CDD

Capability Development Document

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Summary

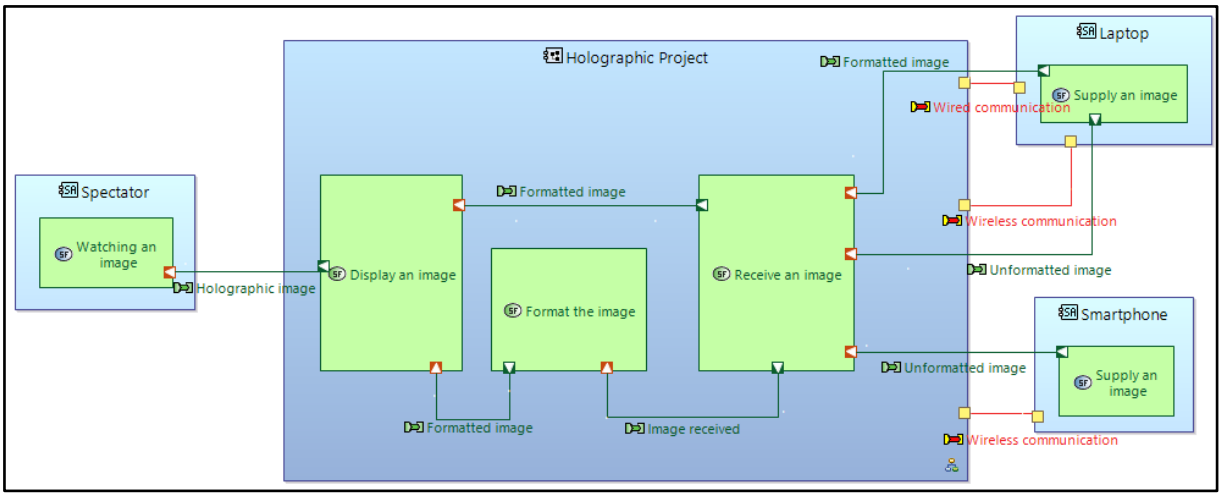
Introduction

This 2nd year engineering cycle project proposed by the Engineering Physics and Embedded Systems speciality for its students is called ‘Holographic Fan. It was assigned to the writers of this document at the beginning of the school year and is spread over the year. It consists of concretising the project during the first semester of the year. This first part includes 3 presentations during which the students are assessed on their progress. By 17 January, students must have a usage scenario, a functional diagram, preferably drawn up in Capella, and technical solutions. They must also be able to demonstrate critical functions or high added value with a prototype. The second semester will be devoted to manufacturing.

The final holographic propeller must be able to act on an image chosen by the user in order to display it. This will be achieved by rotating a paddle at a constant speed, on which LEDs will be distributed at regular intervals, flashing according to a programme also written by the project members. The code must be easy for the user to install, so it will be an installable software/application. The final object will be exhibited during the school's open days and should promote the ‘engineering physics and embedded systems’ speciality.

1- Functional synoptic diagram of the project

1-1 Use case



1-2 Fast digram

The purpose of the fast diagram is to go through the major functions found by analyzing the life cycle of the product in order to make a specification table.

Easily transportable				
	Be compact			
	Be lightweight			
	Resist impacts			
Be divisible into several parts				
	Design a modular structure			
		Avoid numerous connections		
		Limit the number of modules		
Easy mountable				
	Be quick to assemble			
		Have a limited number of assembly steps		
		Require little assembly time		
	Require minimal tools			
Rotate to display an image				
	Rotate the fan			
		Rotate the LED strip		
			Rotate the LED strip simultaneously	
			Rotate the LED strip quickly	
			Have a sufficient number of LED strips	
			Have the required power to rotate the LED strips	
	Light up the LEDs			
		Light up the LEDs at the right moment		
			Identify the position of the LEDs	
				Light up the LEDs according to angular position
		Display without being disturbed by surrounding light		
			Ensure sufficient brightness	
		Have a sufficient number of LEDs		
Import an image from the user's device				
	Access user files			
		Restrict selection to predefined formats		
Process the imported image				
	Automatically resize			
	Adjust quality			
	Preview image			
Export the image to the fan				
	Connect the software to the fan			
		Connect quicky		
		Maintain a stable connection		
		Be close to the fan		
	Export the image to the fan quickly			
Be intuitive to use				
	Easily access features			
		Require minimal scrolling to access main features		
	Guide the user			
		Display the process (instructions) on the home screen		
	Have a clean interface			
Provide rotational stability				
	Limit vibrations			
		Distribute weight evenly on the base		
	Reduce wind resistance			
Power supply				
	Prevent the user from coming into contact with the fan during operation			
		Maintain a minimum distance from the user		
	Protect the user's eyes			
		Do not exceed a luminance threshold		
Power electrically				
	Provide sufficient voltage			
	Adapt power to components			
Facilitate recycling at end-of-life				
	Use recyclable materials			
	Make system components accessible			

The fast diagram of the project

1-3 Specification table and conformity test planned

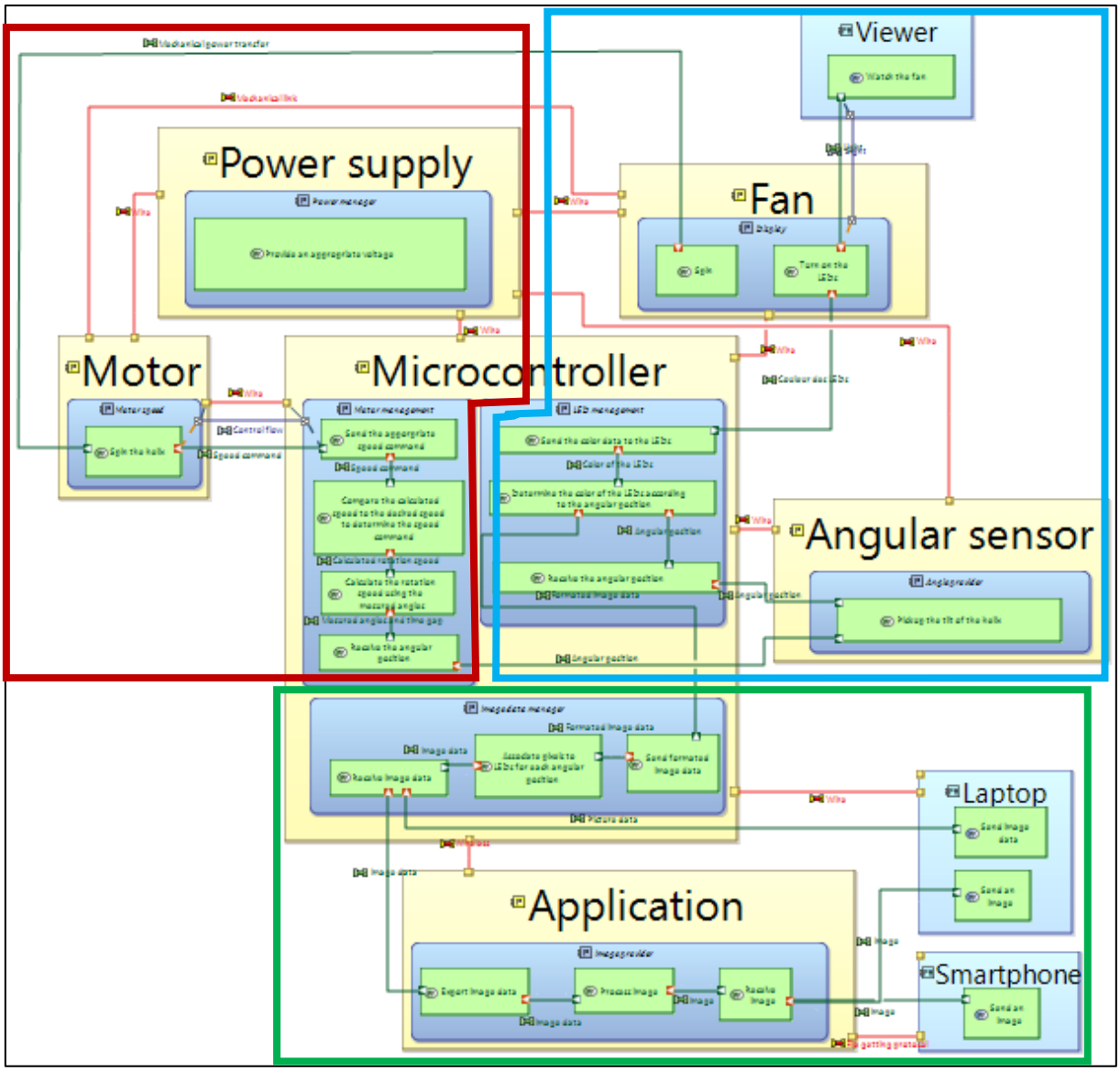
Grade 1	Criteria	Value	Tolerance	Conformity
Easily transportable				
	Volume	< 500x150x600 mm	+ 20mm	Measure
	Weight	< 5 kg	+1kg	Weigh
	Force	10 N	+/-1	
Be divisible into several parts				
	Number of connections	<10	+2	Count
	Number of modules	<5	+1	Count
Easy mountable				
	Number of steps	<5	+1	Count
	Time	<5min	+30s	Clock the time
	Type/Nb of tools	<=1	+1	Count
Rotate to display an image				
		x	x	
	Rotation speed	>700RPM	-50RPM	Datasheet/by way of angular measure
	Number of LED strip	>=2	-1	Count
	Electrical power	>24W	+/-1W	Measurer by way of voltmeter et ammeter
	angular position	x	+/- 1°	Datasheet
	Luminance	>1200cd/m2	-100cd/m2	Simulation by way of Tracepro
	number of LEDs per blade	>=180	+/-1	Count
Import an image from the user's device				
	Image formats	png, jpg, jpeg ,gif	x	Test each predefined format
Process the imported image				
	Dimensions	1:1	x	Put an image that is too big and check the adaptation
	Number of pixels	>[512x512]	-10	Calculate from rotation speed and flashing speed/Compare real image and display image
		x	x	Do you see the image on the app/site
Export the image to the fan				
	Connection time	<10 s	+2 s	Clock the time
	Bandwidth	> 2Mbps	-0,1Mbps	Calculate from export time and send file size
	Distance	<10 m	+ 1 m	Try at the maximum distance requested and beyond until the cutoff
	Export time	<10 s	+2 s	Clock the time
Be intuitive to use				
	Number of scrolls	<= 1	+1	Count
		x	x	Give the app to newbies and ask what they think of it
		x	x	Give the app to newbies and ask what they think of it
Provide rotational stability				
		x	x	
		x	x	Try to rotate by way of airflow
Power supply				
	Distance	>10 cm	-2 cm	Try to touch the fan when it is operating and see if you can touch it
	Luminance	<1500 cd/m2	+100 cd/m2	Using a luminance meter
Power electrically				
	Voltage	>12 V	-0,5 V	Use Voltmeter
	Electrical power	x	+/- 1 W	
Facilitate recycling at end-of-life				
		x	x	Check recyclability of materials, avoid composite materials
		x	x	Check the accessibility of the different components individually

Specifications and conformity

2- System architecture

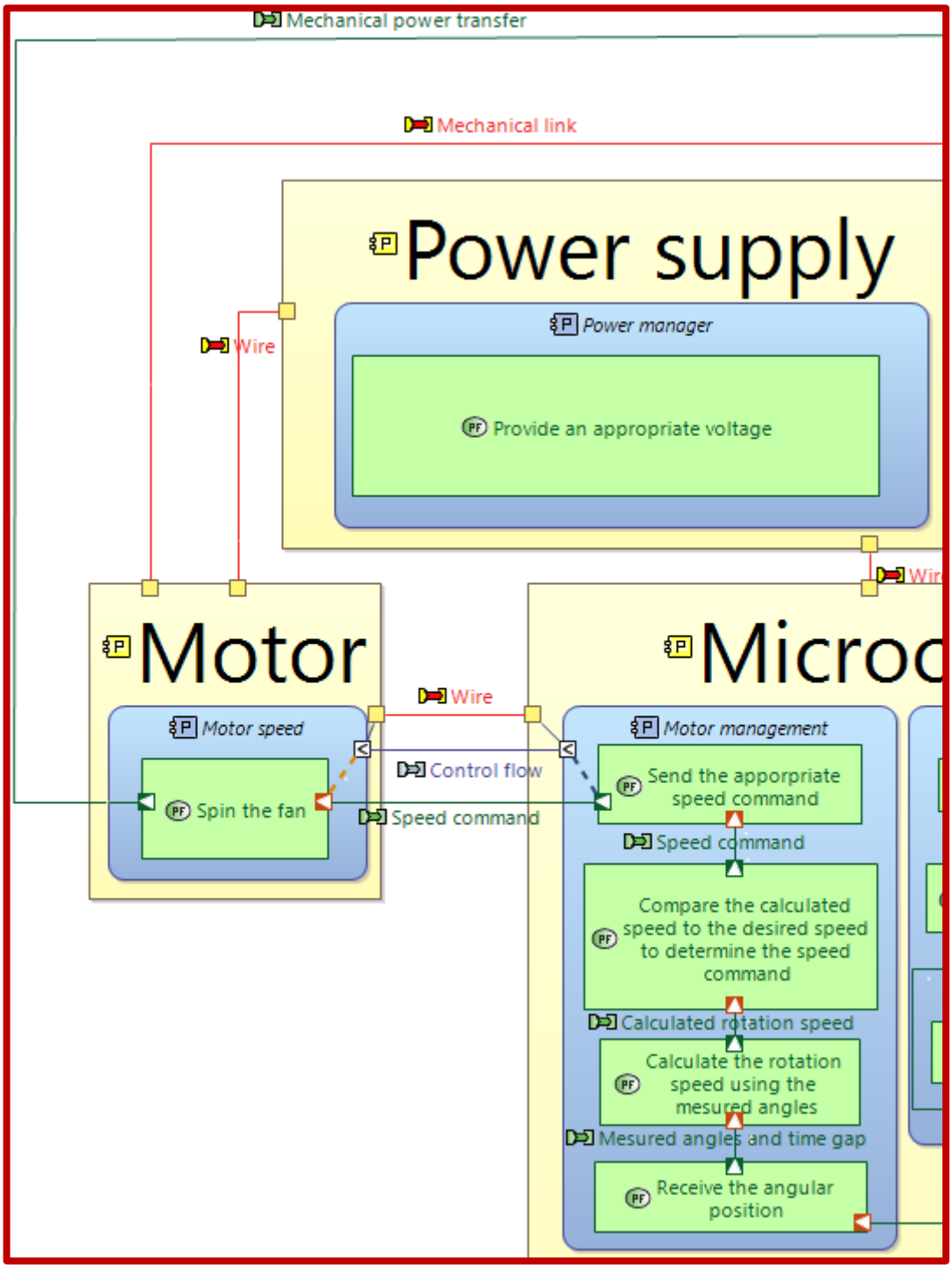
The system architecture shows the main components used for the system, their behaviours and their relationship to each other.

2-1 Global view of the system architecture



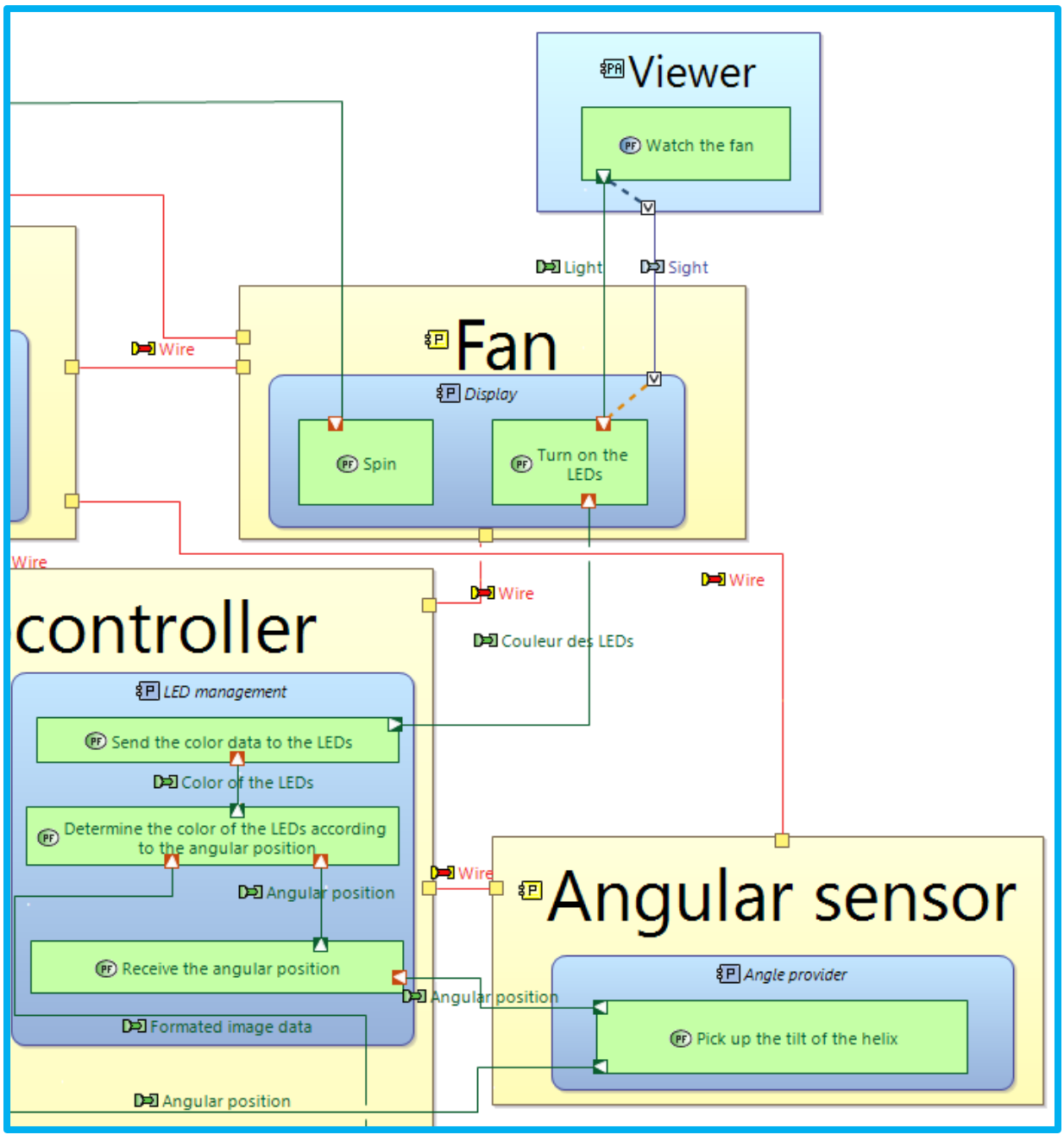
Global view of the system architecture on Capella

2-2 Motor management and power supply



Motor management and power supply architecture on Capella

2-3 Fan, Angular sensor and LED management



Angular sensor, LED management and fan architecture on Capella

2-4 Application and image data

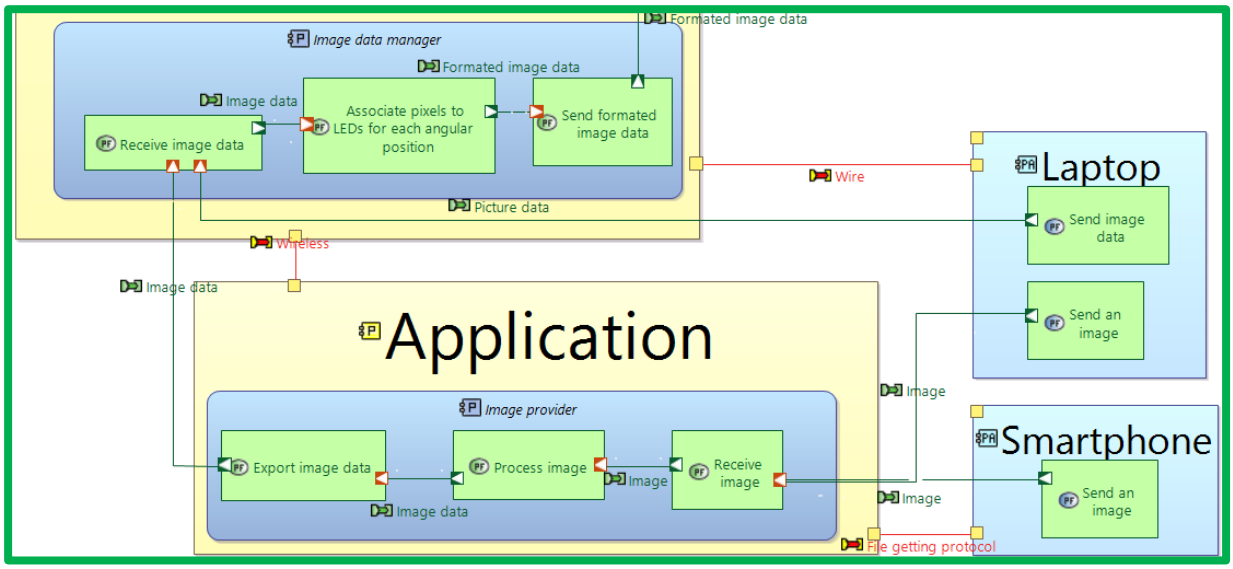


Image data and application architecture on Capella

3- Functional set

3-1 Application and image data management

The objectives of this functional package

To be able to display an image on the fan, the first thing needed is the image and its data. As we want everyone to be able to use the fan, we need to create an application that allows users to choose an image and to send it to the fan, which will then display it. However, the fan has a limited resolution and not every image will fit. To make sure any image of any resolution or any format can be displayed, the app needs to be able to open any format of image and to have the user crop an image to the fan resolution. The application also needs to be able to connect to the fan wirelessly and to send the data of the cropped image, while still being intuitive. Finally, the fan needs to associate each pixel of the image to each of its LED and angular position.

Choices

In this part of the project there were very little choices to make. The most important is the choice of the framework in which the application will be coded. As the application is supposed to be accessible to everyone, it needs to work on IOS, Android and Windows devices. To do that there are two ways possible: create different applications in different frameworks for each type of device or create one application in a cross-platform framework.

Whatever choice was made, we had to learn to use at least one framework that we didn't know before. To gain time, it was decided to use a cross-platform framework and learn only one framework. The most interesting for us was the .NET MAUI framework, using C# for the backend and XAML for the frontend. However, in case we don't manage to learn it in time, we consider using the first choice as backup for the frameworks we already know (such as C# WinForm for Windows devices).

Considering the choice of the wireless technology, we had the possibility to choose either Bluetooth or Wi-Fi. In theory, both technologies are fast enough to upload the data from the app to the fan. For simplicity reasons, it was decided to use Bluetooth. To do so, we decided to use a HC-06 Bluetooth receiver on the fan's end.

Detailed technical description

The chosen framework is called .NET MAUI and uses C# and XAML to do the backend and frontend of cross platform applications. The application we intend to program should first be able to get a picture file from the user's device and let the user crop it. The formats supported should be at least .png, .jpg and .gif. If the resolution is too high (more pixels than the fan can display), the application should reduce the resolution by using average RGB values of a certain group of pixels. If the resolution is too low (the fan has more pixels than the image), several fan pixels will show the same image pixel. The application should then allow the user to send the data to the fan.

The HC-06 Bluetooth receiver is a 16mm by 37mm module that works on Bluetooth 2.0 communication protocol between frequencies of 2,402 GHz and 2,480 GHz. It can only receive data and transmit it via UART to the microcontroller. It can receive and transmit data up to a rate of 2,1 Mb/s. Its 4 pins are Vcc (power voltage, 5V), GND (Ground), TXD (transmitter data pin for UART protocol), and RXD (receiver data pin for UART protocol).

3-2 Engine and engine management

The objectives of this functional package

To make the fan spin fast enough to trick the eyes (approximately 10 rotation/s for a dual blade fan). At high speed the eyes won't be able to see the spinning blades of the fan. Thus, he will only be able to see the light emitted by the LEDs, creating the illusions of a floating image or more commonly named a hologram. While doing so, the blades must stay fixed to the fan to ensure security and functionality. The blades must also be inaccessible while they're spinning so that no one can hurt themselves by getting too close.

To ensure that the illusions and the image are maintained the blades need to spin at a constant speed so there is also a need for a controller/manager.

Choices

Motors were easily chosen as the way to make the blades spin, as they are specialised at creating rotational forces. 3 types of motors could be used to make the blades spin:

- Stepper motor (DC): + constant speed, precise control / - low speed
- Continuous motors (DC): + cheap, high speed / - speed variation
- Brushless motors (DC): + high speed, constant speed, precise control / - difficult to control

The brushless motors were finally chosen as they were the most adapted one, having a constant and high speed of rotation. An ESC (Electronic Speed Controller) being the easiest and most used way of controlling a brushless motor, it was decided to use one.

Detailed technical description

A A2212/15T 930KV brushless motor was bought with its associated 30A ESC. It's a tri-phased motor which spins by alternatively changing the magnetic force of the motor's coils. This model is a cylinder, 22mm high and with a 12mm radius . It has 15 turns per magnetic poles and can generate a speed of 930 RPM / Volt.

It's speed, stability, controllability will be tested, as well as its torque to check its limits.

3-3 LED management and angular sensor

The objectives of this functional package

The main objective of this functional package is to ensure synchronization between the LEDs and the angular position of the rotating fan. By achieving precise timing and precise colour control of the LEDs, the system aims to recreate a clear and stable image when the fan spins. This involves being able to send the colour to the LED, the LEDs having good sensitivity and coordinating the activation of the LEDs based on real-time position feedback from the angle sensor. The microcontroller-LED connection must be managed so that communication is as fluid as possible. Each LED needs to know what colour it should be as quickly as possible.

Choices

In this part there is the choice of the angular sensor and, of course, the LEDs

After careful consideration, the APA102-2020 LEDs were selected for their high refresh rate, individual control and communication protocol (SPI). These features make them ideal for maintaining synchronization with the angular position of the fan, which is crucial for displaying a stable image. However, other LEDs, such as the APA104-1010, were also evaluated for their smaller size, but were not chosen due to their single-wire communication, which could complicate high-speed timing accuracy as well as their lack of stability at high speed.

The second key decision focused on the angular position sensor. Accurate and reliable position feedback is essential to synchronize the LEDs with the rotation of the blades. The AS5600 sensor was chosen for its compact size, high precision and I2C communication protocol. Other sensors, such as optical rotary encoders or rotary resolvers, have been evaluated but rejected due to complexity, cost, or less favourable integration with the rest of the system.

The last key decision concerns the microcontroller used to control the LEDs and the sensor. The two options were the Arduino or the STM32. The Arduino is simpler to code with already existing libraries for the chosen LEDs. Certainly, less efficient than the STM32, coding in Arduino will save considerable time.

Detailed technical description

APA102-2020 LEDs are RGB LEDs measuring 2mm by 2mm. The objective is to glue them one by one to make 150 (the total length being 300 mm for the blades). Each LED requires 32 bits of data: 8 bits for brightness and 24 bits for RGB colour control, with 8 bits per colour channel. Operating at a voltage of 5 V DC, each LED consume approximately 60 mA at maximum brightness (for pure white). For a configuration of 150 LEDs, the total consumption is around 45 W at full power. Their high refresh rate of up to 20 kHz, theoretically without scintillation.

The AS5600 magnetic rotary position sensor provides precise 360° angular measurements. With a resolution of 12 bits (4096 positions for 360°), it can more easily detect the position of the blade to send the information to the LED. The AS5600 operates over a voltage range of 3.3V to 5V and consumes only 6mA. The sensor communicates with the microcontroller via I2C. This can work simultaneously with the LEDs which are in SPI.

3-4 Power supply and the fan

The objectives of this functional package

The mechanical connection between the motor and the fan must be determined in order to ensure stable power transmission. The best way to power the rotating part should be identified to avoid any risk of damage to the cables. Finally, it is necessary to design an optimal armature, defining the best way to arrange the LEDs on the propeller to produce a holographic display.

Choices

Solutions had to be sought and found for this part. The first step was to identify the best way to feed the system. Then find out how to make the propeller blade. We also had to find a way to power a part that was running, so it wasn't possible by cable. Tables with selection criteria according to their importance have made it possible to identify the best solutions that will be kept for manufacturing.

		System Power		
Criterias	**Weighting %**	**Rechargeable battery %**	**Sector %**	**Batteries %**
Minimum Voltage	22,2	100,0	100,0	100,0
Availability at Polytech	22,2	100,0	0,0	83,3
Autonomy after full charge	18,5	60,0	100,0	80,0
Small Size	14,8	100,0	25,0	100,0
Little Weight	11,1	100,0	66,7	100,0
Mobility during shifting	7,4	100,0	0,0	100,0
Rechargeability	3,7	100,0	100,0	0,0
Total /100	100,0	**92,6**	55,6	88,9

Criteria table for the system power

		The blade	
Criterias	**Weighting %**	**PCB %**	**Led strip %**
Need of manufacturing	26,7	50,0	100,0
Possibility of customization	20,0	100,0	0,0
Durability	20,0	100,0	33,3
Ease during maintenance	20,0	66,7	0,0
Clutter in the system	13,3	50,0	50,0
Total	100,0	**73,3**	40,0

Criteria table for the blade

		Powering of the blade	
Criterias	**Weighting %**	**Slip rings %**	**Induction %**
Good power transmission	40	100,0	75,0
Little mechanical complexity	30	66,7	66,7
Lifespan	20	0,0	100,0
Low price	10	0,0	100,0
Total	100	60,0	**80,0**

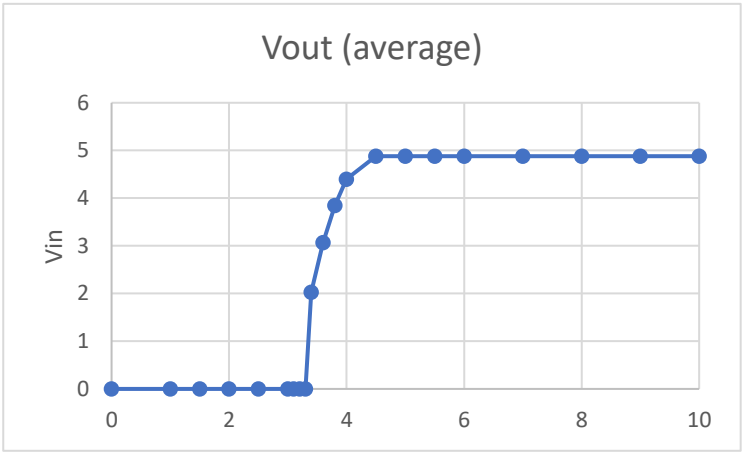
Criteria table for the powering of the blade

Detailed technical description

At the end of this, the choice to use rechargeable batteries, to make the blade in the form of a PCB as well as to power the rotating part by induction was kept. Components have been ordered for initial induction testing. We had to find the transmitted voltage according to the distance.

Fixed distance = 0 mm	Vin V	Vout (average) V
	0	0
	1	0
	1,5	0
	2	0
	2,5	0
	3	0
	3,1	0
	3,2	0
	3,3	0
Distorted signal	3,4	2,03
Distorted signal	3,6	3,07
Distorted signal	3,8	3,85
Near-continuous signal	4	4,4
Continuous signal	4,5	4,88
Continuous signal	5	4,88
Continuous signal	5,5	4,88
Continuous signal	10	4,88

Table of the evolution of the output voltage according to the input with a fixed distance



Graphic of the evolution of the output voltage according to the input with a fixed distance

	Distance mm	Vout
Fixed voltage = 5 V	0	4,88
	2,5	4,8
	5	3,8
	7,5	2,1
	10	0
	15	0
	20	0

Table of the evolution of the output voltage according to the distance with a fixed voltage (5V)

	Distance mm	Vout
Fixed voltage = 12 V	0	4,88
	2,5	4,88
	5	4,88
	7,5	4,88
	10	4,88
	12,5	4,88
	15	4,88
	17,5	4,88
	20	4,7
	22,5	0
	25	0
	27,5	0
	30	0

Table of the evolution of the output voltage according to the distance with a fixed voltage (12V)

4- Risk analysis

	Catastrophic (5)	Considerable (4)	Medium (3)	Low (2)	Negligible (1)
Certain (5)	25	20	15	10	5
Probable (4)	20	16	12	8	4
Occasional (3)	15	12	9	6	3
Rare (2)	10	8	6	4	2
Unlikely (1)	5	4	3	2	1

Identified Risk	Probability of occurring	Impact on the project	Risk score	Proposed solution to reduce the risk
~~HOLO3DLED company that does not send the promised package~~	~~Probable~~	~~Negligible~~	~~4~~	~~Not be dependent on the study of a functional fan~~
Injury caused by the fan while spinning	Unlikely	Catastrophic	5	Make the fan untouchable during its rotation
Application/Site unable to handle traffic	Rare	Catastrophic	10	Make the app/site independent of traffic
Too high ambient light (indoors)	Rare	Medium	6	Ensure a brightness equivalent to the indoor lighting standard
Fan that flies away	Rare	Catastrophic	10	Ensure sufficient weight of the base
Blades that detach	Rare	Catastrophic	10	Keep the blades fixed and prevent unscrewing via vibration
Fan that pitches	Occasional	Considerable	12	Light fan/Stable Base (Big Block?) and Stable Axis of Rotation
System Short Circuit	Occasional	Considerable	12	Spare part and test point (circuit breaker?)
No compatibility with any system (IOS, Android, Windows, etc)	Probable	Medium	12	Used a Cross-System Programming Tool
Image processing problem	Rare	Considerable	8	Pre-Display Confirmation Step/ Simple Image
Fan connection problem	Unlikely	Catastrophic	5	Keeping the distance reduced as possible and without obstacle

Conclusion

In summary, this project on the development of a holographic fan combines technical innovation and practical engineering to achieve a visual effect. It demonstrates the application of core concepts in motor control, LED synchronization, wireless communication, and image processing, all while adhering to safety and usability standards. Moving forward, careful implementation of the proposed solutions and continuous testing will ensure that the final product is both functional and impressive, serving as a compelling showcase for the Engineering Physics and Embedded Systems speciality.

Table of Appendices

A - All useful sources

Lien Web:

Engine & Engine management

https://arduino.blaisepascal.fr/controler-un-moteur-brushless/

https://youtu.be/xiRyQOrpP0E?

https://youtu.be/Be50YbIuTuc?

https://stsolutions.ch/principaux-types-moteurs-electriques/

https://eric-walschaerts.canoprof.fr/eleve/LES_MOTEURS/LES_MOTEURS_ELECTRIQUES/

https://conceptek.net/fr/techniques-de-base/conception/machines-et-composants/quels-sont-les-diff%C3%A9rents-types-de-moteurs-%C3%A9lectriques

https://www.electricity-magnetism.org/fr/5-types-de-moteurs-electriques-les-plus-communs/

https://interactive.3demotion.net/blog-helice/#:~:text=Son%20principe%20est%20simple,ne%20voit%20pas%20l'h%C3%A9lice

https://matel.com/wp-content/uploads/fiches_techniques/MLHHx

https://www.plv-hologramme.fr/helipix

LED management & angular sensor

https://files.seeedstudio.com/wiki/Grove-12-bit-Magnetic-Rotary-Position-Sensor-AS5600/res/Magnetic%20Rotary%20Position%20Sensor%20AS5600%20Datasheet.pdf

https://www.mouser.com/datasheet/2/737/APA102_2020_SMD_LED-2487271.pdf?srsltid=AfmBOoohDNiSU36U6w5PKeeTQEbeQk5pGfmWQD-KM6JJ3rQY8_dBXoU6

Application and data

https://www.youtube.com/watch?v=Hh279ES_FNQ&list=PLdo4fOcmZ0oUBAdL2NwBpDs32zwGqb9DY

ImageCropper.Maui 1.2.3 on NuGet - Libraries.io - security & maintenance data for open source software

Votre Arduino communique avec le module HC-06 • AranaCorp

Getting RGB array from image in C# - Stack Overflow

Implementation of the Bluetooth Connectivity Using .NET MAUI

https://youtu.be/mMByPw8_TMw?list=PL-oGQIjmlO23SJ3Pim42ImNGW4ci2xcoX

Power supply and fan

https://www.gotronic.fr/art-coupleur-10-piles-lr6-em10-5724.htm

https://www.gotronic.fr/art-connecteur-eco-9v-en-i-5696.htm

https://www.gotronic.fr/art-module-de-charge-par-induction-wcm5-1-31351.htm

B – Software

DSEE Labs Software for PC & Phone: Link

Visual Studio 2022: Link

Arduino IDE: Link ; Libraries: AccelStepper (1.64), SoftwareSerial (1.0)

C - CSR approach

For our project, we wanted to be as ecological as possible. Being a non-ecological project due to critical raw materials, inevitable in electronic components, we want to follow an environmentally friendly life cycle.

For the following items, our main objectives are in bold and our overshoot objectives are to be able to achieve everything

- ➔ **Selection of materials with the least environmental impact**
- ➔ **Optimization of product's lifespan**
- ➔ Reduction in the quantity of materials
- ➔ Reduce the environmental impact of the use phase
- ➔ Optimization of the end of life of the system

We have already accounted for :

Selection of materials with the least environmental impact

- Rechargeable battery
- Divisible into several parts

Optimization of product's lifespan

- Try to use sustainable materials from ethical sites

Optimization of the end of life of the system

- Facilitate recycling at end-of-life

List (not exhaustive) of raw materials present in our project:

- PLA (support)
- Polycarbonate (protection panel)
- Copper (wires and PCB)
- Silicon (semi-conductor)
- Polyepoxyde resin (PCB)
- Stainless steel (motor)

D - Distribution of work

	Mustafa	Axel	Cédric	Abigail
Tasks completed				
Use case	25	25	25	25
Life cycle	25	25	25	25
FAST diagram	25	25	25	25
Specifications table	25	25	25	25
Risks table	5	5	90	0
Corporate social responsibility	5	5	0	90
Capella	30	65	5	0
Application + Image data manager	0	100	0	0
Engine + Engine management	0	0	100	0
Led management + angular sensor	0	10	0	90
Power Supply + Fan	80	0	20	0
Gantt	100	0	0	0
Analysis of received propellers	20	0	80	0
Report and slides	40	20	20	20
Prototype	35	45	20	0
Task distribution table	95	0	5	0

E - Self-assessment of skills acquired/strengthened and CV

FICHE COMPETENCES / C.V.

BROCHARD Abigaïl

INGENIEUR en « éclairagisme »

Description du poste/métier envisagé :

J'aimerais pouvoir travailler dans le domaine de l'éclairagisme dans les domaines de la colorimétrie, de l'éclairage public ou en laboratoire. J'aimerais travailler en enteprise pour pouvoir devenir cheffe de projet finir ma carrière dans la formation.

Projets, stages et mobilité intern. réalisés :

- 2021 – Stage de 3 mois dans le cadre d'un BTS TPIL (Techniques Physiques pour l'Industrie ou le Laboratoire) dans le laboratoire ICMN au CNRS d'Orléans.
  - Création d'un dispositif de lévitation acoustique
  - Création d'une boîte pour étude d'échantillons à humidité et température contrôlées
- 2022 – Projet de seconde année de BTS intitulé : "Est-il possible d'associer une station météorologique et un dispositif de récolte du miel ?"
  - Partie Informatique Arduino sur l'affichage des données sur une application, une macro Excel et un afficheur RGB
- 2023 – Stage au laboratoire ICMN au CNRS d'Orléans dans le cadre d'une 3e année d'école d'ingénieur en Génie Physique et Système Embarqués à Polytech Orléans
  - Etude de l'eau « activée »

Soft-Skills :

Rigueur	●●●○○○
Curiosité	●●●●●○
Créativité	●●●●●○
Adaptabilité	●●●○○○
Autonomie	●●●●○○
Coopératif	●●●●●○

Langues :

TOEIC	775
Anglais	●●●●○○
Allemand	●○○○○○
Français	●●●●●○

Compétences

Techniques :

Acquises :

- Word et Powerpoint
- Soudure
- Arduino basique
- QT

A conforter :

- C ++ et python
- STM8
- COMSOL

Méthodologiques :

Acquises :

- Gestion de projet
- Travail d'équipe
- Aisance oral

A conforter :

- Gestion du temps et des priorités
- Patience

Théoriques :

Acquises :

- Bases de l'électricité
- Base de l'optique
- Colorimétrie
- Etude d'un laser

A conforter :

- Physique des matériaux
- Laplace

Self-assessment of skills acquired/strengthened – Mustafa

My role in this project is unique because I am responsible for project management in addition to completing my personal tasks as a team member. Initially, I worked on the "Power supply and the fan" part of the project while actively participating in all the collaborative work. I also worked with Axel using Capella to write the use case and the functional diagram. Together with Axel, we built the prototype of the propeller. Later, I will handle the design and manufacturing of the PCB, which will be the core of the project — the blade. My role as project manager also required me to guide my teammates when necessary. I led our group meetings to assign tasks according to each member's preferences and ensured an equitable distribution of work as best as possible. Additionally, I propose the topics for each PEA session and organize calls outside of PEA to coordinate everyone's availability. I am also responsible for overseeing the general structure of the reports and presentation slides, preparing the format, introduction, and conclusion so that each member can later add their personal contributions. It is my responsibility to monitor project progress to avoid delays. I try to stay ahead with my personal work on the documentation to set an example for the others to follow. I also created the project Gantt chart, though I am not fully satisfied with it, as I feel it does not adequately reflect each member's involvement. I believe I can improve in this area.

My personal contribution to the project has allowed me to enhance my electronics skills, particularly in working with inductive energy transmission, and I collaborated with Axel on the prototype. I also learned to use Capella by applying what we studied with Mr. Drouin. This project revisited project management concepts I began exploring last year, including use cases, functional diagrams, etc. I volunteered to be project manager because I wanted to develop all the skills this role entails, and I am satisfied with the practical experience I have gained so far.

Spécialité Génie Physique et Systèmes Embarqués — Polytech Orléans

FICHE COMPETENCES / C.V.

TOPBAS Mustafa

INGENIEUR en « GPSE »

Description du poste/métier envisagé :

Ingénieur en SE dans une grande entreprise pendant
5 voire 10 ans puis création d'entreprise de production.

Projets, stages et mobilité intern. réalisés :

- 2024-2025 (9 mois) Projet hélice holographique (Chef de projet)
- 2024 (1,5 mois) Entreprise manufacturière de pièce industrielle en Turquie
- 2024 (3 mois) Projet luminaire – réalisation de cartes (parties intelligence)
- 2023 (1 mois) Projet début d'année Fablab – Réalisation du support pour l'escalier de Chambord du Fablab
- 2023 (1/2 mois) Projet de fin d'année de Peip – Démonter et comprendre laser
- 2022 (4 mois) Projet robot – réalisation d'un robot à roues

Soft-Skills :

Rigueur	●●●●●○
Curiosité	●●●●○○
Créativité	●●●●○○
Adaptabilité	●●●●●○
Autonomie	●●●●○○
Coopératif	●●●●●●

Langues :

TOEIC	880
Anglais	●●●●○○
Turc	●●●●●○
Français	●●●●●●

Compétences

Techniques :

Acquises :

- Réalisation de soudures
- Lecture de datasheet
- Réalisation de PCB

A conforter :

- Réalisation de cartes électroniques
- Utilisation découpeur laser
- Utiliser les outils d'une salle blanche

Méthodologiques :

Acquises :

- Faire/suivre un CDC
- Identifier un cas d'usage
- Rédaction de compte rendu
- Présentation orale
- Rétroplanning
- Choix des composants
- Schéma fonctionnel

A conforter :

- Faire une fiche technique
- Capella

Théoriques :

Acquises :

- Langage : C++
- Physique du transistor
- Physique du plasma
- Protocoles de communication I2C, UART, SPI
- Maths/physique niveau 4A GPSE

A conforter :

- Langage : C, python
- Filtrage

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FICHE COMPETENCES / C.V.

DA CRUZ Cédric

INGENIEUR en Génie Physique et Système Embarqué

Description du poste/métier envisagé :

Ingénieur SE dans une entreprise qui se focalise dans la robotique, l'électronique ou l'informatique pendant au moins 5 ans

Projets, stages et mobilité intern. réalisés :

- 2022 (4 mois) Projet de réalisation et programmation d'un robot
- 2023(1/2 mois) Fragmentation d'un LASER et exposition
- 2023 (1 mois) Projet de conception d'un solveur de Rubik's Cube
- 2024 (4 mois) Projet de réalisation d'un luminaire

Soft-Skills :

Rigueur	●●●●○○
Curiosité	●●●●○○
Créativité	●●●○○○
Adaptabilité	●●●○○○
Autonomie	●●●●●○
Coopératif	●●●●○○

Langues :

TOEIC	925
Anglais	●●●●●○
Français	●●●●●○

Compétences

Techniques :

Acquises :

- Réalisation de soudures
- Suite Microsoft

A conforter :

- CAO
- Schéma électronique
- Conception de carte
- Outils de salle blanche

Méthodologiques :

Acquises :

- Cahier des charges
- Compte rendue
- Présentation oral/Exposition / Explication

A conforter :

- Retroplanning
- CAPELLA

Théoriques :

Acquises :

- Langage C++
- Résolution d'équations différentielles
- Types de moteur électrique et fonctionnement

A conforter :

- Langage C/C#/Qt/Python
- Filtrage (Analogique et Numérique)
- Optique géométrique & ondulatoire

FICHE COMPETENCES / C.V.

LEROY Axel
INGENIEUR en GPSE

Description du poste/métier envisagé :

Je souhaiterai travailler dans les systèmes embarqués, dans une entreprise stable afin de pouvoir y faire carrière. L'industrie de l'armement me plaît tout particulièrement.

Projets, stages et mobilité intern. réalisés :

- 2022, 2023, 2024 (6 mois) CDD agent municipal
- 2022 (4 mois) Projet robot de Peip 1
- 2023 (2 semaines) Projet informatique de Peip 2
- 2023 (1 mois) Projet Fablab début d'année : réalisation d'un support pour l'escalier de Chambord imprimé au Fablab
- 2024 (4 mois) Projet 3A
- 2024 (en cours) Projet personnel : conception et fabrication d'une table de lancement pyrotechnique
- 2024-2025 (en cours) Projet 4A

Soft-Skills :

Rigueur	●●●●●○
Curiosité	●●●●○○
Créativité	●●●○○○
Adaptabilité	●●●●●○
Autonomie	●●●●●○
Coopératif	●●●●○○

Langues :

TOEIC	980
Anglais	●●●●●○
Français	●●●●●●

Compétences

Techniques :

Acquises :

- Réalisation de soudures
- CAO (creo, Proteus 8, TracePro)
- Utilisation de découpeuse laser
- Réalisation d'une POC
- Lecture de datasheet

A conforter :

- Réalisation de cicruits imprimés à partir de composants simples
- Utilisation d'imprimante 3D
- Utilisation de matériel salle blanche
- Utilisation de Capella

Méthodologiques :

Acquises :

- Faire et suivre un CDC
- Conceptions de rapports aux normes universitaires
- Présentation orale
- Choix de composants adaptés

A conforter :

- Réalisation de fiches techniques
- Réalisation d'un rétroplanning
- Utilisation de la méthode Arcadia

Théoriques :

Acquises :

- Langages informatique (C, C++, html, php, C#)
- Bases en mathématiques et pyhsiques
- Physique du transistor

A conforter :

- Langages informatique (python, SQL, QT, CSS, XAML)
- Filtrage