

Robot and Human safety in a semi-automated assembly workspace

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Objectives & Approach

“Robots used for automation in industries should be able to react to any uncomfortable situations in their vicinity in order to avoid harming humans, working product, other machinery and itself.”

- Safe **path planning**,
- Automatic collision **detection** and **avoidance**,
- Semi automated **assembly human-robot-collaborative environment**,
- 3D-Time of Flight sensor based **approach**.

SARPP Algorithm

- **Knowledge extraction** from the scene using 3D-ToF sensor,
- **Process information** is extracted,
- Human **localization**,
- **Path planning** and finding a detour in the case of expected collisions,
- Communication with robot is established through **Fast Research Interface (FRI)**
- The SARPP Algorithm flowchart is shown in Fig. 1,

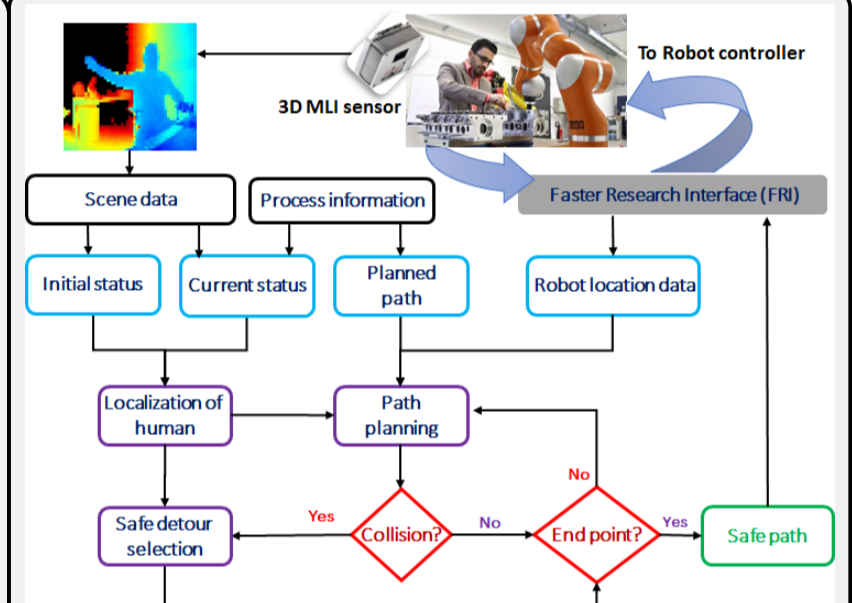


Figure 1: Flowchart SARPP Algorithm

Initial Results

- The Human Robot Collaborative virtual **scenario** is demonstrated in a V-REP software, where either human works or the robot as shown in Fig. 2,
- A **detour is planned** from a human location area in a real scenario, which is communicated to the robot as shown in Fig. 3,
- The Robot **changes the workstation**, and move to the next location for continuing the assembly process.

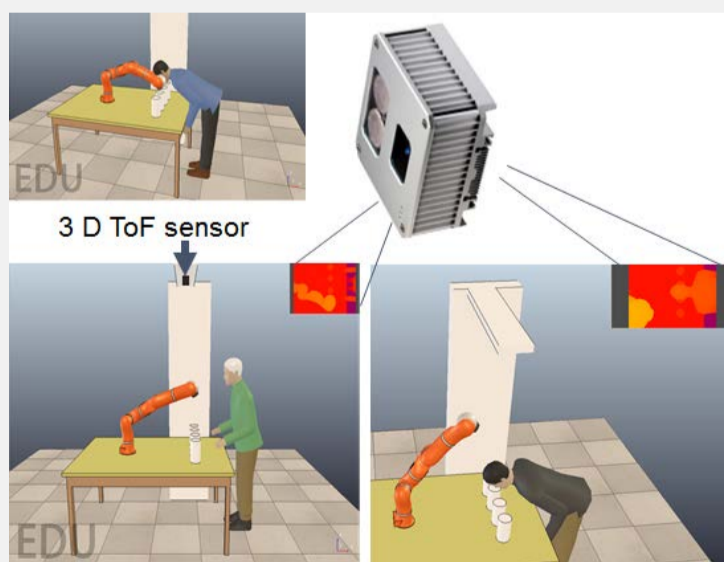


Figure 2: Virtual Scene, HRC

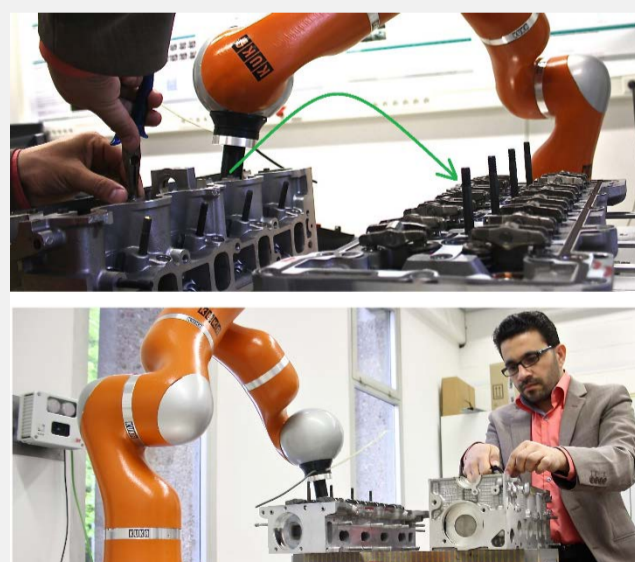


Figure 3: Safe Human Robot Collaborative Assembly process

Perspectives

- Application to real scenarios'
- Integration of knowledge base'
- Integration of 2D Camera system for objects recognition.

Reference: R. AHMAD, P. PLAPPER, “Robot and Human Safety in a Semi-automated Assembly Workspace”, IEEE – iROS Workshop on Safety for Human-Robot Interaction in Industrial Settings, Hamburg, Germany, 28 Sept. – 02 Oct. 2015.

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