Portable user-interface for autonomous fiber optics production line

1 Introduction

Maillefer Extrusion develops industrial machinery for producing power cables and fiber optics. These devices are increasing smart and networked together, in what is known as the fourth industrial revolution, or Industry 4.0. With smart devices generating and consuming vast amounts of data, machine learning (ML) and big data solutions are rapid being integrated with more traditional industrial equipment.

We have developed an Artificial intelligence based autonomous process controller, Smart Buffering, that analyses the buffering process in real-time and is able to optimize the process automatically during production.

This project presents an opportunity to acquire experience with mobile app development in a domain where ICT and physical systems meet.

A secondary coating fiber optics production line. In the buffering process a plastic tube is formed around a bundle of optical fibers. The high speed process requires precise control.

2 Project goal

The goal of this project is to implement tablet based UI for interacting with the Smart Buffering system.

An overview of the Smart Buffering system is presented in the following figure, with the main parts implemented in this project marked as numbered items:

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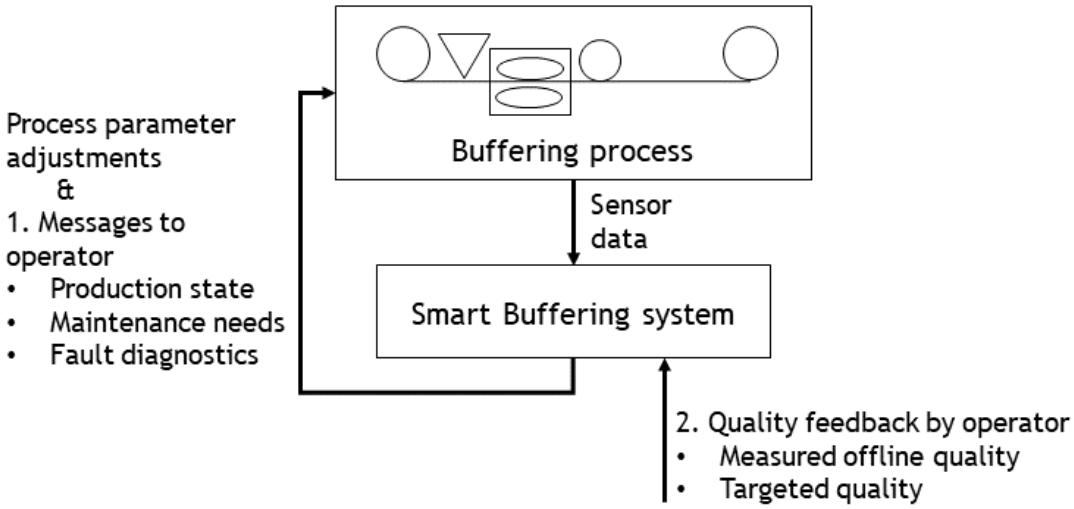

The system interface should be usable with commodity tablets or smartphones.

1. *Messages to the operator* includes numerical values and textual messages that are presented to the operator via the tablet interface.
2. *Quality feedback by operator* is a series of values measured by the operator, which need to be fed into the Smart Buffering system using the tablet interface.

Innovative ideas and proof-of-concept ideas are welcome on how to implement in an efficient and user friendly manner, both the quality feedback interface system, and the operator messaging systems.

3 Technologies

The implementation approach needs to be a local on-site solution, capable for constant 24/7 operation. Working knowledge of Python and web service technologies are beneficial for this project. Basic knowledge of C# and SQL is also recommended.

The students can choose a suitable approach for developing the tablet application. Possible approaches include, e.g. a web server backend with a front-end in a browser, or any cross-platform development framework suitable for targeting different systems (Windows/Android/iOS/browser).

Based on the interest and skills of the students, work on additional elements, such as predictive maintenance and/or quality prediction modules can be included in the project.

Please list relevant tools and technologies you know in your team CV!

4 Requirements for the Students

Willingness to learn the project domain and new technologies is the primary requirements for this project. The resulting tools are intended for internal production use and further development, so a quality-oriented software craftmanship mindset is highly appreciated.

We will supply all the needed SW and HW components and guide the team in their use.

We expect the team to follow course instructions for applying Scrum to the development process, as well as established best practices of software development, such as using Git for version control, implementing standards for code quality, peer reviewing all deliverables etc. A member of our team has acted as a coach on this course for several years and can offer tips on what practices dev teams have found valuable.

5 Legal Issues

Intellectual Property Rights (IPR)

The resulting intellectual property rights to all the results will belong to the client.

Non-disclosure Agreement (NDA)

Signing the NDA included in the Aalto contract is required. This is mostly for convenience: to be able to work at the client's premises and handle the client's real industrial data.

6 Client

Short Introduction

Maillefer Extrusion is a Finnish-Swiss engineering company with main offices at Vantaa employing 400 people. Internationally we have second site in Lausanne, Switzerland, and branch offices and representatives in 8 countries. Maillefer has a decades long tradition of developing specialist software for the field, for example analysis and simulation tools.

What do we offer?

We hope to arrange a social kickoff event (COVID situation allowing) with food and drinks at our offices in Vantaa, so everyone gets to know each other. During the project, all sprint meetings and demos can be held at our offices. Working space can also be arranged for other co-located working sessions if the team wants to work on the premises.

Who are we?

The development team will work with our R&D team, many of whom are Aalto University alumni from various fields, mechanical & chemical engineering, automation and computer science.

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7 Additional Information

There exists a possibility of continuing to work with this and similar projects after the course under internships or junior developer positions.