Advanced Embedded Systems

Automotive door control system design

Static Design Analysis

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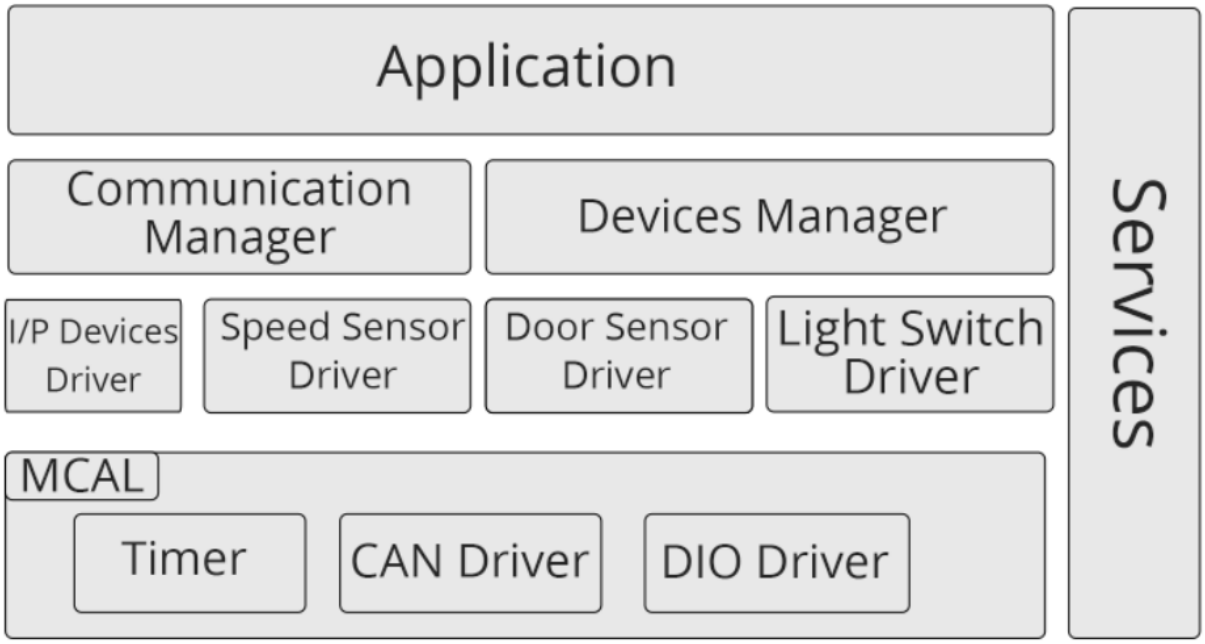
1 ECU (1)

1.1 Layered Architecture



1.2 ECU Components and modules

- Application
- Devices manager
- Communication manager
- Light switch driver
- Door sensor driver

- Speed sensor driver
- Input devices driver
- CAN driver
- DIO driver
- Timer driver
- Services

1.3 Full detailed APIs for each module

➢ Application

	appInit	appStart
Arguments	None	None
Return	Init state (Fail/Success)	None
Re-entrant	No	No
Asynchronous	No	Yes
Description	Initialize APIs and configurations	Main program body and logic

➢ Devices manager

	LightSwitch	getDoorState	getSpeed
Arguments	State (ON/OFF)	None	None
Return	Process state (Fail/Success)	Door state	Speed
Re-entrant	Yes	Yes	Yes
Asynchronous	Yes	Yes	Yes
Description	Control the state of the lights	Gets the door state	Gets the speed

➢ Communication manager

	getData	sendData
Arguments	None	Data
Return	Fetched data	Init state (Fail/Success)

Re-entrant	No	No
Asynchronous	Yes	Yes
Description	Uses APIs from MCAL to get data	Uses APIs from MCAL to send data

- Light switch driver

	sendLightSwitchState
Arguments	state
Return	Init state (Fail/Success)
Re-entrant	No
Asynchronous	No
Description	Send the light switch state over CAN

- Door sensor driver

	sendDoorState
Arguments	state
Return	Init state (Fail/Success)
Re-entrant	No
Asynchronous	No
Description	Send the door state over CAN

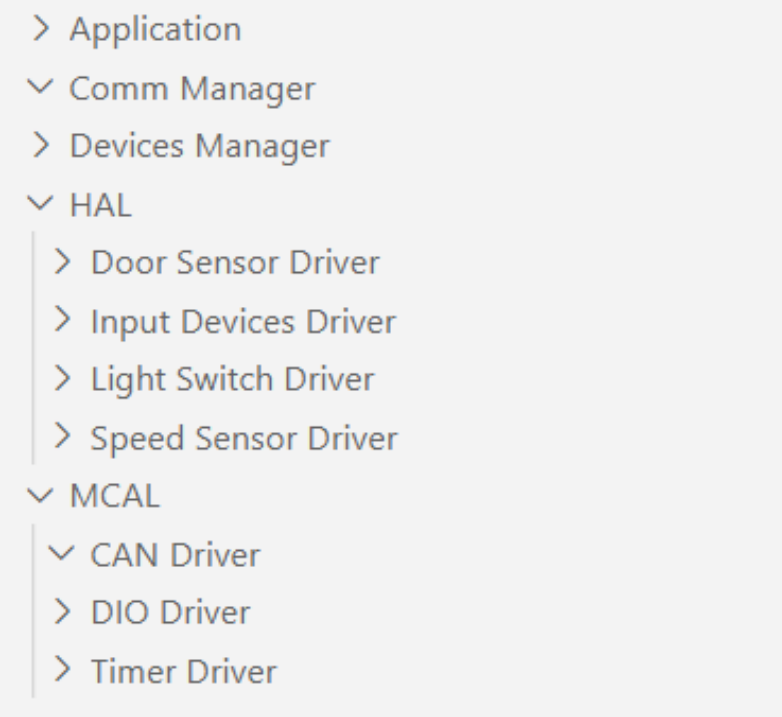
- Speed sensor driver (same as light and door)
- MCAL

	DIO_SET_BIT	DIO_CLR_BIT	DIO_GET_BIT
Arguments	Pin Number	Pin Number	Pin Number
Return	Process state (Fail/Success)	Process state (Fail/Success)	Pin state
Re-entrant	Yes	Yes	Yes
Asynchronous	Yes	Yes	Yes

Description	Set the pin to high	Set the pin to high	Gets the Pin state

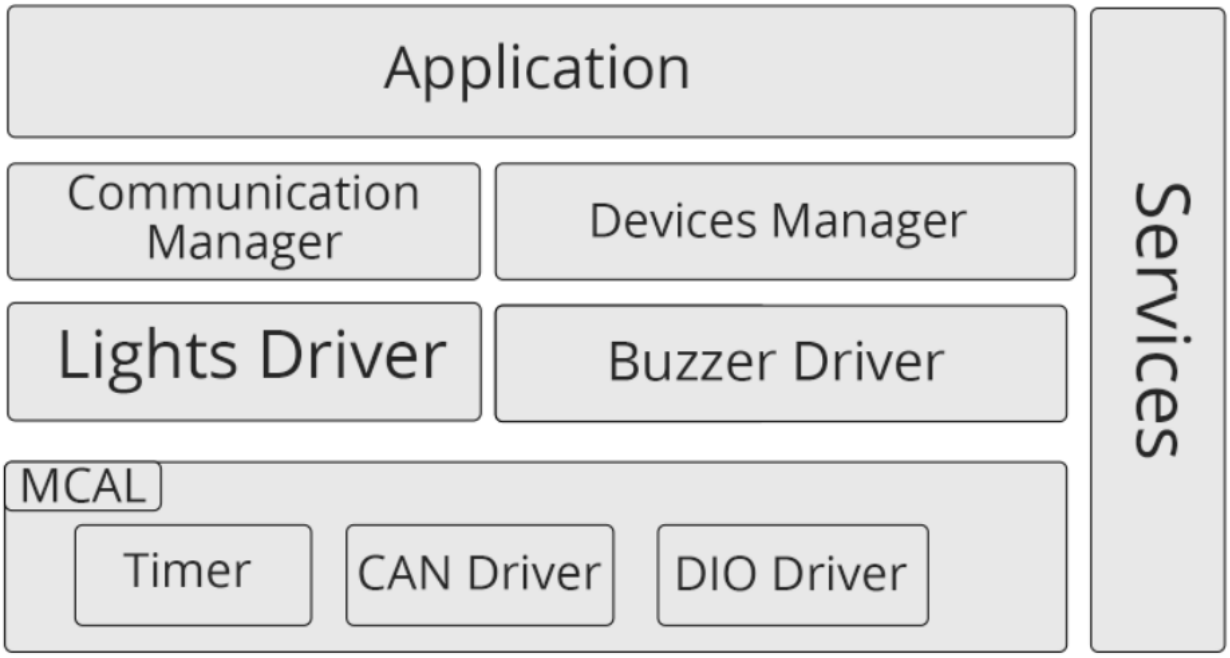
- Services (Added data types)

1.4 Folder Structure



2 ECU (2)

2.1 Layered Architecture



2.2 ECU components and modules

- Application
- Devices manager
- Communication manager
- Lights driver
- Buzzer driver
- CAN driver
- DIO driver
- Timer driver
- Services

2.3 Full detailed APIs for each module

Common modules are same as ECU 1.

- Lights Driver

	setLights
Arguments	State
Return	Init state (Fail/Success)
Re-entrant	No
Asynchronous	No
Description	(on/off)

- Buzzer Driver

	setBuzzer
Arguments	State
Return	Init state (Fail/Success)
Re-entrant	No
Asynchronous	No
Description	(on/off)

2.4 Folder Structure