List of components/materials and the suppliers

This document presents a list of components and materials, along with their suppliers and additional explanations. Two separate lists have been created: one for the final product and one for the prototype. This distinction is necessary, as the prototype must be developed within a budget of 100.00 euro. To minimize costs while still demonstrating the functionality of the final product, available components and materials from the school and project group have been utilized.

Final product

Definition to buy	**Component/Material**	**Weblink/Origin Component/Material**	**Price [€]**
Controller kit	Raspberry pi kit	Botnroll	134,90
Protective case/stand for tablet	To be built (PLA printer)	Fablab	126.40
Screen protector tablet	Screen protector	Tablet depending screen protector	20,00
Used Tablet	Tablet	Second hands tablets from people	75,00
Used Pencil For tablet	Touch Pen For tablet	Second hands pencil from people	10,00
Projector	Project To Display The Drawings	Optoma ML1080.	989,00
Protective case for projector	To be build (metal plats)	Leroy merlin	8,49
Total cost			€ 1.363,79

Additional Explanation – Final Product

- **Controller**: In our product, we need a central control center that will act as a server, database, and projector connection hub, managing the connection between the user and the projector placed on the station.

For this reason, it must meet the following requirements:

Requirement	Description
HDMI	The central control center must support HDMI output to connect with the projector for video and audio transmission.
Power connection	A reliable power source must be available to ensure continuous operation of the system and connected devices.
Installable Software	The system must support installable software to manage configurations, updates, and settings for both the server and projector.
Wi-Fi Connection	A stable Wi-Fi connection is essential for wireless communication between the user, control center and drawing tablet.
Processing Power	The control center must be powerful enough to maintain a web server and support the installation and operation of a database.

These requirements are met by several minicomputers, which are listed below. During their comparison, factors such as community size and support will also be considered, as they will greatly enhance the process of troubleshooting and advancing the project.

Controller	Local Providers
Raspberry Pi	Mauser Ptrobotics Farnell Electrofun
Intel NUC	Worten Chip7
Odroid-HC4	Kubii
Beelink	Kuantokusta

We will compare the central controllers of our system based on the following criteria: Price Range, Software Availability, Lifespan, Connection Options, Maintenance, Community Support, and Development Opportunities. Each of these factors plays a critical role in the overall performance and sustainability of the system, so they will be thoroughly evaluated to determine the best option for our needs.

Criterion	Description	Raspberry Pi	Intel NUC	Odroid-HC4	Beelink
Price [€]	The cost of the device and its components, impacting the overall budget.	35 - 90	160 - 900	80 - 140	160
Software Availability	The availability of software for system management and	High (Linux, RPi OS)	High (Windows, Linux)	Medium (Linux, Android)	Medium (Android, Linux)

	compatibility with tools.				
Lifespan	The expected duration of reliable operation of the device.	Medium (5-6 years)	High (7+ years)	Medium (5-6 years)	Medium (5-6 years)
I/O Options	The variety of ports and connectivity options (USB, HDMI, etc.).	High (HDMI, USB, GPIO)	High (HDMI, USB, Ethernet)	Medium (HDMI, USB, Ethernet)	High (HDMI, USB, Ethernet)
Maintenance	Ease of maintaining and upgrading the device, including software and hardware.	Medium (DIY-friendly)	Low (Professional service)	Medium (DIY-friendly)	Medium (DIY-friendly)
Community Support	The strength and activity of the user community for troubleshooting and development.	High (Large community)	Medium (Active but smaller)	Medium (Smaller)	Medium (Smaller)
Development Opportunities	The potential for customizing and extending the device for specific applications.	High (Flexible, GPIO)	Medium (Limited flexibility)	Medium (Limited)	Medium (Limited)

Raspberry Pi is the best option due to its low cost, extensive software availability, and strong community support, which makes it ideal for DIY projects and rapid development. It offers excellent flexibility, especially with GPIO pins for hardware integration, and has a wide range of compatible software, including various Linux distributions. Its lifespan is sufficient for most applications, and its connectivity options (HDMI, USB, GPIO) cover most needs. The large and active community ensures easy troubleshooting and continuous updates, making Raspberry Pi a versatile, cost-effective, and well-supported choice for this project.

For the list of materials and components, a Raspberry Pi starter kit was selected to ensure that all necessary accessories, including the charger, SD card, and casing, are included.

Webpages where specifications can be found:

Raspberry

Intel

Hardkernel

Bee-link

• **Protective Case/Stand for Tablet**: To prevent theft or unintended movement, a protective case will be designed and 3D-printed using PLA. PLA is selected due to its lightweight properties, strong mechanical durability, and environmental benefits it is 100% bio-based and biodegradable. The choice of 3D printing also allows for easy customization based on the tablet's dimensions.

- The price for printing at Fatlab is 0,06 euro/g + 10 euro setup time.
- The volume of the protective case is 1552 cm^3.
- The density of PLA is 1.25 g/cm^3.

That gives a total price for producing the protective case 126.40 euro.

• **Screen Protector for Tablet**: To ensure the longevity of the tablet screen, a high-quality screen protector will be used. Market research indicates that good-quality screen protectors typically range around 20.00 euro, though exact pricing depends on the tablet model.

• **Used Tablet**: Since only the touchscreen functionality is required rather than advanced computing power, cameras, or other features, a second-hand tablet is the most cost-effective choice. A review of multiple second-hand marketplaces suggests that a suitable model can be acquired for approximately 75.00 euro, though this may vary depending on availability and condition.

• **Used Pencil for Tablet**: Similarly to the tablet, a second-hand drawing pencil will be obtained to reduce costs while maintaining functionality. Based on market research, the estimated cost for a compatible used stylus is 10.00 euro.

• **Projector Selection**: A key component of the project, the projector must meet specific quality requirements to function effectively. Research into available models led to the selection of the Optoma ML1080, a compact, high-performance projector with the following advantages:

- **Brightness & Visibility**: The ML1080 utilizes RGB triple laser technology, ensuring clear projection even on concrete walls and under varying lighting conditions.
- **Durability & Stability**: Unlike traditional lamp-based projectors, the laser light source has longer lifespan and lower maintenance requirements. Additionally, it can withstand minor vibrations, such as those caused by passing trains, ensuring a stable image.
- **Energy Efficiency**: The ML1080 operates with a low power consumption of 62W, making it an energy-efficient option.
- **Compact & Portable**: At only 1kg, it is lightweight and easy to install, making it an ideal choice for the project setup.

The range of the projector is 1.594m - 2.657m. This will make the projector suitable for most waiting stations.

• **Protective Case for Projector**: Although the projector will be placed out of reach, further protection against vandalism or accidental damage is essential. To ensure security, a custom metal protective case will be constructed. Given that the projector is the most expensive component of the setup, additional safeguarding measures are justified to extend its lifespan and maintain performance.