

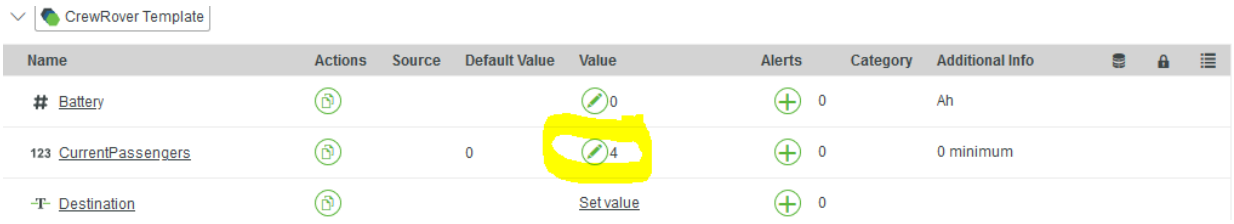
Task 4.8 Testing Service

1)When Add passenger service is invoked 5 times

i)Input Output



ii)General information



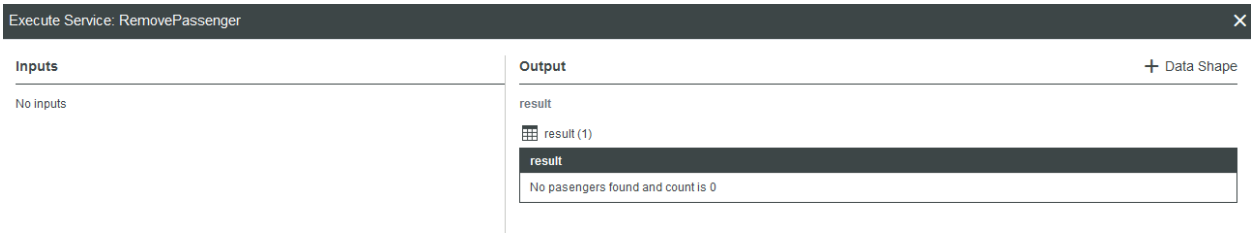
Explanation:

While executing or invoking the **Add passenger** event for four times the message I displayed as "**passenger is added and passenger count is 4"** and also the value of the **CurrentPassengers** changes to **four** and but when the same function is invoked for the fifth time The message "**Cannot add passenger because it is full and the count is 4"**

Remove Passenger:

When remove passenger service is invoked 5 times

i)Input Output



ii)General information

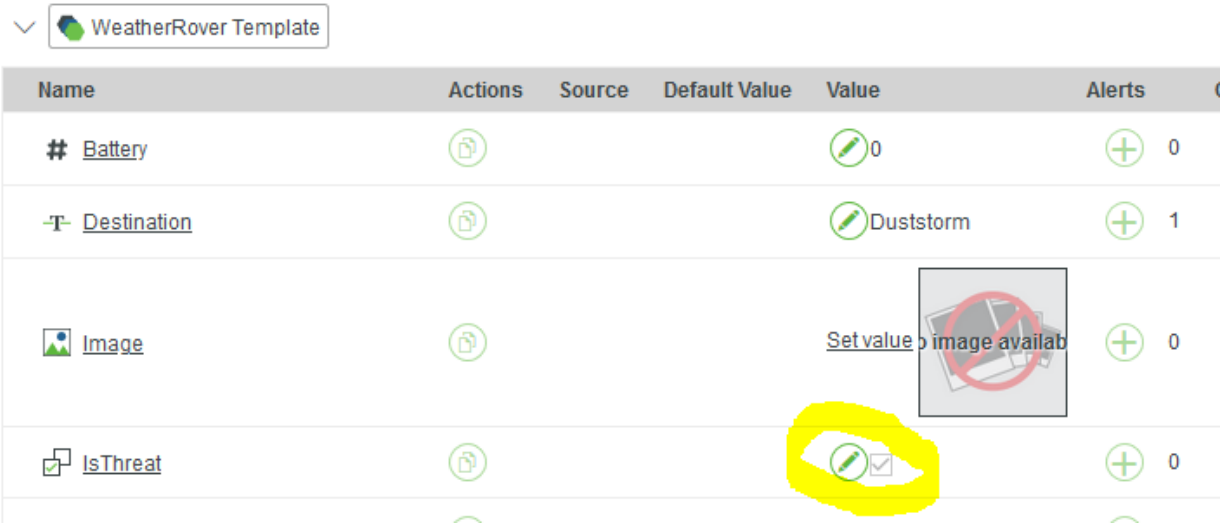
Explanation:

While executing or invoking the **Remove passenger** event for four times the message is displayed as "**passenger is removed and passenger count is 0"** and also the value of the **CurrentPassengers** changes to **Zero** and but when the same function is executed for the fifth time The message "**No passengers found and count is 0"**

Task 4.9 Creating Alerts

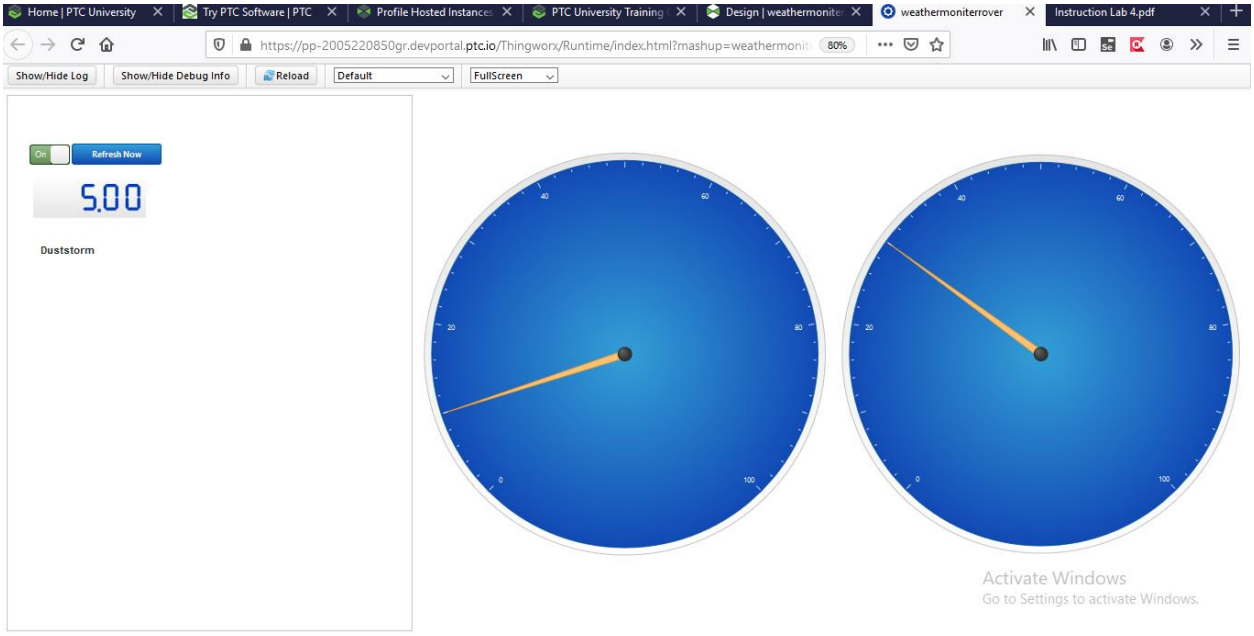
Before Setting up value in destination

After Setting up value in Destination



As per the scenarios the alert is to indicate the threat to rover by **"IsThreat"**property.This indicator Goes on when the value of the Destination Changes to "**Duststorm"** and the situation indicates that rover is in duststorm which is a threat to rover.

Task 4.10 Creating a MashUp



Explanation:

Widgets:

Led display: Led display give the Raw destination coordinate number based on the raw destination the destination name is determined.

Label box: Label widget displays name of the Destination.

Speed: Speed gauge widget displays the speed of the moving rover in Kmph.

Battery: Battery gauge widget display the battery capacity of the rover battery in Ah(Ampere hours)