**Personal Development Report**

**Johnson Domacasse**

**Smart Industry and IoT Specialization Semester 4**

**spring 2023/24**

**Document update history**

|  |  |  |
| --- | --- | --- |
| **Update Date** | **Version** | **Comments** |
| **23/02/2024** | **0.1** | **Personal information** |
| **08/03/2024** | **1.0** | **Modules Chosen** |
| **28/03/2024** | **2.0** | **Orienting Progress** |

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# A person with curly hair wearing glasses Description automatically generated*Persona*

Hi there. My name is Johnson Domacasse. I am a student at Fontys university of applied science. I am currently in my 4th Semester. In this section I will tell you a bit more about myself.

My hobbies include spending time with my friends. Usually this is in the form of video games. Otherwise, we spend time with each other personally.

Before this study I did Mechatronics for one year at Fontys Engineering. This was because I have a lot of love for electronics and all that come with them. The reason for the change was because at the time, I didn’t like the direction the physics part of the study was going. I changed to ICT and chose technology because in short, its basically Mechatronics without the physics. I do miss the application of mechanical skills to projects.

My skills range from both technical and professional. My technical skills include everything I have done so far in my school career at Fontys. I will list the ones that come to mind but there may be some I may have missed.

### Technical Skills:

* Knowledge in both C and C++ (object-oriented) programming
* Knowledge in embedded register programming in C (STM32)
* Knowledge in communication protocols
* Knowledge in microcontrollers, actuators and sensors
* Minimal knowledge in 3D modelling
* Knowledge and affinity for 3D printing

### Professional Skills:

* Knowledge in proper documentation of projects.
* Strong leadership skills within a project.
* Minimal experience in being a scrum master in the group.
* Knowledge in researching topics.

# *2. Smart Industry & IoT Context*

What I understand from smart industry is that it mainly deals in industrial machines, manufacturing and production processes. A simple example of this is a factory that produces a product. Currently we are experiencing industry 4.0 because of the technology that is incorporated within this industry. This specialization for me aims to teach us as much about the current industry 4.0 as possible to prepare us for the potential coming of 5.0. In doing so, we as the future engineers are better prepared for new jobs that may come up in the future.

For now, my opinion on this study is that it will teach me a lot. Not just about the technical side of things but also other parts of an entire operation that I would typically neglect. These Include data that is being processed and used for different appliances. Another, would be the business side of the entire operation.

**(rewrite what I think about what this specialization is all about when I have more experience and a better understanding within this domain).**

# *3. Orientation*

I would be lying if I said from the start I knew which modules I wanted to do. I did have a rough idea but I was not completely certain. Orientation gave me a chance to start the process of elimination for the five modules. I knew for certain I wanted to pursue the **module of M2M** simply because anything that has to do with hardware excites me. The second module was open for choices however I was leaning towards the **IoT module**. When I got the **data and machine learning module** I will admit, it was very interesting to me how data can be manipulated to do different things. How you can process it. How you can make it predict an event. How you can store it. I chose not to pursue this module because although it was interesting to know, it was very boring. When doing the first challenge, it would easily getting boring for me. To the point where the a 1 day assignment turned into 3 days of procrastinating. When I got the first class of the **HMI module**, I was not as interested in the topic as I thought I would be. There was only one subject that interested me and that was “Digital Twins” and how the technology is used in todays world. Aside from this I didn’t like the module. The challenges themselves were fine, but it is not something for me. The intelligent management module interested gave me a bit more interest compared to the HMI class solely because I personally like the idea of leading a team to success. It was one of the choices I was considering because with some management knowledge and skill that this course could provide me I could get further in my career. Finally, I decided to chose **IoT module** solely because the teachers assured me that IoT is not just a topic for hobbyists. I chose this one because it makes more use of hardware then the intelligent management class.

## *3.1 My ambitions this semester*

As described in section 1 of this PDR, I am someone that has a strong affinity for electronic system in general. Almost every aspect of it intrigues me as to how they work and how it can relate other concepts I have learned throughout my lifetime.

With this specialization I hope to gain more knowledge in hardware programming in general and how this can work in the industry. I hope to maybe even use this knowledge in a potential project at some point in the future. I want to gain more experience with working with a company on a project so I can understand how they work a bit better.

Since all of my semesters from here on out are going to be research based, I hope to get more knowledge in how I can apply myself in certain situations when I am met with a topic that I have minimal to no knowledge on.

Finally I am here to find out what my passion really is. I am interested in electronics, but also embedded programming to some degree. C and C++ programming as well. There are a number of things I am interested in but not one that I truly want to do for the rest of my life. I hope to have a better understanding of what that is at the end of this semester.

# *4.1 Module A* : *M2M Interaction and Control*

My reasoning for choosing this module is because it aligns with my interests. As mentioned, I chose mechatronics previously because I enjoyed seeing big, and even smaller, industrial projects come to life. I made the change for personal reasons but I still miss the idea of seeing these projects come to life. In choosing M2M I feel like I am one step closer to what I love while still maintaining some distance from the physics. I enjoy coding projects. I enjoy having to come up with the idea on paper, implementing it, debugging it and re-implementing the new working version. The challenges given to me in orientation weeks were fun for me and when I asked, I was reassured that if I choose this module, then this would be the style I would be working with for the remainder of the semester.

As the semester evolves, you keep track of the knowledge you have gained in the field of this particular module. Keep it short and focus on the gained knowledge and not on delivered work (see also section 7).

# *4.2 Module B* : *IoT Communication and Infrastructure*

My reasoning for choosing this module is because it aligns with my knowledge. Like the previous module, my interests also peak when I simply hear the name of the module. In semester 3 I already gained some knowledge on this topic however just the first lesson made me realize how much I don’t know about this topic. This intrigues me and makes me want to learn more about it. On top of that, I always thought that this topic mostly applies to hobbyists. There is some truth in this case, however I underestimated how this topic can be applied in the industry. This makes me want to learn this topic to potentially pursue a career in it. This applies to the previous module as well. For these reasons I chose this module.

As the semester evolves, you keep track of the knowledge you have gained in the field of this particular module. Keep it short and focus on the gained knowledge and not on delivered work (see also section 7).

# *5. Industry project Mini-FLUFFY.*

I chose this project out of the many because of a few key reasons. Some of these reasons can be applied to other projects as well but this project ticked all of the boxes for me.

To begin with it covers hardware. Specifically PLC programming. This seems to be one of my biggest interests this semester. So when looking at all of the projects, it was between this and the factory within the technology lab. Since both offer some type of PLC programming. The second reason is my background. I always had an interest in the mechanical, electrical and software side of projects. This project enabled me to be closer to my initial mechatronics study while maintaining the programming aspect. Compared to the smart factory, there are certain topics that are discussed here such as 3D models and digital twins that I am interested in. It also offers me to see a project being programmed from nothing to something in industrial automation.

I expect to learn more about PLC logic, programming, error-handling and both the structured text and ladder languages. Next to this I also want to improve my documentation skills, so on the side I am looking into making my documents on overleaf using the LaTeX format. Since no one likes to do documentation (but I do), I expect myself to be putting in a decent amount of work here while also maintaining the basic skills I mentioned above.

As the semester evolves, you keep updating the short summary of the knowledge and skills you are gaining, the work you are doing for the project, your own contribution, products or parts of a product, research, reports, documents you have delivered, etc. Make clear what your **own contribution** has been. Find a good balance between making a good short summary of your work supported by links and references to the work you have done and delivered.

* Setting up the environment
* Research on version control
* Licences
* Experimentation with PLC programming (simple if program)
* documentation

# *6. Evidences Learning outcomes*

During the semester you collect evidence which show your progress on the learning outcomes. You summarize the evidence per learning outcome and you indicate in which context (a module, a project or other context) it took place. You do that in the given table below which displays the LO's and their (general) description. Note that you can add as many as you like/need evidences and the three examples which are given in the template are only examples. Also make sure that you provide evidences from the different modules and the project, as the learning outcomes need to be demonstrated in different contexts and more than once.

|  |  |  |  |
| --- | --- | --- | --- |
| **Learning outcome** | **Evidence** | **Module/Industry Project /other** | **Self-evaluation** |
| Analysis | Challenge 1: Bluetooth Low Energy.  <https://fhict.instructure.com/courses/13417/assignments/229840?module_item_id=994057>  In this challenge I acknowledge that I did an excellent job analysing the concepts that revolve around this topic. I spent a lot of time researching what this concept was and fully understood it. When I finally reached the implementation phase, I could understand almost every little detail of what was happening. | Module B | Orienting |
| .  . | Challenge 2: Cloud integration: AWS  <https://fhict.instructure.com/courses/13417/assignments/229826?module_item_id=994061>  In this challenge I acknowledge that I did a very good job at analysing how this technology worked. I made some simple proof of concepts to see how they worked based on papers found online. From there I formed my own analysis on how the system works and implemented an advanced topic to see if my analysis was correct. Once I got it working I labelled the challenge a success. | Module B | Beginning |
| Design | Orientation Challenge: Tuning a P-Controller for a linear servo Control.  <https://fhict.instructure.com/courses/13417/assignments/229883?module_item_id=994008>  In this challenge I will acknowledge that I did a fantastic job designing a state machine to make sure the program runs both efficiently and error free. This proves to me that I am able to sit down and think of different ways to make a system robust. | Module A | Orienting |
| .  . | Challenge 2: Automatic feeder in research facility.  <https://fhict.instructure.com/courses/13417/assignments/229819>  In this challenge I acknowledge that I further improved my design skills. Just as before I had to design a state machine for a system. This time I had an existing system and I had to re-design the state machine to fit the description of what the stakeholder wants. Most industries have already made systems that simply need improvements, so this assignment was a good practice tool. | Module A | Beginning |
| Implementation | Challenge 2: LoRaWAN to The Thing Network. <https://fhict.instructure.com/courses/13417/assignments/229837?module_item_id=994060>  In this challenge I think I did a pretty good job of taking a project with quite some troubles to set up managed to get it working weeks before it is due. I did one of the extra assignments that prove that I am still capable of using the knowledge I have gained in the past. | Module B | Orienting |
| .  . | Challenge 2: Automatic feeder in research facility.  <https://fhict.instructure.com/courses/13417/assignments/229819>  In this challenge I acknowledge that my implementation skills have improved simply because of my ability to adapt to a program structure. The system was already in place with some working functions. I was to simply re-design and implement this design. Since the implementation worked as expected I labelled this challenge a success. | Module A | Beginning |
| **Professional Development** | | |  |
| Future orientation | Project: Mini-Fluffy.  <https://fhict.instructure.com/courses/13417/assignments/229892?module_item_id=994086>  Not much can be said here other than us preparing to work on the actual project. Due to holidays there was not much to be done, however at home, I decided to look a bit further into the documentation. I also asked Oswald to see what a standard siemens S7-1200 was and he clarified some doubt I had with the project as well. | Project | Orienting |
| .  . | Challenge 2: XY-dosing laboratory systems.  <https://fhict.instructure.com/courses/13417/assignments/229920?module_item_id=994081>  Outcome I think I can describe it a bit better using this challenge. In this challenge I learned a lot from classes that I have had previously from this challenge, and based on reading the challenge alone I got a rough idea of what I wanted to do to solve this problem. After putting it on paper and confirming it with teachers I began working on it. So more planning went into this challenge compared to the rest | Module A | Beginning |
| Professional standards | Project: Mini-Fluffy.  <https://fhict.instructure.com/courses/13417/assignments/229826?module_item_id=994061>  As for my professional standard I think I made a beginning from sprint 1 by simply being on time on project dates, deliverables, and working according to what the stakeholder wants. In sprint 2, I am happy to say that I have kept the same professional standards. I like to think I also helped a group mate improve his professional standard as well. | Project | Orienting |
| Personal leadership | Project: Mini-Fluffy (grades)  <https://fhict.instructure.com/courses/13417/assignments/229892?module_item_id=994086>  Again not much can be said here about my personal leadership in the first few days. I think I did a pretty good job in maintain myself to the deadlines by working on my assignments decently early. So I am working on my own personal set goal of time-management. I think this is a good example I can give right now of my personal leadership. | Project | Orienting |
| .. | Challenge #: cloud integration (Azure)  <https://fhict.instructure.com/courses/13417/assignments/229827?module_item_id=994062>  I put azure here because when I turned this challenge in I noticed that I have kept up with my personal goal of turning in assignments on time and with the appropriate quality. Regarding time-management I think I am making great improvements because I notice I started doing most of my work in the week and taking weekends off as a break to myself. In these weekends I notice I feel like “I am not doing enough”. This is good because I did do all of my work that was needed, so I need to focus on giving myself the time to relax as well. I am going to try and maintain this and see how it goes. | Module B | Beginning |

# *7. Sprint retrospectives of your total activities and work*

Every three or four weeks (see the weekly planning) you will have a review/delivery/demo moment for the modules and for the industry project. For the modules these will be done with your module teachers, and for the industry project with the problem owner and your semester coach. After every sprint you will have a retrospective. You will reflect on **YOUR** progress, achievements, process, gaining knowledge, study load and study discipline, working method and the communication with your teachers, project group members and the clients. Include a summary of each retrospective in this document.

## *7.1 Semester Sprint 1 (wk4-wk6)*

This sprint will go over the first few weeks in the advanced phase of the course. Not much has been done for some of the subjects like M2M and industry project. More was done for the IoT course. See the appropriate sections below for additional information.

### IoT and Infrastructure:

I did the most of amount of work for this module this sprint. This is because I wanted to explore a topic I already knew (IoT) and expand it with more knowledge that I can potentially gain. I made the challenges I was supposed to within the deadline. Within that same deadline, I did the LoRaWAN to TTN challenge, which was not planned for that sprint. This is all due to my increased motivation and since I know I may struggle with this later, I decided to work forward to turn them in when appropriate.

What is also important here is my BLE challenge. The first implementation I turned in was considered incomplete due to some miscommunication. The second implementation, I quickly implemented the extra part of the challenge and turned it in. Although I provided proof of it somewhat working, it was not complete because of some small details. Seeing incomplete twice did somewhat discourage me, however I decided to sit down and carefully look at the problems. I managed to fix all of the problems that were mentioned and tested the program to make sure that it worked fine.

### Machine to Machine interaction:

I did not do as much work for this module as I would’ve hoped to do in this sprint. We received our first challenge which was the automatic feeder. The classes I did learn a fair bit about Simulink and testing out motion actuators. I learned a bit more about the PID of a system and I got a quick idea of what the mini projects are.

Towards the end of the sprint, I started working on the assignment so I can meet the deadline. The deadline for this was the second week of the second sprint. I managed to finish the assignment on time before delivering this to my teacher. During the assignment I have think I have progressed in my designing and implementation learning outcomes of this project. More will be said in section 6.

### Industry Projects:

For industry project I think I did rather decent in terms of both a team member and as a professional. Due to not having much time this sprint, it was kept rather short. The aspects I can mention were the professional meetings, the research that was done, the projects plan, and the environment that was established to program in.

The first week I had a meeting with the stakeholder (Omar Idoum), my Fontys coach (Ben Schreur) and my group members. Here we got acquainted with the Mini-Fluffy project. This was also a good use of our time since we had the opportunity to ask questions about both the system and about the requirements.

The following week we established some quick rules on what we expect form each other. This week we had our first stand-up with Ben about the intentions of the group and what we are going to do to tackle this project. Here he gave us some tips on the project plan we began writing and changed our point of view on a few topics (see feed pulse section). Finally, one of my group mates started experimenting the environment and from there we managed to import the PLC device in the project.

## *7.2 Semester Sprint 2 (wk7 - wk10)*

In this sprint I am a bit more acquainted with everything regarding my two modules and my project. This sprint felt like I did an equal amount of work for every subject compared to the previous sprint where I did more for one and less for the other. Below you will find the details. It was also a sprint where although I did an equal amount of work for both modules, it still felt like I wasn’t doing enough. This was fine to me because I was using this time to find an internship instead.

### IoT and Infrastructure:

As mentioned in the previous sprint, I managed to finish the LoRaWAN to TTN challenge before this sprint. After that, We got acquainted with the concept of the cloud using Azure and AWS. We started off with AWS and I managed to finish the basic parts of the assignment within one day. By then end of that week I tried finishing one of the advanced parts of the assignment. Overall I feel like my problem solving and analysis skills have gotten better with each IoT challenge. The azure challenge was a bit harder regarding problem solving. I have tried my best to solve most of the problems but I could not. So I focused more on what I already had and improving that and helping others get to the same point I was.

The next thing I want to mention is my mini project choices. I made my choices purely because I think I want to go a bit deeper into certain topics of IoT. While I liked almost every, I could only choose three so I chose the three I would want to do.

### Machine to Machine interaction:

This is a follow up on the first challenge. I managed to turn the assignment in and I began working on another mini challenge. This challenge was to connect the Raspberry PI as a PLC device and program it using CODESYS. The majority of it was mostly installation. The sources were somewhat outdated so I had to do a bit of my own research to implement this. Once I had it working, I implemented a simple switch program that turns an LED on and off. I made it in simulation and physically by wiring an LED to the correct GPIO pin o the PI. I provided a video of this. This was one of the assignment (despite being short) that I was the most proud of. This is because Despite me having some troubles with it, I never once thought to ask my colleagues for help. This was partly because I thought I was the only one that began the assignment. From there I think I had to find new ways of tackling the problem rather then just asking for help. I am not saying asking for help is bad, because it saves a lot of time and you can learn from others as well but this was felt like I put in more effort to complete the challenge.

In this sprint we got acquainted with the dosing challenge and what is expected of us to complete it. I started experimenting with it by just tuning the servo. I enjoyed this part because the classes we get for M2M seemed a bit redundant at first, but when this assignment is being made, you could see all of the points coming back together in the assignment. If you paid attention in the classes, this part of the assignment went by rather easily. So I enjoyed applying what I learned in the first part of the assignment.

The second part of the assignment I began working around the state machine I want the system to run. Once finished I began working on the logic behind the states.

### Industry Projects:

This sprint for industry project was great for me personally. It was fun to do all this research on how PLC programs work. How the devices can be configured. How to read electrical diagrams. All of this was very fun to do because again I did not need to ask for help. Most of the material I found experimenting with Proof of concepts or online research. We began by finally formatting the PLC and begin experimenting with the Mini-Fluffy.

While experimenting with the system we ended up finding a problem that was not described before to us in the previous documents. We brought this up with our stakeholders after noticing that the initial project also had the same problem. In the end we decided to skip over this, however we ended up running into another problem. This one was cased by us and we need to find a way to fix this problem still.

## *7.3 Semester Sprint 3 (wk11 – wk13)*

## *…..*

## *7.4 Semester Sprint 4 (wk14 – wk17)*

## *…..*

## *7.5 Semester Final delivery*

# *8. Evaluation and Reflection*

Add an evaluation and a reflection of your whole Smart Industry and IoT semester. Your evaluation describes what went good and bad during your process and how you dealt with that. Your reflection describes how **you** have grown as a person, and what **you** will take with you in your further professional career. In the reflection you should also shine a light on the following aspects:

### *Gaining technical knowledge*

### *Improving professional skills*

### *Problems solving capabilities*

# *9. Feedback and Feed pulse*

A screenshot of a chat

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Here I receive feedback from my IoT teacher stating that the assignment I delivered was not complete. In the assignment itself it stated that one section was optional. This was an issue that was based on canvas and the GIT. I added the additional feature while also remaking my document to fit the “research” style documents. From here I just made it a standard for myself that if there was an “advanced” section In the assignment, that I would just make one or two.

A screenshot of a computer

Description automatically generated

Here The feedback that was received in the standup meeting from our Fontys stakeholder, was written down so that we can come back to it. The feedback was very constructive, for me both for Industry project and normal assignments.