GENESIS – MBD Learning Report

LTTS
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Details

Ver. Rel. No.	Release Date	Prepared. By	Reviewed By	To be Approved	Remarks/Revision Details
1.0	14-12-2020	Siddi.Ahalya			

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Activity 1

MATLAB Onramp

MathWorks | Training Services

Progress Report

Name: Siddi Ahalya
Course: MATLAB Onramp
Progress: 100% complete (as of 14 December 2020)

Chapters

1. Course Overview 100%
2. Commands 100%
3. MATLAB Desktop and Editor 100%
4. Vectors and Matrices 100%
5. Indexing into and Modifying Arrays 100%
6. Array Calculations 100%
7. Calling Functions 100%
8. Obtaining Help 100%
9. Plotting Data 100%
10. Review Problems 100%
11. Importing Data 100%
12. Logical Arrays 100%
13. Programming 100%
14. Final Project 100%
15. Conclusion 100%

Release: R2020b | Language: English

MathWorks | Training Services

Course Completion Certificate

Siddi Ahalya

has successfully completed 100% of the self-paced training course

MATLAB Onramp

DIRECTOR, TRAINING SERVICES

14 December 2020

Simulink Onramp

MathWorks | Training Services

Progress Report

Name: Siddi Ahalya
Course: Simulink Onramp
Progress: 100% complete (as of 15 December 2020)

Chapters

1. Course Overview 100%
2. Simulink Graphical Environment 100%
3. Inspecting Signals 100%
4. Basic Algorithms 100%
5. Obtaining Help 100%
6. Project - Automotive Performance Modes 100%
7. Simulink and MATLAB 100%
8. Dynamic systems in Simulink 100%
9. Discrete systems 100%
10. Continuous systems 100%
11. Simulation Time 100%
12. Project - Modeling a Thermostat 100%
13. Project - Peregrine Falcon Dive 100%
14. Conclusion 100%

Release: simulinkR2020b | Language: English

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Simulink Onramp

DIRECTOR, TRAINING SERVICES

15 December 2020

Stateflow Onramp

MathWorks | Training Services

Progress Report

Name: Siddi Ahalya
Course: Stateflow Onramp
Progress: 100% complete (as of 17 December 2020)

Chapters

1. Course Overview 100%
2. State Machines and Stateflow 100%
3. Creating State Charts 100%
4. Stateflow Symbols and Data 100%
5. Chart Actions 100%
6. Chart Execution 100%
7. Project - Robotic Vacuum 100%
8. Flow Charts 100%
9. Functions in Stateflow 100%
10. Chart Hierarchy 100%
11. Project - Robotic Vacuum Driving Modes 100%
12. Conclusion 100%

Release: simulinkR2020b | Language: English

MathWorks | Training Services

Course Completion Certificate

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has successfully completed 100% of the self-paced training course

Stateflow Onramp

DIRECTOR, TRAINING SERVICES

17 December 2020

Activity 2

Vehicle Subsystem and features

Steering:

- The steering subsystem is responsible for providing the operator with maximum directional control over the vehicle via the steering wheel. The steering wheel rotational input is transferred down the steering column to the steering rack.
- The purpose of the steering rack is to translate the rotational motion of the steering column into lateral, linear motion by means of a rack and pinion gear set. Attached on each side of the rack are tie rods, which transfer the lateral motion of the rack to the steering arms - one mounted at each front wheel.
- When the tie rods push / pull on the steering arms, there is a change in the direction of the wheel. The combined ratio of the gear set and steering arms provide the final steering ratio of the vehicle. In the end, if the driver turns the steering wheel clockwise, the car will turn right and when turned counterclockwise, the car will turn left.

Activity 3

MPXY8000 Series Tire Pressure Monitoring Sensor: AN1954/D

- The MPXY8000 Series sensor is a fully integrated sensor targeted specifically for tire pressure monitoring systems (TPMS)
- Capacitive absolute pressure sensor with a range from 0 kpa to 637.5 kpa
- Temperature sensor capable of measuring temperature in the range of -40°C to 125°C
- Optimized for low-voltage and low-power draw suitable for powering with a single 3-volt lithium battery
- Media compatible with fluids and media and media that are commonly found within the tire environment
- Operates in four modes namely Standby/Reset (Idle), Measure Pressure, Measure Temperature and Output Read mode

Infineon:

The classical BCM combines all 5 core functionalities of an electronic control unit:
The number of body functions has increased, but also their variants of these functions required for different vehicle trim levels. For example; one module may support seat movement to bidirectional lift, slide, recline and adjust lumbar and headrests, as well as heating and cooling but this module, may only include some of these for a low-end vehicle. This creates a need for flexibility and scalability of product families to create a BCM platform that can accommodate easy variants and changes throughout the design two years after SOP.
Infineon's Power Switch families PROFET tm, SPOC tm, and SPIDER have the most scalable portfolio of protected switches in the market to enable this flexibility in hardware and software.

youtube link:

https://youtu.be/s_d7FUq_4t8

Renesas:

Electronic control units (ECUs) can now be found everywhere in automobiles, from power windows and airbags to lamps, mirrors, doors, and seats. Due to this trend, the burden on software development for ECUs has also increased. Renesas offers a wide variety of products for automotive body, including MCUs, SoCs, sensors and power management devices.

Youtube link:

https://youtu.be/sAL65FqeyMw

ECU (Electronic Control Unit)

Definition: An **electronic control unit** (**ECU**), also known as an **electronic control module** (**ECM**), is an embedded system in automotive electronics that controls one or more of the electrical systems or subsystems in a vehicle.

Applications:

- Precision, integrative control functions keep diesel engine emissions clean.
- Reduces collision damage to large vehicles.
- Automatic shifting like that of automatic transmission.
- Enhances fuel efficiency and environmental performance.
- Enhances vibration absorption performance and loading/unloading efficiency.

Reference:

https://www.pistonheads.com/features/ph-features/what-is-an-electronic-control-unit-ph-explains/37771

https://en.wikipedia.org/wiki/Electronic_control_unit

Comparative analysis of Actuators:

Parameters	L298	L293x
Voltage range	+5 to +46V	4.5 V to 36 V
Storage and Junction Temperature	–40 to 150	65 150
protection	Internal ESD protection	Over temperature
Maximum Peak motor current:	1.2A	3A
Application	• Automatic door control systems. • CNC machines	• Stepper Motor Drivers • DC Motor Drivers

ACTIVITY 4

How BMC is applicable to transport?

The rapidly increasing demand for driving comfort and safety inevitably leads to the need for cutting-edge vehicle electrical system architecture. A comprehensive body control module system is aimed at communicating and integrating the work of all electronic modules through the vehicle bus. Strictly speaking, a BCM is an embedded system that controls load drivers and coordinates activation of auto electronics units.

The microcontrollers and connectors integrated into a BCM constitute the central structural unit of the system responsible for the controlling part. Operating data is transmitted to the control module through input devices. These may include sensors, vehicle performance indicators, and variable reactors.

After data is processed by the module, a response signal is generated through integrated output devices, including relays and solenoids. Through the system of output devices, the BCM coordinates the work of various electronics systems. This diagram of a body control module design shows a customized circuit that works as a gateway connecting and integrating smaller circuits.

Reference:

https://www.infineon.com/cms/en/applications/automotive/body-electronics-and-lighting/body-control-modules/?redirId=64463#:~:text=Sensing%20with%20pressure%20sensors%20of,AURIX%E2%84%A2%20Families%20of%20microcontroller

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