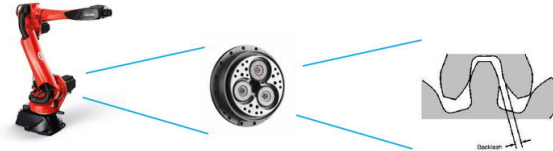


Virtual Measurement of the Backlash Gap in Industrial Manipulators

Topic

Industrially focused research problem

- Industrial manipulator
- Gears ageing - Backlash phenomenon
- Predictive maintenance
- Virtual sensor
- lot



Goal

Translate a disturbance identification/caracterization problem in an optimization problem well suited for CI techniques



Easy solution for a N-variables non-separable problem



Virtual sensor realization

Innovation

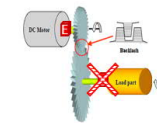
Industrial **standard** solutions:

- Sensors placed **close** to the expected fault location
 - Accelerometer
 - Two encoders (motor + load encoder)



New solution :

- Sensors **NOT close** to the fault location
 - No dedicated sensor
 - Motor encoder **only** → virtual sensor



Method

Backlash analysis of a robotic joint transmission

- System and phenomenon modeling
- Estimate from indirect measuring methods
- Value prediction over time

Tools

- Matlab/simulink
- Python - CMA-ES

Method validation

- Performance analysis: comparison of real measured values with the output of the developed algorithm
- Applicability limits
- Method generalization

