

Module name: Dynamic robot trajectory generation based on information from 3D-camera

- **Main functionalities:**

This module has two functionalities first one is to provide flexible and adaptive way to create robot trajectories dynamically based on point cloud data created automatically with 3D-camera. Camera can be mobile in example attached to industrial robot as a tool or stationary installation.

Secondary functionality is to provide point cloud data of scanned object and save it as file. In this case only 3D-camera and Cloudcompare is needed.

- **Technical specifications:**

The overall description of this module is shown in figure 6. Workpiece is scanned with PhotoXi 3D scanner to generate a Point cloud in real-time. Optionally Kinect V2 can also be used. PhotoXi connects to PC via Ethernet and Kinect V2 connects via USB3 connection respectively.

This information is then processed by a PC running CloudCompare software. This step needs human interaction to combine all point cloud data gathered from all perspectives together into a single model file. After model file has been created, it can either be saved in local file system or user can create trajectories for industrial robot with AutoMAPPSS. AutoMAPPSS calculates trajectories for robot, based on information from input file. After calculating trajectories can be downloaded to robot controller for executing. PC has connection to industrial robot either via serial or ethernet interface depending on options available on robot.

Model files of static work cell objects are also needed. These are provided in STEP-format

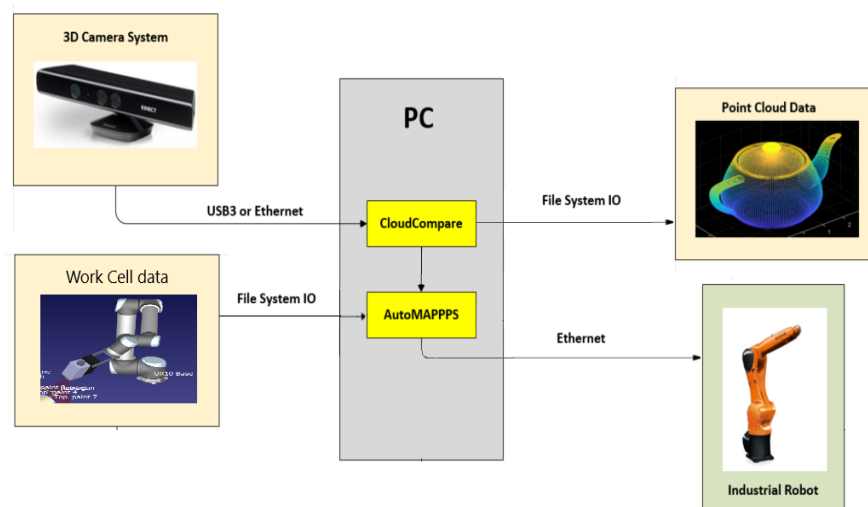


Fig 6. Module connections and components

- **Inputs and outputs:**

First input here is point cloud data from PhotonXi or Kinect V2. Second input is virtual model of robot and work cell from in example SolidWorks and RoboDK. Output is trajectory for industrial robot or point cloud data file.

Interface specification:

User interfaces here are GUI's of AutoMAPPPS and Cloudcompare.

- **Formats and standards used:**

ISO 10218, ISO TS 15066, ISO 10303-STEP

Availability:

This module is currently under development. First version is available at the beginning of year 2020.

- **Application scenarios:**

This module has applications with integrators and companies who are building applications where robot trajectories will be generated dynamically using 3D cameras or scanners.

- **Offered for internal / external use**

This module as a concept will be available for internal and external use.