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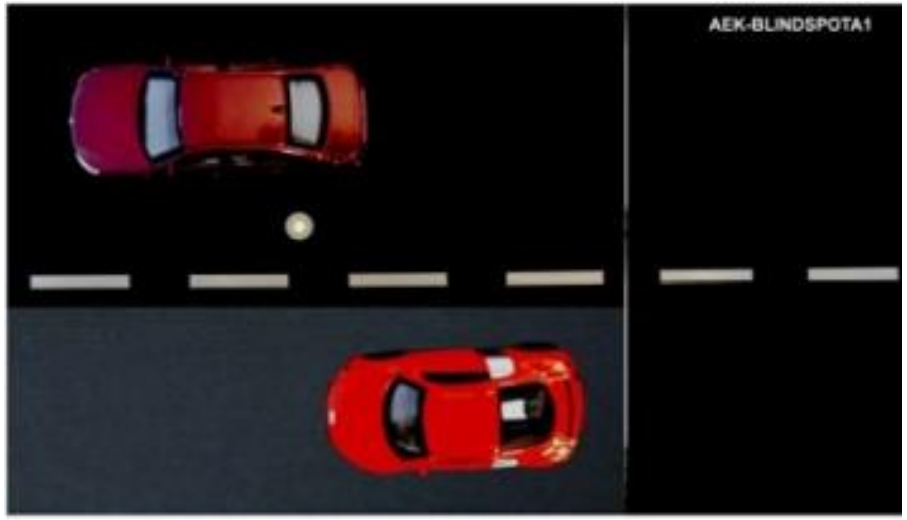
Blindspot Detection & Warning Educational Tool

March 2020

What should I buy?

You need to order the following two kits which are part of ST's AutoDevKit development initiative:

Set of assembled evaluation boards for the Blindspot detection simulation kit AEKD-BLINDSPOTB1



Blindspot detection simulation kit AEKD-BLINDSPOTA1

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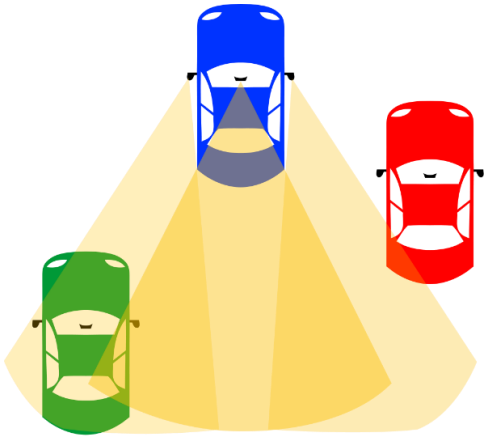
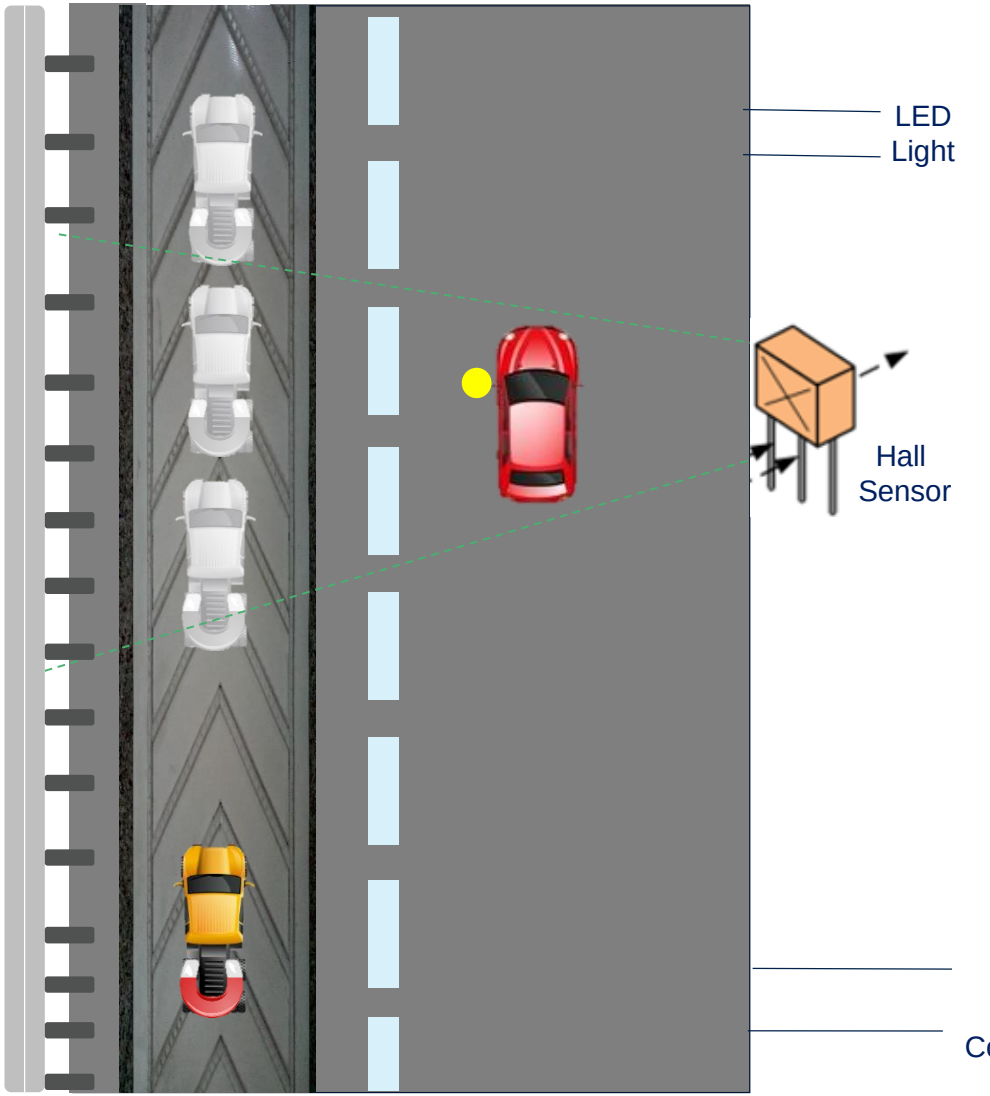
Blindspot Detection Application Motivational



A **blindspot** in a vehicle is an area around the vehicle that cannot be directly observed by the driver while at the controls.

Simulation of a "Vehicle Blindspot"

- A car containing a magnet is carried by a conveyor belt
- A linear Hall effect sensor with output signal proportional to the magnetic field strength is placed in the stationary car.
- When the car with the magnet is in proximity of the stationary car, the Hall effect sensor detects a magnetic field variation and turns on a LED indicating a vehicle is present in the blindspot perimeter.



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What is inside the box?

Blindspot detection simulation kit
AEKD-BLINDSPOTA1

Set of assembled evaluation boards for the Blindspot detection simulation kit
AEKD-BLINDSPOTB1

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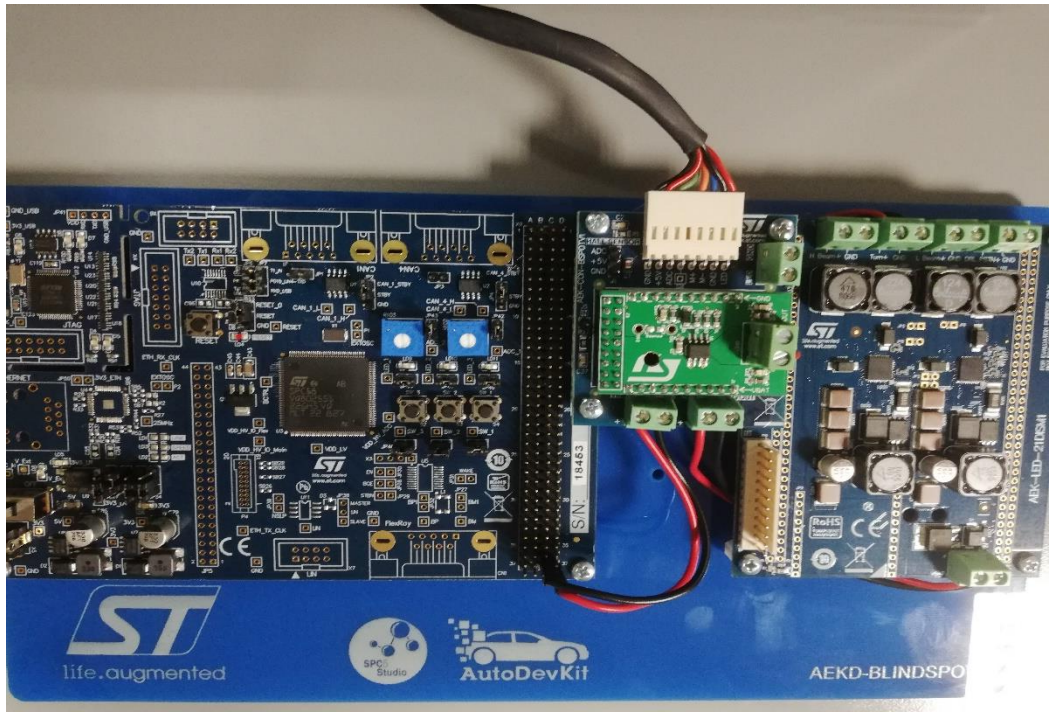
Mounting the demo

1. Place the car with adhesive tape next to the LED on the black panel. The LED represents the car's blind spot warning system.
2. Place the other car containing the magnets on the conveyor belt when you start the demo.
3. Connect the cable on the top side coming out of the black box to the AEKD-BLINDSPOTB1 assembly.
4. Connect the power supply from the AEK-MCU-C4MLIT1 board on the AEKD-BLINDSPOTB1 assembly to the AEKD-BLINDSPOTA1 simulator.



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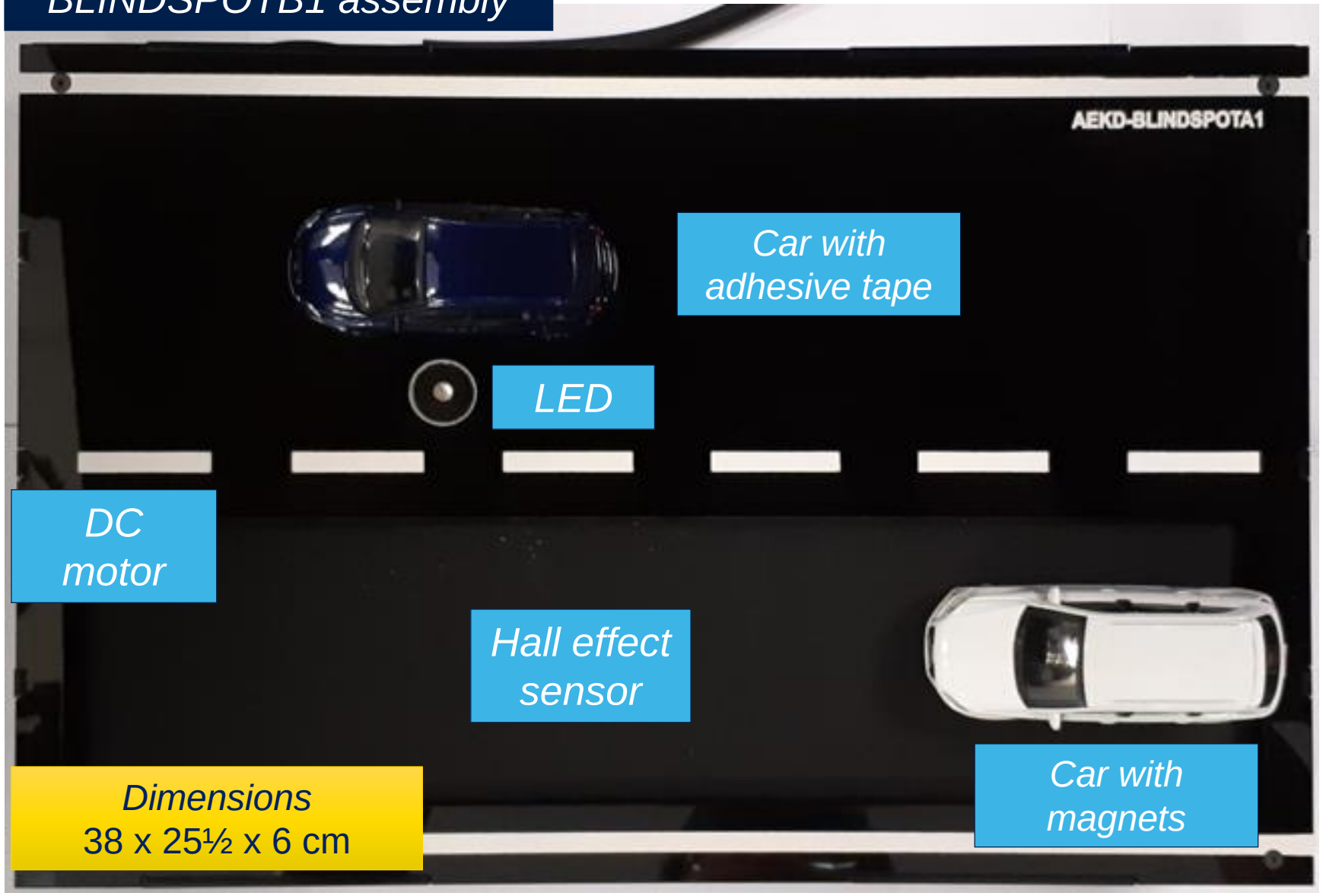
Actuator Hardware Details

Side connected to AEKD-BLINDSPOTB1 assembly



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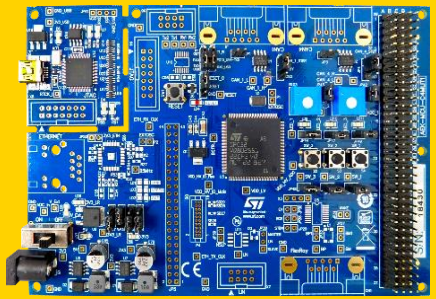
Elements for Blindspot Demo

The following components are included:

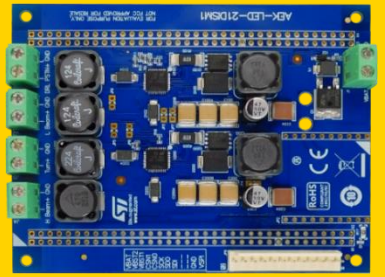
Main Controller
SPC58EC

AEK-MCU-C4MLIT1



LED Driver
L99LD21

AEK-LED-21DISM1

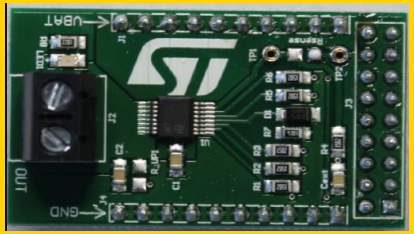


Hall effect sensor

HONEYWELLSS495A

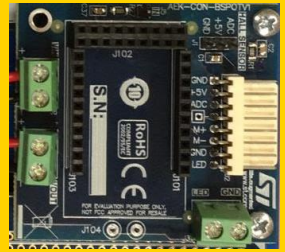
Conveyor belt driver (unidirectional)
VN7050AS

EV-VN7050AS



Connector board for Blindspot demo

AEK-CON-BSPOTV1



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Blindspot Demo Hardware Details

Hall effect sensor

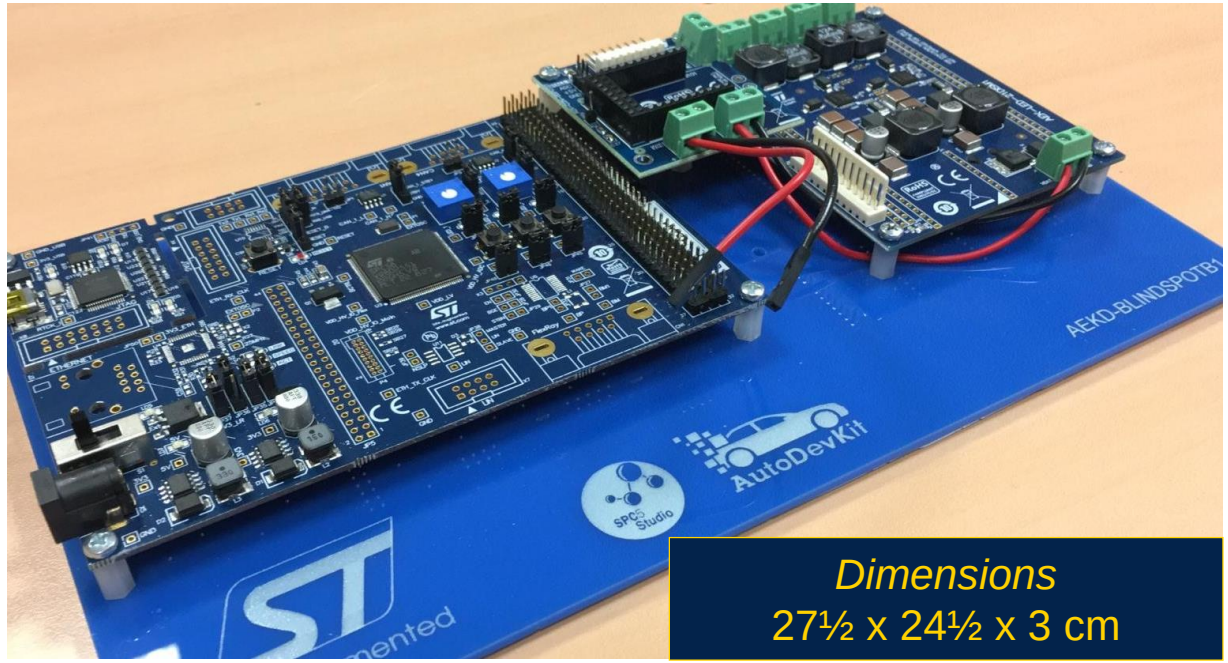
- It has three pins: 5V, GND, and Signal
- The signal is read through an ADC

Conveyor belt

- It has two pins: GND and OUT
- The OUT pin from the motor is connected to the EV-VN7050AS board's OUT pin.

Power Supply Connections

- GND connections are available on the AEK-MCU-C4MLIT1 board's 4x37 connector
- The 12V power supply is connected to the AEK-MCU-C4MLT1 to power the complete system



Dimensions
27½ x 24½ x 3 cm

LED

- It has two pins: GND and VIN
- The VIN is connected to the one of the AEK-LED-21DISM12 board's buck outputs

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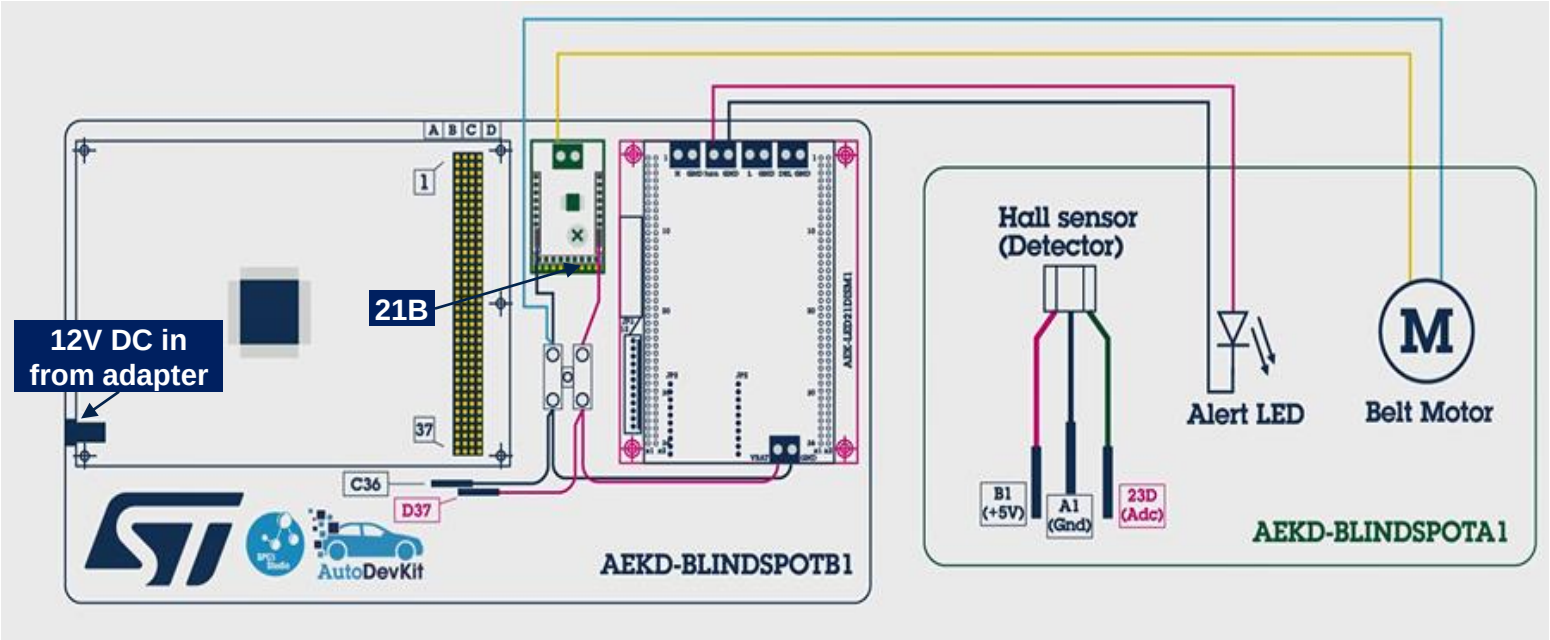
Preloaded firmware test

Test pre-loaded firmware

- Using the single pin female-to-female wires provided connect the boards on AEKD-BLINDSPOTB1 according to the below table.
- Plug the power supply, turn on the switch on the AEK-MCU-C4MLIT1 and place the car with magnets on the initial extremity of the conveyor belt.
- Once the car with magnets is carried closed to the fix car the Blindspot warning LED shall turn-on.

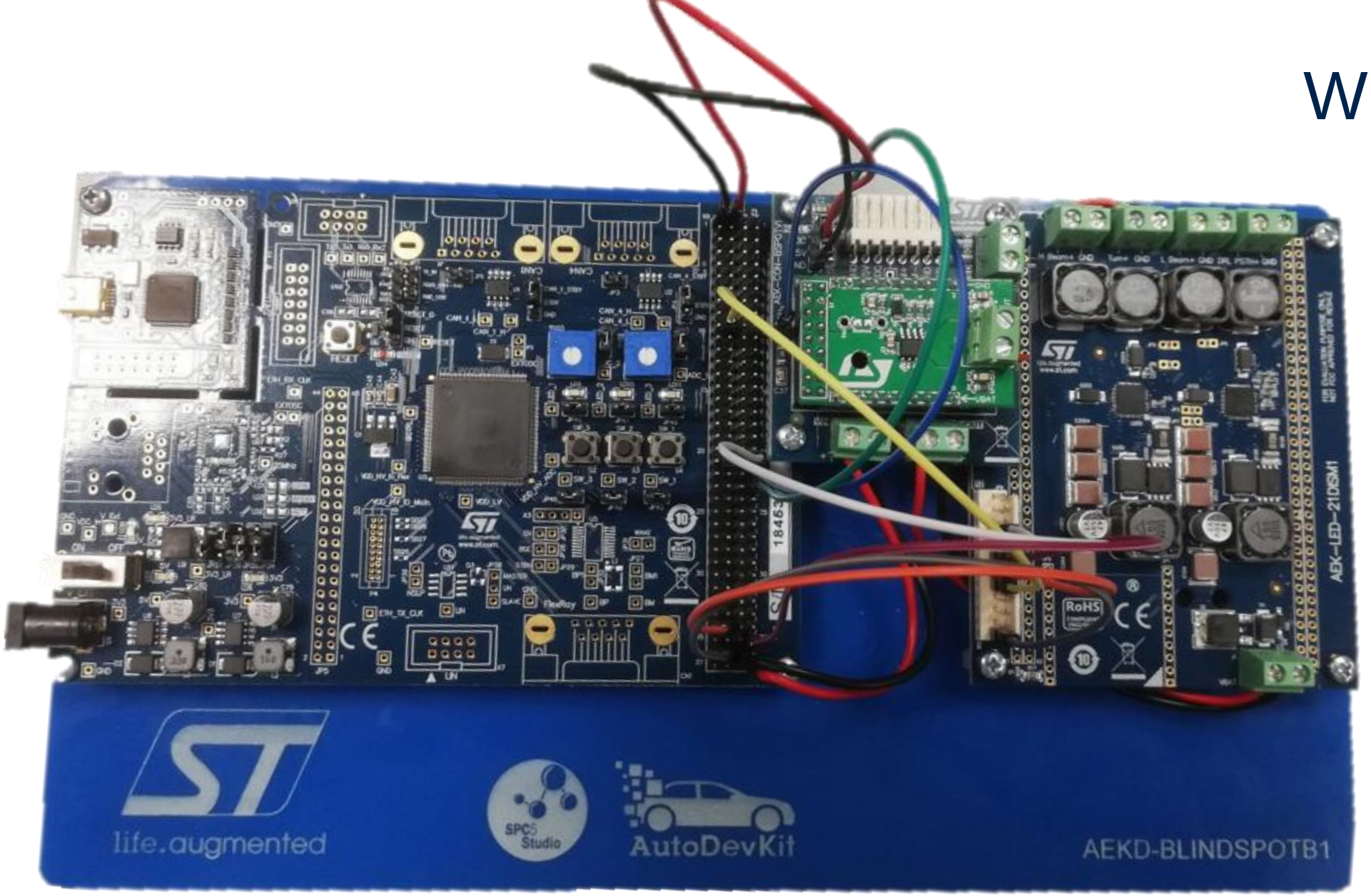


SIGNAL	AEK-LED-21DISM1	AEK-MCU-C4MLIT1
SDI	#5	10B
SDO	#6	34B
SCK	#7	35D
CS	#9	21D
+5VSPI	#1	36B

SIGNAL	HALL SENSOR	AEK-MCU-C4MLIT1
+5V	RED	1B
GND	BLACK	1A
SENSOR	GREEN	23D

SIGNAL	EV-VN7050	AEK-MCU-C4MLIT1
12V	RED	37D
GND	BLACK	36C
INPUT	#13	21B

Wired Demo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SPC5 Studio
AutoDevKit
AEKD-BLINDSPOTB1
AEK-LED-210SM1
RoHS

Self-learning mode

Getting started and developer resources

- Download and install:
  - SPC5-Studio integrated development environment for SPC5 automotive MCUs
  - AutoDevKit™ library plugin for SPC5-STUDIO
  - SPC5-UDESTK PLS Universal Debug Engine®) debugging software for Windows
- Watch our YouTube video to learn step-by-step how to create and build the Blindspot application demo.
- Visit ST's AutoDevKit™ development initiative for more information including user manuals and technical resources
- Join ST's AutoDevKit™ community to ask questions, propose suggestions and share insights

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Self-learning steps

Creating and configuring a new SPC5-Studio project

- Create a new project in SPC5-Studio using an SPC58EC MCU platform
- Add standard components and the following AutoDevKit™ components
  - `Init` package
  - `AEK_LED_21DISM1` for LED
  - `EV_VNx7xxx` for the DC motor
  - `Linear_Hall_Effect_Sensor`
- Generate code for low-level drivers
- Configure and generate code for each AutoDevKit™ component
- The Hall effect sensor component will allocate the ADC peripheral. Verify its configuration.
- Use BoardView to connect the hardware components.
- Write your `main()` function by checking the single component demo for `#include` information
- Download and debug your firmware using the SPC5-UDESTK debugging tool

Useful AutoDevKit APIs

LED Board

- `ClearAndTrigger(AEK_LED_21DISM1_DEV0);`
  (Clean all registers status and activate the toggle on the Watchdog)
- `ActivateBuckDev(AEK_LED_21DISM1_DEV0, DEV1, BUCK2);`
  (Activate the Buck of the Boost/Device selected)
- `DeActivateBuckDev(AEK_LED_21DISM1_DEV0, DEV1, BUCK2);`
  (Deactivate the Buck of the Boost/Device selected)

DC Motor Board

- `ActiveINChannel(int channel, EV_VNx7xxx_DEV0)`
  (Activated the IN channel selected)

Hall Sensor

- `LinearHallADCinit (LINEAR_HALL_DEVICE dev)`
  (Initialization ADC)
- `LinearHallADCstartConverison (LINEAR_HALL_DEVICE dev)`
  (Start and stop a conversion of the ADC)

Pro tip:

- Use ADC values in [3400, 3800] range to turn on the LED
- `osalThreadDelayMilliseconds(x)` to delay execution by *x* milliseconds

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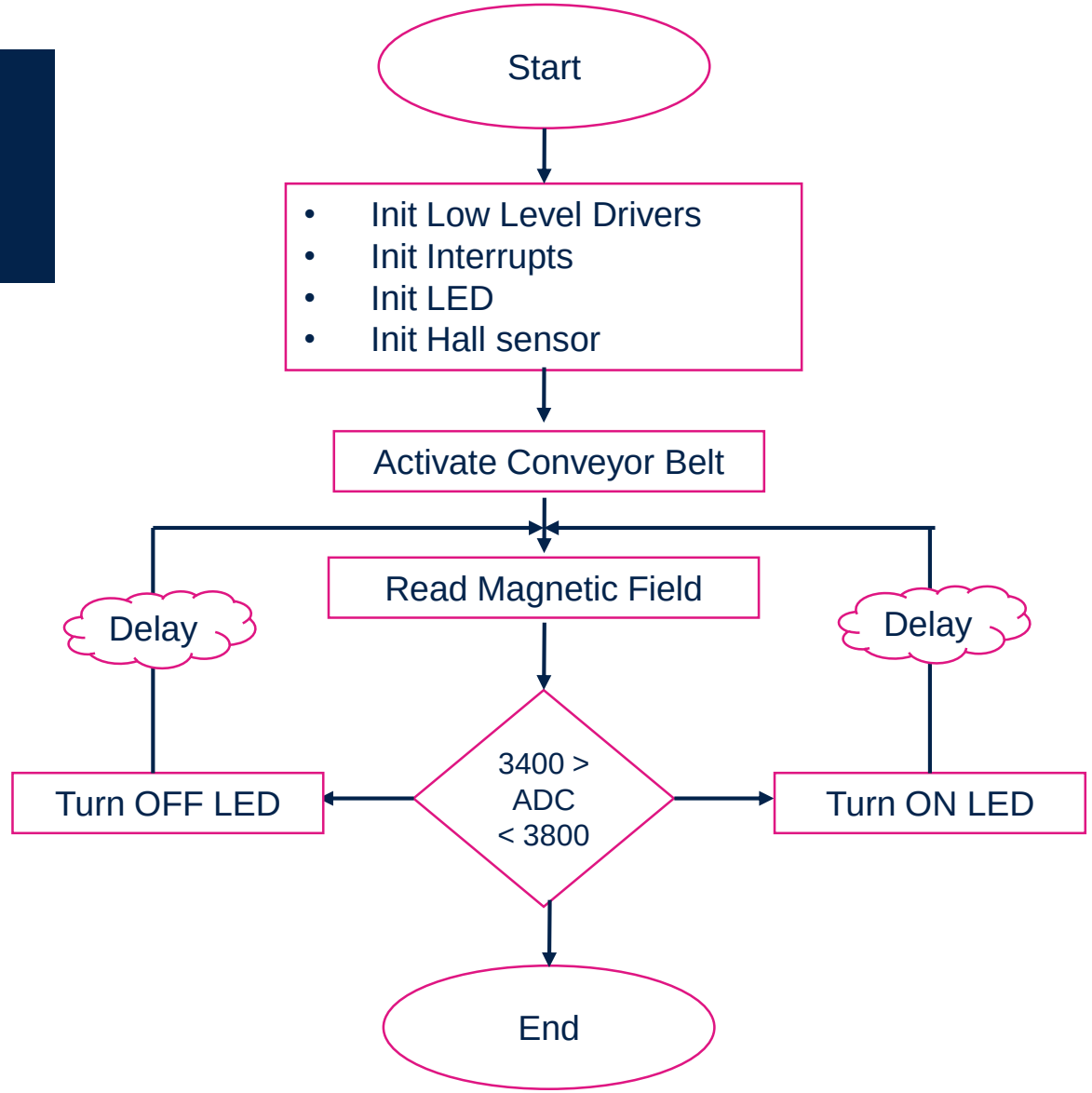
Self-learning flowchart



Thank you

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