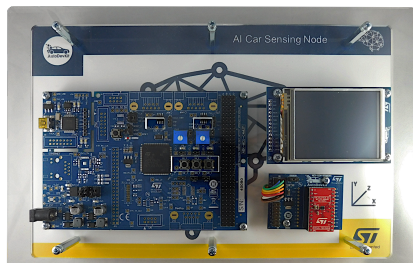


## Automotive AI on the edge for car state classification



### Features

- The **AEKD-AICAR1** is a hardware kit that consists of the following boards:
  - AEK-MCU-C4MLIT1**–SPC58EC Chorus 4 Mbytes MCU board
  - AEK-LCD-DT028V1**–SPI-based TFT LCD display
  - AEK-CON-SENSOR1**–MEMS sensor connector for SPC5 MCU
  - STEVAL-MKI206V1**–Adapter board with **AIS2DW12** digital motion sensor
- Pretrained neural network code flashed in the MCU
- Classification of four vehicle states: parking, normal road, bumpy, and skidding
- Real-time data collection and processing of MEMS sensor data
- LCD display for vehicle state
- On MEMS disconnection, the system performs classification based on the internal datalog in the MCU flash memory
- 28x18x7 cm
- Supplied by 12 V or by eight AA batteries (not provided in the package)

### Applications

- Automotive AI on the edge
- ADAS
- Automotive sensors reading and processing
- Automotive predictive maintenance

### Description

The **AEKD-AICAR1** is a versatile system based on a long-short term memory (LSTM) recurrent neural network (RNN), which can provide a car state classification: car parked, car driving on normal road conditions, car driving on a bumpy road, car skidding or swerving.

The innovative idea in the **AEKD-AICAR1** is to define an ECU detection node with an embedded artificial intelligence processing.

The **AEKD-AICAR1** houses an SPC58EC chorus 4Mbytes microcontroller, which can acquire discrete acceleration variations on a three-axis reference system.

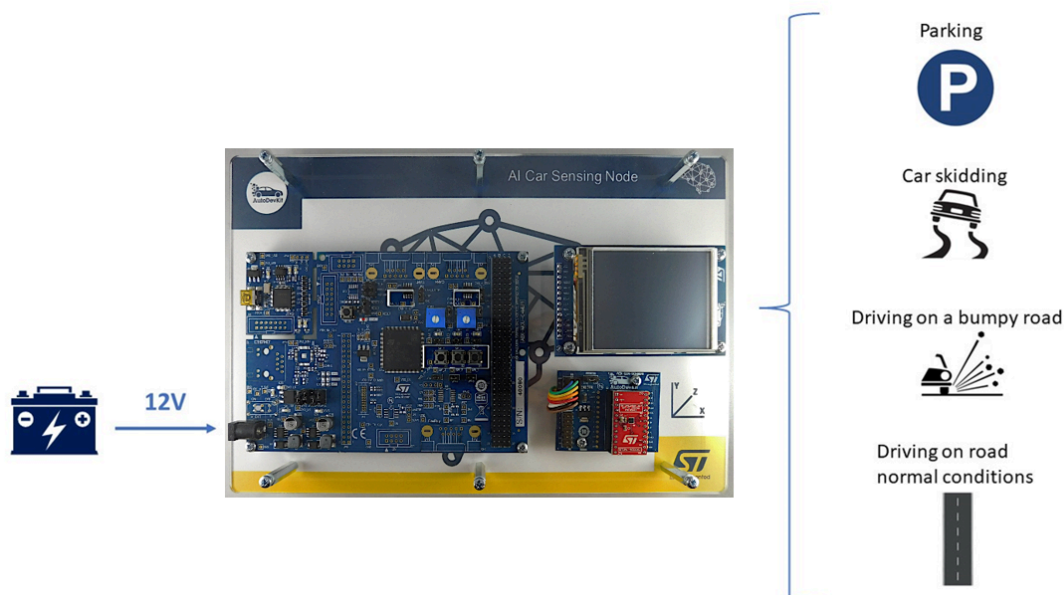
The **AEKD-AICAR1** system represents a reference for the automotive AI on the edge processing.

It is possible to replace easily the sensor with another one that belongs to the ST MEMS family. It is also possible to modify the neural network and/or retrain the neural network. The new neural network is converted into a library executable by the MCU using **SPC5-STUDIO-AI**.

Product summary	
Automotive AI on the edge for car state classification	<b>AEKD-AICAR1</b>
Connector board for SPC5 MCU discovery boards and MEMS sensor boards in DIL 24 socket	<b>AEK-CON-SENSOR1</b>
MCU discovery board for SPC5 Chorus	<b>AEK-MCU-C4MLIT1</b>
Display expansion board with resistive touch for Chorus family	<b>AEK-LCD-DT028V1</b>
AIS2DW12 adapter board for a standard DIL 24 socket	<b>STEVAL-MKI206V1A</b>
AutoDevKit library plugin for SPC5-STUDIO	<b>STSW-AUTODEVKIT</b>
Artificial Intelligence (AI) plugin for automotive SPC5 MCUs	<b>SPC5-STUDIO-AI</b>
Application	<b>ADAS/Predictive Maintenance</b>

# 1 Block diagram

Figure 1. AEKD-AICAR1 block diagram



## 2 Schematic diagrams

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- Note:* The **AEKD-AICAR1** kit consists of the following evaluation boards: [AEK-MCU-C4MLIT1](#), [AEK-CON-SENSOR1](#), [AEK-LCD-DT028V1](#), and [STEVAL-MKI206V1](#). You can find their detailed schematic diagrams at the related web pages:
- [AEK-MCU-C4MLIT1 schematic diagrams](#)
  - [AEK-CON-SENSOR1 schematic diagrams](#)
  - [AEK-LCD-DT028V1 schematic diagrams](#)
  - [STEVAL-MKI206V1 schematic diagrams](#)

## Revision history

**Table 1. Document revision history**

Date	Revision	Changes
21-Sep-2022	1	Initial release.



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