

Personal Development Report

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Smart Industry and IoT Specialization Semester 4

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1. 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.

My definition of smart IoT right now can only be limited to what I have learned in my two modules, however in those two modules, I can already see how they interact with each other. From what I heard about other students in other modules as well, you can see the interaction between their modules and my modules as well. So I am very pleased to hear and say that the specialization is indeed structured in a way that makes everything come together into one big context. I think that this specialisation, if refined, could be an entire study on its own. If this were the case, I think I would choose this study without skipping a heartbeat.

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 get 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 today's 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 me a bit more 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 choose **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 than 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.

I am proud to say I have learned a considerable amount on PLC programming itself but also PLC logic. This can fall under devices that aren't exactly PLC but can function as one. Think of the Monarco hat and raspberry PI. This module was my favourite. By the end of it, I wanted to buy my own personal PLC. It taught me how to properly design software so that it can be modular as well as robust.

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.

This semester made me realize that I have a lot of love and appreciation for libraries that are facilitating our usage of sensors and protocol functionalities. I have learned to improve on these libraries to keep them slightly up-to-date. It also thought me more protocols to consider when working on different projects.

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.

- Setting up the environment
- Research on version control
- Licences
- Experimentation with PLC programming (simple if program)
- Project plan
- Test documentation
- Showroom demonstration
- Main program logic

6. Evidences Learning outcomes

Learning outcome	Evidence	Module/Industry Project /other	Self-evaluation
Analysis	<p>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.</p>	Module B	Orienting
.	<p>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.</p>	Module B	Beginning
	<p>Challenge 2: XY-dosing Laboratory systems. https://fhict.instructure.com/courses/13417/assignments/229920?module_item_id=994081 In this challenge I acknowledge that I did a very good job at analysing first how the system already worked and how it was supposed to work. After doing this small research and making a small design, I was able to make it work using a built in function that shifts bits to the left. I think this was a bit extra however this made the system function exactly how I intended it to.</p>	Module A	Beginning
	<p>Industry Project: Mini Fluffy (Teams). https://fhict.instructure.com/courses/13417/assignments/229911?module_item_id=994097 This week we had to fix some simple problems on the mini-fluffy while also beginning to implement some of the requirements that are expected. One of the problems we had was implementing the systems HMI to work with the actual system. One key factor into getting it to work was performing doing analysis on how specific key variable types functions. For example there is the input and the output. But there is also the memory type. This type made it possible to implement a start button for the system that actually works.</p>	Industry Project	Beginning
	<p>Mini-Project: STM32 Lora research: https://fhict.instructure.com/courses/13417/assignments/229899 In this case, I was responsible for performing analysis on what was already available for use on the connection to TTN aspect. Again, since there was not much available on</p>	Module B	Proficient

	<p>the topic, a majority of it was performing analysis on what was available and making a design to fit what we needed. Additionally, I have done some extra research on a soil moisture sensor that has a built-in Lora module. This allowed it to connect to online platform like TTN. Although the research was kept short due to time, it was pleasing to see that connection to the platform was possible.</p>		
	<p>Mini-Project: Monarco Hat. https://fhict.instructure.com/courses/13417/assignments/229900 A majority of this project was based on analysis since there is not many projects that have been done before on this device. The documentation itself was excellent to the point where, even though it was outdated, we were able to do extra digging and find what we needed. This is where I feel like my analysis skills have really impressed both me and my group mate. Now the device has our own up-to-date documentation on how to set it up and making different implementations.</p>	Module A	Advanced
Design	<p>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.</p>	Module A	Orienting
.	<p>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.</p>	Module A	Beginning
	<p>Mini-Project: STM32 Lora Research. (teams) https://fhict.instructure.com/courses/13417/assignments/229899?module_item_id=994063 In this challenge I acknowledge that I did some work on design how the project should look and how we plan on tackling the problem. The basic outline should be that the first part of the sprint should be focused on the simple connection between them. Finally after the connection is established, they send each other packets containing information.</p>	Module B	Beginning

	<p>Industry Project: Mini-Fluffy (teams) https://fhict.instructure.com/courses/13417/assignments/229911?module_item_id=994097 Next to the improvements made on the system and additional features being added, we refined the designs to show how the system works. These are so far based on the basic movement of the solenoids found throughout the system. It was also based on the transfer unit functionalities.</p>	Industry Project	Beginning.
	<p>Challenge 2: XY-Dosing Laboratory. https://fhict.instructure.com/courses/13417/assignments/229920?module_item_id=994081 In this challenge I acknowledge that my design skills are up to my own personal standard. This is because after analysing and understanding the system, I was able to make a more robust design that handles almost all cases. I implemented the system according to this design and it worked.</p>	Module A	Proficient
	<p>Mini-Project: STM32 Lora Research. (teams) https://fhict.instructure.com/courses/13417/assignments/229899?module_item_id=994063 For this project, we had to design a node-red dashboard next to the TTN connection. I was responsible for the design on how to connect it to TTN. The design was also based like a how-to manual on what tools to use, how to correctly configure them and then observing if everything is working as intended.</p>	Module B	Proficient
	<p>Industry Project: Mini-Fluffy (teams) https://fhict.instructure.com/courses/13417/assignments/229911?module_item_id=994097 In this case, I was responsible for designing the test documents. These tests were based on predefined use cases by my colleagues and me. Additionally, there are more tests that don't cover the use cases, but the program itself.</p>	Industry Project	Proficient
	<p>Mini-Project: Monarco Hat: https://fhict.instructure.com/courses/13417/assignments/229900 For this project, we designed a simple step-by-step plan on how to first connect the Monarco Hat to your machine so that it can be then programmed to perform your projects. The how-to manual was the highlight of everything, as this was never done at Fontys before according to our knowledge. Oswald was very pleased with this as he said that if he could give us a grade higher than outstanding, he would.</p>	Module A	Advanced
Implementation	<p>Challenge 2: LoRaWAN to The Thing Network. https://fhict.instructure.com/courses/13417/assignments/229837?module_item_id=994060</p>	Module B	Orienting

	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.		
	<p>Challenge 1: Automatic feeder in research facility. https://fhict.instructure.com/courses/13417/assignments/229819</p> <p>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.</p>	Module A	Beginning
	<p>Challenge 2: XY-dosing laboratory systems. https://fhict.instructure.com/courses/13417/assignments/229920?module_item_id=994081</p> <p>in this challenge I acknowledge that my implementation skills have improved. This is because I can clearly see the improvements made on my first PLC programs and my current ones. In the beginning I was more focused on making it work. Now I am more focused on making sure it both works and runs optimally.</p>	Module A	Beginning
	<p>Mini-Project: STM32 Lora Research (teams) https://fhict.instructure.com/courses/13417/assignments/229899?module_item_id=994063</p> <p>During this challenge I realized that I am able to adapt to situations different than what I am used to. In this case, I am familiar with 3 development environments to program my microcontrollers. However none of these worked for this research, so after adapting and finding a new environment I was able to have an implementation ready to demonstrate in front of the class midway to mini-project course.</p>	Module B	Beginning
	<p>Industry Project: Mini-Fluffy (teams) https://fhict.instructure.com/courses/13417/assignments/229911?module_item_id=994097</p> <p>As previously mentioned, this sprint was more focused on implementing new features, such as the HMI of the system. Additionally we worked on improving the already existing implementation on the system. We also finally began working on the final bits of the logic behind the system.</p>	Industry Project	Beginning.
	<p>Mini-Project: STM32 Lora Research (teams) https://fhict.instructure.com/courses/13417/assignments/229899?module_item_id=994063</p> <p>in this project I was responsible for the implementation of the connection from the board to TTN. Later I came across that the intended way to do this implementation</p>	Module B	Proficient

	<p>was through the first project we used. This had both the ping pong and the TTN example in the entire directory. The way I did it was by using an external library called the LMIC-node. It was somewhat outdated but also decently up-to-date at the same time. So I had to make some changes but nothing to big.</p>		
	<p>Mini-Project: Monarco Hat: https://fhict.instructure.com/courses/13417/assignments/229900 After connecting the monarco hat to our device, we wanted to make a simple project to showcase the system working. This kind of led us into both a simple project using LEDs and buttons and then making a more complicated project using PWM control on the device. These were both documented and provided to the teacher as he was pleased with these as well.</p>	Module A	Proficient
Professional Development			
Future orientation	<p>Industry 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.</p>	Industry Project	Orienting
.	<p>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.</p>	Module A	Beginning
	<p>Mini-Project: STM32 Lora Research (teams) https://fhict.instructure.com/courses/13417/assignments/229899?module_item_id=994063 I have always been good at planning ahead for my tasks. I always plan for them and execute them in a timely manner. So this is one of the outcomes I think can reach advanced if I do everything right till the end of the semester. For this part of the semester, I had already planned how the project should go, and so far everything is going according to plan. If by the end everything goes well, then I would have a soil sensor implemented alongside the stm32 board to send data to the things network.</p>	Module B	Proficient

	Mini-Project: Monarco Hat: https://fhict.instructure.com/courses/13417/assignments/229900 The intended goal of this project was just to somehow make some improvement on connecting the system to our machines. We have not intended on making simple projects at all. However it was made and we were significantly happy with this.	Module A	Proficient
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.	Industry Project	Orienting
	Challenge 2: XY-dosing laboratory systems. https://fhict.instructure.com/courses/13417/assignments/229920?module_item_id=994081 My professional standard has remained the same by keep track of what I do, making sure everything is on time and improving my communication skills. In this case I spoke plenty with the teacher outside of the class to better understand what he wants ready for the assignment. This helped significantly as I was able to turn this in before the deadline with good functionality.	Module A	Beginning
	Mini-Project: STM32 Lora Research (teams) https://fhict.instructure.com/courses/13417/assignments/229899?module_item_id=994063 I have gotten better at communication when working in groups as well as working in a professional standard. Firas has taught me to keep him within the loop, when we are performing research. This is how he is able to keep up with us to better discuss future plans. Next to this improvement, I also confronted my group mate about not doing any work for the first half of this project and there was a change of heart on his side. Now he is working alone on the second part, as I am fixing documentation and doing research on an optional third part of this assignment. I think this is a good step as I was able to have the “hard” conversations in a group project.	Module B	Proficient
	Project: Mini-Fluffy. https://fhict.instructure.com/courses/13417/assignments/229826?module_item_id=994061 In the final weeks, I noticed I was getting sick. I was unable to attend one of my project days as a result of this. This didn’t stop me from contributing to the project. I ended up doing extra on the days I had off to at least	Industry Project	Proficient

	<p>contribute something to my past day that I was not there. This show somewhat of a professional standard in my opinion to not leave my group hanging.</p>		
Personal leadership	<p>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.</p>	Industry Project	Orienting
..	<p>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.</p>	Module B	Beginning
	<p>Mini-Project: STM32 Lora Research (teams) https://fhict.instructure.com/courses/13417/assignments/229899?module_item_id=994063 As stated before, I have confronted my group mate about how he has not contributed to the group project at all. I bring this up again because It provided me an opportunity to think about how I would do a project on my own. Considerable amounts of planning have to be thought of, and of course the workload would need to be split for this as well. This was good leadership on my end (next to confronting him) because now that he is working, it offered me more time to focus on other things.</p>	Module B	Beginning
	<p>Challenge 2: XY-dosing laboratory systems. https://fhict.instructure.com/courses/13417/assignments/229920?module_item_id=994081 This assignment gave me a chance to show my leadership skills by taking initiative and asking around for help. I asked for the help of an old friend that did the semester previously, as well as from my teacher who has clarified what needs to be done. This resulted in me taking the</p>	Module A	Beginning

	advice from both my friend and my teacher, and improving upon this with my own implementation.		
	<p>Mini-Project: STM32 Lora Research (teams)</p> <p>https://fhict.instructure.com/courses/13417/assignments/229899?module_item_id=994063</p> <p>Due to my group mate not meeting my standards or doing simple tasks in the beginning and in the middle of the project, I had to take action to make something I'm proud of to deliver. In this case, I just assumed that I would be doing the entirety of the project on my own, and that made me replan the entire project and what I think is a good workload for myself. This showed personal leadership as I was able to adapt the circumstances and make the best of the situation.</p>	Module B	Proficient

7. Sprint retrospectives of your total activities and work

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 LoRa WAN 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 from 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 LoRa WAN 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 of 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 than 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 caused by us and we need to find a way to fix this problem still.

7.3 Semester Sprint 3 (wk11 – wk13)

This is the sprint I think I am the most acquainted with all of the modules and all that I could have learned from them. This sprint was primarily based on finishing up on the last challenges available for both modules, making progress in the project and begin thinking about the mini-projects I want to do for these modules. Due to me being abroad for an international project representing Fontys, I was unavailable for one of these weeks as well. A majority of this work was done in the first week, and the last bits of it in the final week.

IoT and Infrastructure:

I was assigned the STM32 Lora research mini project to work on for the remainder of this semester. This project was my second choice but its proving to be more fun than I thought. The first week was mostly researching the topic, available resources available, previous projects and so on. There was not much regarding projects online. As for documentation, it was mostly what was available already on the existing websites, or the forum pages with the appropriate topic.

The way I intended the project to go was to treat it like the initial Lora assignments. One where I would connect two devices together and the next where I would connect one device to the things network. As for the optional part of this project, I am open for additional things that can be done. At the time of writing this, in week 13, Renata suggested a soil sensor that is implemented with a Lora module.

The first part of this assignment was already done and the documentation behind it has also been made.

At the time of this report, my group mate has begun working on the second part of this project. He will attempt to make an implementation which connects to the things network.

Machine to Machine interaction:

The focus of this sprint was to finish the XY-dosing challenge and then begin working on the mini-project. The state machine for the XY-dosing was made in the end of the previous sprint, this sprint, this was

implemented. It took some time and research, but after a week and a half, the challenge was finished and then turned in. It was rather difficult as Oswald made it in a way that fits as if someone had left the code mid-way through. I liked this form of assignment because it forced me to adapt the program into a more functional one while keeping the same principles as the previous ones. It also allowed me to learn a bit about other concepts I didn't know existed in PLC programming.

The final week of this sprint, we began working on the mini-project for this module. I chose to work with another classmate on the Monarco Hat project. It is something that hasn't been researched before for this module and it seemed interesting to work on. The final week of the research was spent installing images on the board, but so far unsuccessful. We hope to make some type of progress in the first week of sprint 4, to determine what we want to turn in for our project.

Industry Projects:

In this sprint we finished working on the basic loop that the system runs on so now the system has the same functionality as it did when we first begun. The stakeholder has advised us to ignore the problem for now and build our implementation around it instead. After we got confirmation to do this, the implementation went by quickly. By the end of the sprint we had the mini-fluffy working exactly as it did, when we first got it. Additionally, we have an HMI system that was taking in the data from the sensors and displaying this on the screen.

The HMI was mostly done by another groupmate, however I made sure I understood what he was doing by doing something similar to pair programming. After understanding what He does with two of the nodes, I tried it for myself on his computer for the remaining 4 nodes. This way we had a simple PoC working. The last day of the sprint was focused on making the PoC nicer to show.

Additionally, the improvements were made on the logic we had already implemented before and now the system has no faults it did when we first started working. I was part of figuring this logic out so I included that in this section as well. Additionally, the HMI was made to look nicer, ready for the show case we will have at the start of the next sprint.

7.4 Semester Sprint 4 (wk14 – wk17)

This sprint, like the last, I am already acquainted with the modules. The focus of this sprint was to work on all of the mini-projects that I was assigned to and get as far with them as I can. This sprint I was able to finish 1 of my mini-projects while making considerable progress on the other. More on this in their respective section. I also want to mention that I was invited to represent Fontys at the "Vision, Motion & Robotics" fair that takes place in den Bosch. I was tasked with presenting the mini-fluffy to students that are interested in it as well as companies that were interested in what the students make.

IoT and Infrastructure:

This sprint I focused on getting the board to work with the things network. For this initially I wanted to explore different libraries that serve this purpose. I ended up working with simply one and going deeper with that same library. Making an instance of the device on device went good. All that was left was connecting it using the library. Initially, there were some problems, but these were all solved by changing some parts of the configuration file. All of which was found with the help of the documentation available on the library. After it began transmitting to the network, I declared the project finished with all of the mandatory steps done.

Additionally, I wanted to improve the existing version of the project. I did this by connecting this to node-red and displaying the data I receive there. This data was encoded in a specific format, so I had to decode it as well so it can be human readable. This part was also successful as I was showing this data accurately and real-time in the dashboard.

Finally, I worked on a sensor that can be inserted into soil so it can take readings and send this data to my network via Lora. This worked fine with the help of a library found online with the sensor. The data however I was unable to display due to the dashboard they used, being discontinued. To make this sensor work, I would need to refactor the code to a newer, existing dashboard that exists and transmit the data to this as the current version of the data is being sent in one long payload. I want to see how far I can get with this. Again, this step is purely for my own benefit and not mandatory.

Machine to Machine interaction:

This sprint we finally managed to make an existing image function. The process to get to this point was difficult but it was finally done. Oswald was very pleased with this and we agreed with him that we would write the report of all of this in the form of a “How-to” manual for the next group to come.

With the device working, we began working on some simple projects that we can showcase on the device. Here we managed to make a simple program that uses logic gates to control when a timer starts. This was all done with the onboard HMI feature. To take it a step further, we wanted to make these control physical as well. We were able to connect two buttons and an LED to simulate everything. All of which worked in the end and we were able to write a report based on our findings so far.

We hope to continue on by upgrading our project as much as possible till the end of the semester. As for now, Oswald is very satisfied with our work.

Industry Projects:

For this sprint we have made improvements on the HMI as it now looks nicer. We are now working to get it functional with multiple windows. We also began researching the potential of logging this data from the HMI so it can be used later on.

While this was all happening, the project station was also scheduled to be showcased at a robotics. I was tasked to do this one of the days of the fair. Sadly, the linear actuator malfunctioned at the fair and was stuck in place like the previous ones in the beginning. We ended up turning the actuator off and then brute forcing it down to continue working on the last part of the logic.

In the last part, the task was to finish the logic that would check if the next station would be free. This way we are able to run multiple pallets and not have to worry about timers elapsing and pallets crashing into each other. This was a success as we have showcased this in one of the meetings. Sadly I was not available for the final version of this due to being sick. I initially only worked on the base behind this logic that would later serve as a design to be used to make the logic work. The week I was sick, I contributed slightly by beginning to look into data logging.

7.5 Semester Final delivery

8. Evaluation and Reflection

This semester was in my opinion one of the best semesters I have had in my entire career. In the beginning it felt quite easy and I thought I would not be doing a lot for this semester. Then I noticed that if I spent my time doing more research on the topics I am most interested in, the semester would be not only a bit more challenging but also more fun.

Gaining technical knowledge:

In this semester, I was able to get a considerable amount of knowledge I didn't think I would need in my career. All of this knowledge I have come to appreciate as it depends on which one I am working on. Now looking back at previous projects, I would apply different technical methods to further improve them. Additionally, the knowledge I gained this semester I would hope to improve in the coming future.

Improving professional skills:

This semester taught me more about professional standards when it comes to working in groups. About a quarter of the semester I had to work with group mates. This taught me that I had to adapt myself to different groups based on what they require of me. The semester taught me to plan my tasks better as the project in a way was defined by me, so I would also need to define what I consider "done". Finally, the project also taught me that not every project group is perfect and there is room for someone not pulling their weight. This required me to adapt myself and the project scope in a short period of time but in the end it was all successful.

Problems solving capabilities:

This semester I think my problem solving skills have reached an all time high so far in my career. Due to the semester being research based, most of the answers were not already available online for me to simply find and build around those. I had to go find those answers myself. This was the case for both modules. More so in M2M. This for me was very fun, because although it can be demotivating to work hours on end just to not have it working, the moment it finally works, is a feeling unlike any other. This semester made me fall in love with ICT all over again and I hope coming semesters have the same effect.

9. Feedback and Feed pulse



Beks, Mark M.L. at Mon Mar 18, 2024 10:09am

This is still incomplete: can you try to implement the environmental service?



Domacassé, Johnson J.H.M. at Mon Mar 18, 2024 2:15pm

sure thing! Can you also elaborate a bit on why the assignment was incomplete? from my perspective, every requirement was met (except for the optional one of course)




Beks, Mark M.L. at Mon Mar 18, 2024 4:16pm


sure, that is marked optional. However, without the environmental service you really haven't learned much. You just run the code from a tutorial with minimal change. If you try to implement the environmental service you actually need to do a little bit of research and learn much more

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.

Checkpoint 1 lwk7-friday-meetup 05-04-2024

**Geurts, Kevin K.** an hour ago
Feedback 5-4-2024
We talked about the following:

- Do research relatively early to determine which requirements can be met and which ones cannot. This information is then communicated with the stakeholder to see how we can move forward.
- Make functional and non-functional requirements.
- Make More smaller requirements to have smaller simple task.
- Break down tasks into smaller tasks (this way we can achieve smaller "victories")
- Budgeting our time to have a more efficient workflow. In other words, say you have 15 minutes for a tasks, you try to do that task within 15 minutes to avoid spending hours on it.



Write a summary of what you discussed with your teacher...

Post feedback

Students in this group

Search students...

Daamen, mats M.R.
[Domacassé, Johnson J.H.M.](#)
Geurts, Kevin K.
Geus, Thijs T.
Kapitein, Milan M.

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.

