**Module Design Document**

**For**

**LrnPinionCentr**

**12-Jan-2018**

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**Change History**

|  |  |  |  |
| --- | --- | --- | --- |
| **Description** | **Author** | **Version** | **Date** |
| Initial Version | ML | 1.0 | 18-Sep-2017 |
| Updated DaVinci graphic for Cal name change | BRB | 2.0 | 12-Jan-2018 |

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# Introduction

## Purpose

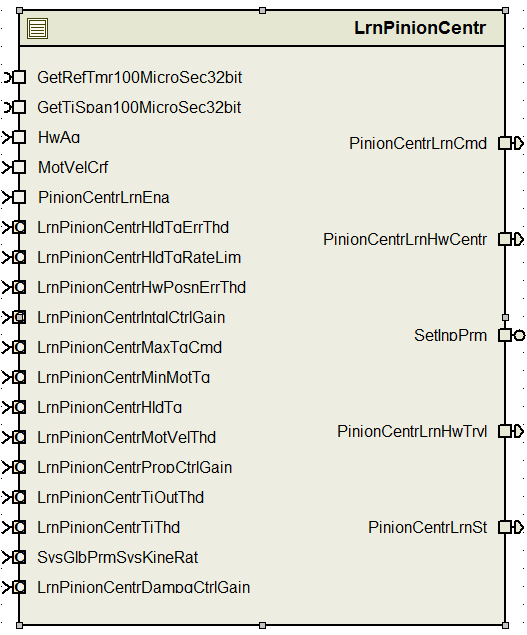
## Scope

# LrnPinionCentr & High-Level Description

*Refer FDD.*

# Design details of software module

## Graphical representation of LrnPinionCentr



## Data Flow Diagram

Refer FDD

### Component level DFD

Refer FDD

### Function level DFD

Refer FDD

# Constant Data Dictionary

## Program (fixed) Constants

### Embedded Constants

#### Local Constants

|  |  |  |  |
| --- | --- | --- | --- |
| Constant Name | Resolution | Units | Value |
| Refer DataDict.m file from FDD for other constants | - | - | - |

# Software Component Implementation

## Sub-Module Functions

## Init: LrnPinionCentrInit1

Refer FDD Simulink model

## Design Rationale

Refer to Anomaly EA4#17174. Implementation deviates to fix this issue for build.

## Per: LrnPinionCentrPer1

Refer FDD Simulink Model

## Design Rationale

None

## Server Runnable

### SetInpPrm

Refer FDD Simulink Model

## Interrupt Functions

None

## Module Internal (Local) Functions

## Local Function #1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | RunMinMax | Type | Min | Max |
| **Arguments Passed** | HwAg\_HwDeg\_T\_f32 | float32 | -1440.0 | 1440.0 |
|  | PinionCentrLrnEna\_Cnt\_T\_logl | boolean | FALSE | TRUE |
|  | \*MaxHwPosn\_HwDeg\_T\_f32 | float32 | -1440.0 | 1440.0 |
|  | \*MinHwPosn\_HwDeg\_T\_f32 | float32 | -1440.0 | 1440.0 |
| **Return Value** | None |  |  |  |

## Description

Implementation of ‘Running MinMax’ function.

## Local Function #2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | PosAgVelStCtrl1 | Type | Min | Max |
| **Arguments Passed** | HwAg\_HwDeg\_T\_f32 | float32 | -1440.0 | 1440.0 |
|  | MotVelCrf\_MotRadPerSec\_T\_f32 | float32 | -1350.0 | 1350.0 |
|  | TarMotVel\_MotRadPerSec\_T\_f32 | float32 | 0.0 | 1600.0 |
|  | \*PinionCentrLrnSt\_Cnt\_T\_u08 | uint8 | 0 | 7 |
|  | \*TqCmd\_MotNwtMtr\_T\_f32 | float32 | -8.8 | 8.8 |
|  | \*MotPosnCmd\_MotRad\_T\_f32 | float32 | -1440.0 | 1440.0 |
| **Return Value** | None |  |  |  |

## Description

Implementation of ‘POSANGVEL State Control 1’ function.

## Local Function #3

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | PosMotTqStCtrl2 | Type | Min | Max |
| **Arguments Passed** | \*PinionCentrLrnSt\_Cnt\_T\_u08 | uint8 | 0 | 7 |
|  | \*TqCmd\_MotNwtMtr\_T\_f32 | float32 | -8.8 | 8.8 |
|  | \*MotPosnCmd\_MotRad\_T\_f32 | float32 | -1440.0 | 1440.0 |
| **Return Value** | None |  |  |  |

## Description

Implementation of ‘POSMTRTRQ State Control 2’ function.

## Local Function #4

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | NegAgVelStCtrl3 | Type | Min | Max |
| **Arguments Passed** | HwAg\_HwDeg\_T\_f32 | float32 | -1440.0 | 1440.0 |
|  | MotVelCrf\_MotRadPerSec\_T\_f32 | float32 | -1350.0 | 1350.0 |
|  | TarMotVel\_MotRadPerSec\_T\_f32 | float32 | 0.0 | 1600.0 |
|  | \*PinionCentrLrnSt\_Cnt\_T\_u08 | uint8 | 0 | 7 |
|  | \*TqCmd\_MotNwtMtr\_T\_f32 | float32 | -8.8 | 8.8 |
|  | \*MotPosnCmd\_MotRad\_T\_f32 | float32 | -1440.0 | 1440.0 |
| **Return Value** | None |  |  |  |

## Description

Implementation of ‘NEGANGVEL State Control 3’ function.

## Local Function #5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | NegMotTqStCtrl4 | Type | Min | Max |
| **Arguments Passed** | MaxHwPosn\_HwDeg\_T\_f32 | float32 | -1440.0 | 1440.0 |
|  | MinHwPosn\_HwDeg\_T\_f32 | float32 | -1440.0 | 1440.0 |
|  | \*PinionCentrLrnSt\_Cnt\_T\_u08 | uint8 | 0 | 7 |
|  | \*TqCmd\_MotNwtMtr\_T\_f32 | float32 | -8.8 | 8.8 |
|  | \*MotPosnCmd\_MotRad\_T\_f32 | float32 | -1440.0 | 1440.0 |
| **Return Value** | None |  |  |  |

## Description

Implementation of ‘NEGMTRTRQ State Control 4’ function.

## Local Function #6

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | MoveToStCtrl5 | Type | Min | Max |
| **Arguments Passed** | HwAg\_HwDeg\_T\_f32 | float32 | -1440.0 | 1440.0 |
|  | TarHwAg\_HwDeg\_T\_f32 | float32 | -1440.0 | 1440.0 |
|  | MotVelCrf\_MotRadPerSec\_T\_f32 | float32 | -1350.0 | 1350.0 |
|  | TarMotVel\_MotRadPerSec\_T\_f32 | float32 | 0.0 | 1600.0 |
|  | \*PinionCentrLrnSt\_Cnt\_T\_u08 | uint8 | 0 | 7 |
|  | \*TqCmd\_MotNwtMtr\_T\_f32 | float32 | -8.8 | 8.8 |
|  | \*MotPosnCmd\_MotRad\_T\_f32 | float32 | -1440.0 | 1440.0 |
| **Return Value** | None |  |  |  |

## Description

Implementation of ‘MOVETO State Control 5’ function.

## GLOBAL Function/Macro Definitions

None

# Known Limitations with Design

None

# UNIT TEST CONSIDERATION

None

Abbreviations and Acronyms

| **Abbreviation or Acronym** | **Description** |
| --- | --- |
|  |  |
|  |  |

Glossary

**Note**: Terms and definitions from the source “Nexteer Automotive” take precedence over all other definitions of the same term. Terms and definitions from the source “Nexteer Automotive” are formulated from multiple sources, including the following:

* ISO 9000
* ISO/IEC 12207
* ISO/IEC 15504
* Automotive SPICE® Process Reference Model (PRM)
* Automotive SPICE® Process Assessment Model (PAM)
* ISO/IEC 15288
* ISO 26262
* IEEE Standards
* SWEBOK
* PMBOK
* Existing Nexteer Automotive documentation

| **Term** | **Definition** | **Source** |
| --- | --- | --- |
| MDD | Module Design Document |  |
| DFD | Data Flow Diagram |  |

References

| **Ref. #** | **Title** | **Version** |
| --- | --- | --- |
| 1 | AUTOSAR Specification of Memory Mapping (Link:AUTOSAR\_SWS\_MemoryMapping.pdf) | v1.4.0 R4.0 Rev 3 |
| 2 | MDD Guideline | EA4 01.00.01 |
| 3 | [Software Naming Conventions.doc](http://misagweb01.nexteer.com/eRoomReq/Files/erooms8/NextGeneration/0_fc55f/Software%20Naming%20Conventions%2003x(In%20Work).doc) | 1.0 |
| 4 | Software Design and Coding Standards.doc | 2.01 |
| 5 | FDD – SF024A\_LrnPinionCentr\_Design | See Synergy Subproject verison |