AI4EU Robotics Pilot: Vibration sensor measurements in a robotic wrist - Dataset Documentation

The wrist demonstrator represents a mechanical wrist with three axes that can hold tools, e.g. for spray painting in combination with a pump. On this robotic wrist, two accelerometers are mounted for vibration monitoring and recording: one in the movable front part of the wrist and one in the shaft. The wrist can be controlled through the torque or the designated position of each axis' motor.
The dataset consists of 1.8 billion measurements of several sensor data of a robotic wrist in 1-second intervals over six months in 2020.

The wrist is controlled in repeated patterns (see columns *scenario* + *movement*). These patterns are repeated multiple times (see column *iteration*).
During the 1-second intervals, the main sensor information comes from the vibration sensors (columns *s1* + *s2*, see figure for sensor placement) that record the vibration of the wrist at a high frequency (6.14 kHz). There is additional sensor data (e.g. the voltage, torque, or pressure of each motor in the wrist) which is sampled at a lower frequency and interpolated for the other timestamps. For the first measurements in a series, the columns Drv*SetPoint and Drv*Temp are NaN, because the information is not yet available and we do not want to extrapolate.
The unique identifier for one interval is the *key*.

The data is split by the recording date over 98 files. The file names are not continuous. For some dates there are
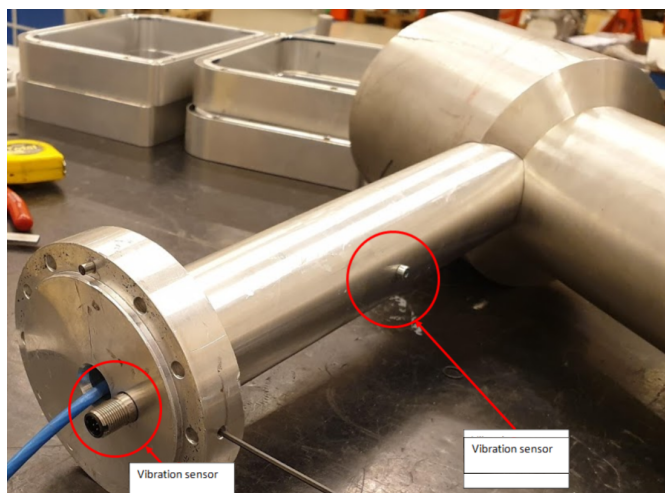
no measurements due to instabilities in the recording environment and restricted access to the setup due to the COVID-19 pandemic.

Dataset Column Description

Column	Unit/Domain	Observed Values	Description
time	Datetime with nanoseconds		Timestamp of measurement (includes constant timezone information (+00:00))
key	Key to identify series (String)		Main identifier to split individual measurement intervals
scenario	String	SideBySideTest, UpDownTest, Rotate6Test, Rotate4Test	General pattern of fixed movements
movement	String	rotr4, down, up, rotl4, right, left, rotr6, rotl6	Specific movement within the scenario
iteration	Integer		Repetition of the current pattern
s1	sqrt(x*x + y*y + z*z)		Magnitude of first vibration sensor reading
s2	sqrt(x*x + y*y + z*z)		Magnitude of second vibration sensor reading
iDrv1Actual	rpm	[-45; 45]	1. Motor: Current motor rpms reported (actual rpms)
iDrv1Torque	Nm	[-0.95; 1.059]	1. Motor: Measured torque
iDrv1Volt	Volt	[264; 343]	1. Motor: Measured voltage inside the motor
iDrv1Temp	Degrees celsius	[33,2; 50,2]	1. Motor: Temperature in the motor
iDrv1SetPoint	rpm	[-45; 45]	1. Motor: Target rpm set by the driver
iDrv2Actual	rpm	[-20; 35]	2. Motor: Current motor rpms reported (actual rpms)
iDrv2Torque	Nm	[-2,00; 3,76]	2. Motor: Measured torque
iDrv2Volt	Volt	[263; 342]	2. Motor: Measured voltage inside the motor
iDrv2Temp	Degrees Celsius	[33,4; 56,5]	2. Motor: Temperature in the motor
iDrv2SetPoint	rpm	[-20; 35]	2. Motor: Target rpm set by the driver
iDrv3Actual	rpm	[-10,02; 45]	3. Motor: Current motor rpms reported (actual rpms)

iDrv3Torque	Nm	[-2,46; 3,60]	3. Motor: Measured torque
iDrv3Volt	Volt	[265; 344]	3. Motor: Measured voltage inside the motor
iDrv3Temp	Degrees Celsius	[34,2; 63,0]	3. Motor: Temperature in the motor
iDrv3SetPoint	rpm	[-10; 45]	3. Motor: Target rpm set by the driver