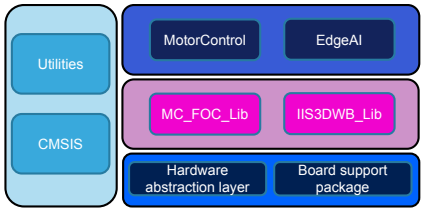
STM32Cube Function Pack for EVLSPIN32G4-ACT with FOC algorithm for BLDC motor control and edge AI fault recognition



Features

- Sample application with a field oriented control algorithm to drive a low voltage three-phase brushless motor, managing the EVLSPIN32G4-ACT board
- Machine learning model for motor behavior classification with Edge AI
- Motor control protocol master implementation to interact with EVLSPIN32G4-ACT evaluation board, programmed as slave through MCSDK (X-CUBE-MCSDK)
- Free, user-friendly license terms

Product status link
FP-IND-MCAI1
EVLSPIN32G4-ACT
STEVAL-MKI208V1K
X-CUBE-MCSDK

Description

The FP-IND-MCAI1 function pack is a reference code to control a low voltage three-phase brushless motors with EVLSPIN32G4-ACT reference design board, monitoring the vibrations using the STEVAL-MKI208V1K sensor kit, and classifying the operating conditions through an optimized AI algorithm.

The function pack comes with an implementation example of a motor fault classification based on a machine learning (ML) solution developed through NanoEdge™ AI studio, working in parallel with the field-oriented control motor control algorithm (FOC) generated with the STM32 motor control software development kit (X-CUBE-MCSDK).

The firmware collects data on the motor current and the IIS3DWB vibrometer (mounted on the STEVAL-MKI208V1K board). This data stream feeds the ML model allowing an accurate classification of motor behavior among normal operation (no faults) and two possible fault conditions.

The user can customize the ML model by changing motor configuration and adding their own classes.

1 What is the EVLSPIN32G4-ACT board?

The EVLSPIN32G4-ACT is a reference design for implementing next-generation smart actuators, based on the STSPIN32G4, a system-in-package integrating in a 9x9 mm VFQFPN package, a triple high-performance half-bridge gate driver with a rich set of programmable features and a mixed signal STM32G431 microcontroller.

The board is designed to drive three-phase brushless motors up to 5 A_{rms} output current and 48 V supply input delivering a total power of 250 W in a very compact form factor (62 mm x 50 mm).

2 How does this software complement the EVLSPIN32G4-ACT?

This software is based on the STM32CubeHAL hardware abstraction layer for the STM32 microcontroller.

The software package includes an example of integration of a machine learning solution into a motor control application developed with the MCSDK environment. The motor behavior is accurately classified into three states according to real time-acquired data.

Motor speed and PI controllers' parameters can be runtime changed.

Revision history

Table 1. **Document revision history**

Date	Version	Changes
11-Dec-2025	1	Initial release.

Contents

List of tables

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