Project Proposal – Internship

Version: 7
Period: Spring 2023

Goal and use of this document

The proposal is used to describe a practical research internship which is carried out in semester 5 of the study program. Through this form the student requests approval for the assignment from the internship coordinator. This document is also used to receive feedback from client and coordinator and should lead to all three parties having one single view of the assignment. The student is responsible for writing the content, based on input of the organization and feedback of the coordinator. This document may be written in Dutch.

Student details

Student number	: 4797086
First name + Family name	: Stephanie Radu
Location	: Eindhoven
Profile Semester 3	: Software
Specialisation Semester 4	: Smart Mobile
Internship choice	: Smart Mobile
Dutch-speaking?	: No (currently learning)

Internship period

Start date	: 10th of February 2025	(official start date: Monday FHICT-week 1)
End date	: 27th of June 2025	(official end date: Friday FHICT-week 18)

Organisation details

Name	: SMART Photonics
Visiting address	: High Tech Campus 37
Zipcode + City + Country	: 5656AE, Eindhoven, Netherlands
Phone	: +31 611438824
Website	: www.smartphotonics.nl
Own Company	: No

Company mentor

(The person who guides the student on a regular basis)

First name + Family name	: Bart van der Heijden
Department	: ICT
Position	: Application Engineer
Background (highest education)	: Bachelor Artificial Intelligence at Radboud University
Background URL (e.g. LinkedIn)	: https://www.linkedin.com/in/brcvdheijden/
Phone	: +31 6 15411416
Email	: Bart.van.der.heijden@smartphotonics.nl
Assignment in ASAM?	: No

Department lead:

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First name + Family name: Andre van de Geijn
Department: ICT
Position: ICT Manager
Background (highest education): Master IT and Management at the Open Universiteit
Background URL: https://www.linkedin.com/in/andre-van-de-geijn-3115321/
Phone: +31 6 21695863
Email: andre.van.de.geijn@smartphotonics.nl

1. Context & Problem/Opportunity

Below the organization and its activities and structure are described. It must become clear in which part of the organization and activities the problem or opportunity lies and what the reason is for this assignment.

1.1 Context & Background

The organization is introduced by describing its main activities and processes. The relevant (recent) developments within the company and or related field of interest (e.g. IT) are described also.

SMART Photonics aims to improve people's lives and create a better world with the help of integrated photonics. They are an independent pure-play foundry – producing high-end Photonic Integrated Circuits for customers. One that thinks along. Their goal is to always look for innovative solutions that make a difference for their customers. From proof of concept to full production. Adding value at every step of the way.

The company, founded in 2012, is a Photonic Semiconductor Pure-Play InP foundry, which currently successfully manufactured over 300 generic chip designs. Photonics uses photons (light) to transfer and process information. Photonic chips, also called photonic integrated circuits (PICs), integrate photonic functions into microchips to create smaller, faster and more energy-efficient devices. SMART Photonics manufactures Indium Phosphide (InP) based chips; the only material suitable for high performance at low system cost.

The IT department of the company consists of 10 people split into the following areas: 5 – working on applications, 2 – infrastructure, 2 – operational support and 1 manager. It also keeps close contact with the suppliers from external companies, especially with the provider for the MES (Manufacturing Execution System). The background of the department starts 4 years ago, with only one person, and developed all the way to 10 people. Its purpose is automating the production process and reducing manual actions.

1.2 Current situation & Stakeholders

The current situation regarding the activities, problems (or opportunity) is described. The relevant stakeholders within the organization are provided with an explanation why they (possibly) are stakeholders. The scope of the project must become clear at this point.

At the moment, there is an inventory management system, designed as a tool for the factory operators. The scanner application, as well, is at a basic level, which does not provide its users with information about where to move, find or store a lot of products. The MES is provided by a supplier and is being used in implementing by both parts for this tool.

1.3 Problem/opportunity description

The problems/opportunities, possible causes and impact or effects of these problems/opportunities are described. Concrete examples are given, and the depth and scope of the situation is made clear. In this section it should become clear what the added value of the internship will be.

The application needs to be a standalone mobile application, for the zebra hand scanner. Right now, very little feedback is provided to the user, for example, if an error occurs, the user is not provided with the source of the problem. No visuals for the current inventory are available either, which is not helpful in the day-to-day use of the system. The project aims to automate the process for the factory operators and employees working with the inventory, for a better workflow.

2. Assignment

2.1 Desired project result

Below it should be clear what the desired result of the internship is. What situation should be reached at the end of the internship?

The project focuses on:

- Full Stack development and Android development
- Development of an application for Zebra handheld scanners running Android OS
- Server-based application with a web-based client GUI for data processing and continuation
- Integration with a MES system (Manufacturing Execution System), with the supplier based in Enschede
- Functional Domain: Inventory management

Project goal

A clear and as concrete as possible description of the intended results and what value they should have for the organization. A (concept) project goal can be formulated and products to be delivered are indicated.

The goal of the project is to deliver an intuitive solution for operators, minimizing errors, reducing dynamic cycle time, while assigning the next location for a selected batch, resulting that the operator knowing where to find it and what to do with it.

Project IT-deliverable

Specifically indicate the IT-products (proof-of-concept) that will be developed. Describe the end product as well as any intermediate products or other deliverables that are already known. For each IT-deliverable, specify the technology(s) to be used.

The mobile application will be programmed in Java, combined with the provided MES, while the Full Stack development will include also React.

2.2 Research aspects

Research questions

As it is important that all results are based upon (also practical) research: Which research questions are going to be relevant in order to achieve the desired project result? Provide (sub)-research questions and possibly a main research question.

Main question:

How can an Android application for Zebra handheld scanners be developed and integrated with a MES system to improve inventory management?

Subquestions:

- What are the key features required for the Android-based application to support Zebra handheld scanners?
- How can the application's UI/UX be designed for intuitive operator use?
- Which development frameworks and technologies are most suitable for full-stack Android development in this context?
- How should the server-side application be designed to ensure real-time data processing and synchronization?
- What database structure would best support inventory management tasks and scalability?
- How can data security and access control be implemented to protect sensitive inventory data?
- What communication protocols and APIs are required for seamless integration with the MES system?
- How can batch assignment logic be designed to minimize operator search and process time?
- How can the application be deployed with minimal disruption to current inventory operations?

Research approach

Regarding the DOT Framework: give a first indication of which research strategies and methods will be used and/or will be the most important ones. Think of the possibilities your internship environment specifically has or lacks and how you can in any case ensure you have enough methods and strategies to use.

The research approach for this project will follow the DOT Framework by combining Design-Oriented Research with Technical Implementation and Evaluation. A design-oriented strategy will guide the creation of the application's UI/UX, ensuring intuitive user interfaces and smooth operator workflows. Technical research methods such as system analysis, prototyping, and API integration testing will be critical for developing the server-side application and integrating it with the MES system. Given the internship environment, access to developers and operators will support the implementation process, while simulation testing can be conducted to validate system performance. This combined approach will ensure a well-rounded development and implementation process.

3. Guidance & Expertise

Coach/Mentor

What background does your company mentor have? Think of education (Bachelor/Master/Phd) as well as experience in (internship) coaching or mentoring. How many hours of guidance will there be per week and will you be coached?

Bart - "I have been working at Smart Photonics for 2,5 years now, starting as a Data Engineer on the Engineering side of the company after which I transferred internally to the ICT department where I started as an Application Engineer for our Production Automation Control (PAC) application. Over the last 1,5 years at ICT, I have branched out as project manager for several projects ranging from the development of internal applications to larger projects spanning multiple departments and 3rd party suppliers.
During my time with SMART, I have onboarded new employees and have already mentored a software engineering student. for the mentoring of Stephanie and her project, I estimate that I will need 4 hours per week. I believe my task as a coach is to guide them through the process of delivering a product from start to finish and support and enable the student to learn from- and navigate SMART. "

Expertise / Guidance

What expertise is available in the company and who has that expertise? What kind of support does the company provide on IT skills related to your domain? Describe the people and/or teams or departments where you are able to go to and who will help and guide you with (IT)-domain related questions, advice and review.

The student will be supported by a knowledgeable team of Application Engineers in addition to a close cooperation with our suppliers. Application Engineers with history at ONSemi, Fairchild and NXP will be able to support the student in the fields of application development. The ICT department is led by Andre van de Geijn, who has over 30 years of experience in the field of ICT and semiconductors, of which 20 years in a leading role.

4. Personal & Professional goals

Which aspects on personal or professional development will you further develop? Focus on soft-skills. Select a realistic three to five aspects to work on. Use previous feedback received from others (e.g. semester coaches and teachers as input).

Personal goal	Describe what exactly you want to achieve and how to work on this.
Problem-Solving and Critical Thinking	Break down complex problems into smaller tasks, explore multiple solutions, and conduct research or consult with team members when needed.
Adaptability and Learning Agility	Stay proactive in learning through online courses, tutorials, and developer communities. Schedule dedicated learning hours weekly to stay updated on emerging technologies relevant to the project.
Effective Communication	Conduct regular progress meetings, present project updates, and document development processes with clear explanations. Request feedback on clarity and adjust accordingly.

5. (Optional) other important remarks