#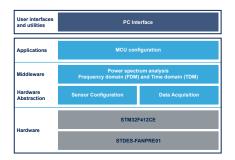 Firmware package to enable predictive maintenance with time domain (TDM) and frequency domain (FDM) algorithm, and condition based monitoring

User interfaces and utilities	PC Interface	
Applications	MCU configuration	
Middleware	Power spectrum analysis Frequency domain (FDM) and Time domain (TDM)	
Hardware Abstraction	Sensor Configuration	Data Acquisition
Hardware	STM32F412CE	
	STDES-FANPRE01	

Features

- Time domain (TDM) and Frequency domain (FDM) algorithms
- based on the STM32CubeHAL library
- Virtual Com communication with STLINK-V3SET programmer/debugger
- PWM signal available on board

Description

The STSW-PRMN001 firmware package runs on the STM32F412CE microcontroller and implements time domain (TDM) and frequency domain (FDM) algorithms for condition based monitoring and to enable predictive maintenance applications.

The firmware enables accelerometer data acquisition, motion processing analysis for predictive maintenance purposes, rotation speed calculation in RPM, and bearing temperature monitoring.

The predictive maintenance algorithm based on MotionSP libraries is able to signal anomalies during equipment operation through configurable thresholds applied to FDM, which uses Fast Fourier Transforms (FFT) processing to generate vibration power spectra for each axis, and TDM based on acceleration peak and acceleration RMS processing.

PC communication and data exchange from the microcontroller, including FDM, TDM, rotation speed and bearing temperature values, is managed via the Virtual Com port available on STLINK-V3SET modular in-circuit programmer and debugger.

The firmware is based on the STM32CubeHAL library and supports the IAR Embedded Workbench toolchain.

Product summary	
TDM/FDM analysis firmware for Predictive Maintenance solutions	STSW-PRMN001
STM32 dynamic efficiency MCU with BAM, high-performance and DSP with FPU, ARM Cortex-M4 core, 512 Kbytes Flash, 100 MHz, Art Accelerator, DFSDM	STM32F412CE
Circular board design for predictive maintenance and condition monitoring applications for fans and small motors	STDES-FANPRE01
Development environment	IAR Embedded Workbench
Applications	Condition Monitoring and Predictive Maintenance

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For further information contact your local STMicroelectronics sales office.

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Revision history

Table 1. Document revision history

Date	Version	Changes
07-Jan-2020	1	Initial release.
25-Aug-2020	2	Updated description and title.
19-Oct-2020	3	Updated title.

IMPORTANT NOTICE – PLEASE READ CAREFULLY