

Antonin Beliard

Building useful systems

Learning through software, data and teamwork.



Selected work

Provenance · TRIC Robotics
Ascendant Trials · Ecorobotix

Inside the portfolio

Four experiences, considered through three competencies.

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A developing engineer

Connecting information, software and real systems.

Purpose and profile

I am a second-year student in EPITA's five-year engineering programme, in the specialty year of the French preparatory cycle. I work in French and English. My experience spans a mobile application, agricultural robotics internships, a cooperative game and integration work in a software team. [P1, P2]

I selected four experiences to explain how I build, learn and contribute. Provenance gave me responsibility for an application. TRIC Robotics connected software to measurements and physical equipment. Ascendant Trials required my work to fit a shared game. Ecorobotix placed my contributions inside existing services and team processes.

Each experience involved connecting separate components into a useful system: presenting a database through an interface, organising sensor readings, sharing state between game clients or integrating tools into an existing environment.

1 Translate practical needs and data into useful software

Choose representations and interfaces that answer a practical need.

2 Learn independently, debug and verify results

Move from a symptom to an explanation, then retain evidence of the check.

3 Collaborate and communicate technical work clearly

Make responsibilities, interfaces and decisions understandable to others.

These competencies combine implementation with judgement: deciding what is useful, checking whether it works and making the work understandable to others.

The cases connect my contributions to evidence and reflection. The final pages assess my strengths and identify practical improvements for future projects.

Learning by making

An international education, followed by practical projects.

Academic background

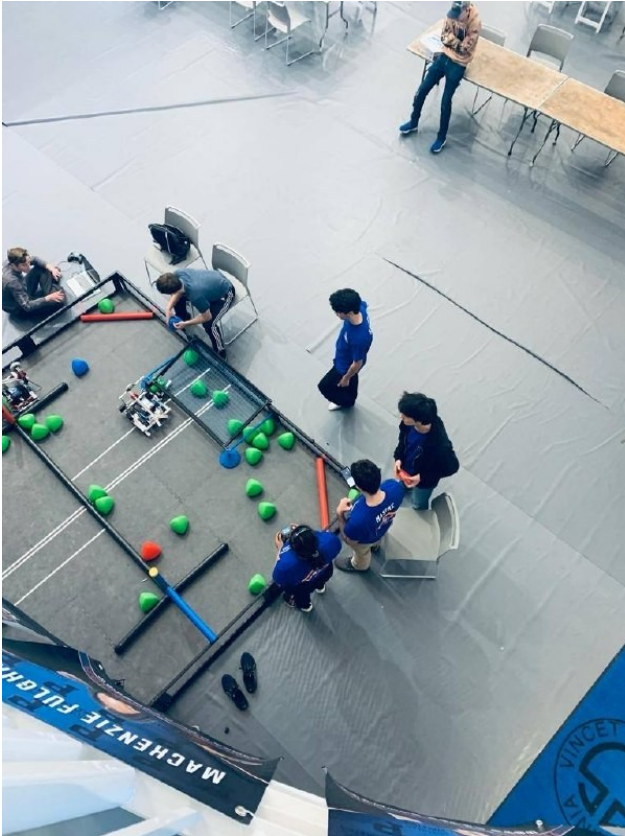


Figure 1. VEX competition, January 2024. Team activity around the field. [P9]

How I learn

I learn by structuring ideas, reconstructing notes and explaining topics to others. Diagrams help me identify what a component does and what information it needs. Classmates and internship colleagues provide feedback from different parts of the same problem. [P1, P2]

Education

I studied at British International School Phuket, Lycée Français de New York and Rochambeau before beginning EPITA in Paris in 2025. Studying in French and English shaped how I learn and explain technical ideas. [P2]

Robotics

At Rochambeau, I participated in VEX Robotics. Programming became part of a physical task involving mechanisms, electronics and teamwork. That experience connects to my later sensor work at TRIC. [P2]

Learning through a project

In July 2023, I took a Georgetown summer course in Python computer science through dual enrolment. It introduced topics including text classification and model evaluation. Provenance then pushed me to learn Dart through application development. [P2, P3]

An academic idea in practice

At EPITA, Ascendant Trials brought these ideas into a team project. Its January defence describes Python and Ursina, JSON-driven content and separate game and networking repositories. Parallel work depended on clear interfaces between those components. [P4, P5]

Provenance

Making product information usable.

Individual project · Mobile application · 2023 challenge

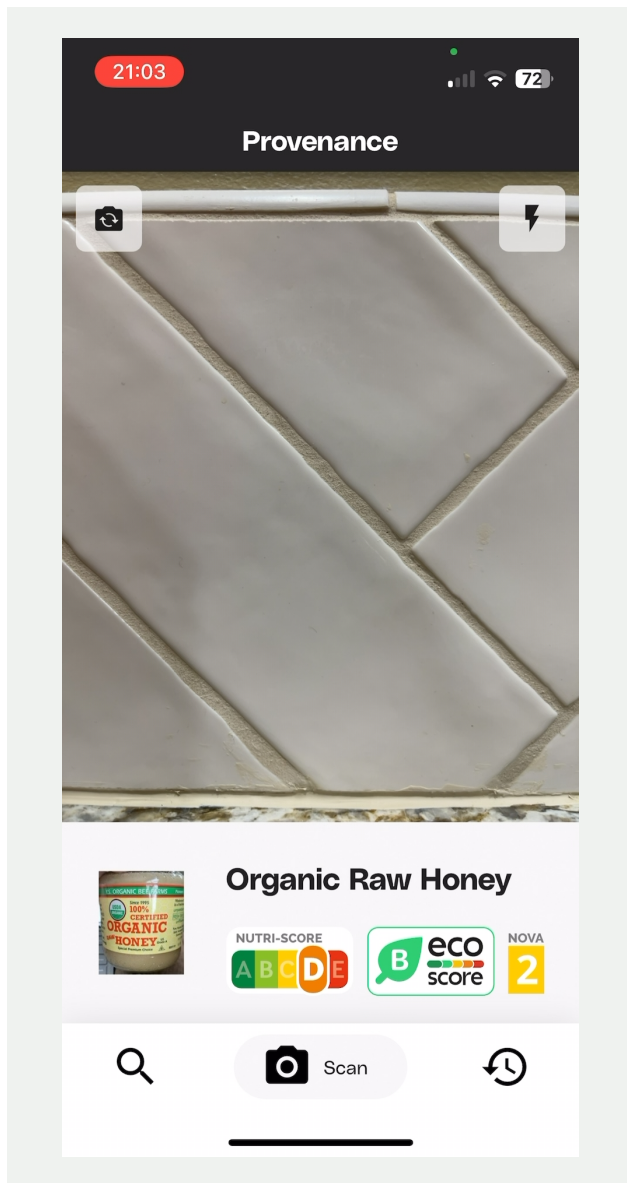


Figure 2. Provenance scan screen with a populated product result. [P9]

Context

I built Provenance individually for the Congressional App Challenge to make food-product information easier to access when choosing what to buy. [P1, P3]

Action

Using Flutter and Dart, I connected Open Food Facts to Search, Scan and History. I developed the application and its interface. The external database supplies the product information. [3, P3]

Result

Provenance won the 2023 Congressional App Challenge for the District of Columbia's at-large district. [1, 5]

Skills

Mobile development · API integration · Independent learning

What changed my thinking

Discovering similar apps after starting made me reconsider why someone would choose mine. The lesson was to research alternatives earlier and test one clear user benefit before expanding the feature list.

From scan to detail

An interface that organises an external dataset.

Provenance · Product information and reflection

The screens follow the same product from a populated scan result to an overview and nutrition table. They illustrate the information hierarchy. [P9]



Figure 3. Product overview: identity, labels and summary scores. [P9]

Nutrient	Per Serving	Per 100g
Salt	0 g	0 g
Sodium	0 g	0 g
Sugars	16 g	76.2 g
Fat	0 g	0 g
Saturated-fat	0 g	0 g
Proteins	0 g	0 g
Carbohydrates	17 g	81 g
Energy	60 kcal	286 kcal
Barcode: 0726635121278		

Figure 4. Nutrition-table detail, cropped from the app screen. [P9]

Data into an interface

Learning Dart and integrating dependencies were implementation challenges. I connected incoming product information to a route through the app: identity, origins, labels and summary scores before the denser nutrition table. The data and scoring systems are external. [3, P3, P9] The screenshots document interface states, rather than independent tests of barcode decoding or food-data accuracy. [P9]

A more focused next version

My submission proposed broader information, faster search and recommendations for a second version. These remain improvement ideas. A future iteration should start with one user task and test whether the proposed change helps. [P3]

TRIC Robotics

Turning measurements into a usable representation.

Internships · Software and hardware · 2023–2024



Figure 5. Early scanner, approximately May–June 2023: distance sensors, compute board, battery and GPS. [P1, P9]

Context

During internships in 2023 and 2024, I worked on scanning strawberry rows and turning measurements into a map. The aim was to support the robot's response to changing plant height around the boom carrying UV lights. [P1, P6]

Personal action

I began with an Arduino distance-sensor array, then worked with a small LiDAR and an Intel depth camera. I developed software to receive measurements and account for the different inputs in the scanning setup. [P1]

Employer assessment

TRIC's January 2025 work certificate credits my multi-sensor contributions and a leading role in plant-height tracking. According to TRIC, the resulting self-leveling capability was deployed in commercial systems. [P6]

Skills

Sensor-data processing · Python ·
Hardware/software integration

What changed my thinking

The difficult part was making the readings form a coherent 3D map. Each measurement needed context: where and when it was captured, and how it related to the others. Representation became a system-design problem, not just a plotting task.

Reading the inputs

Different measurements, one processing problem.

TRIC Robotics · Historical pipeline and diagnostic context

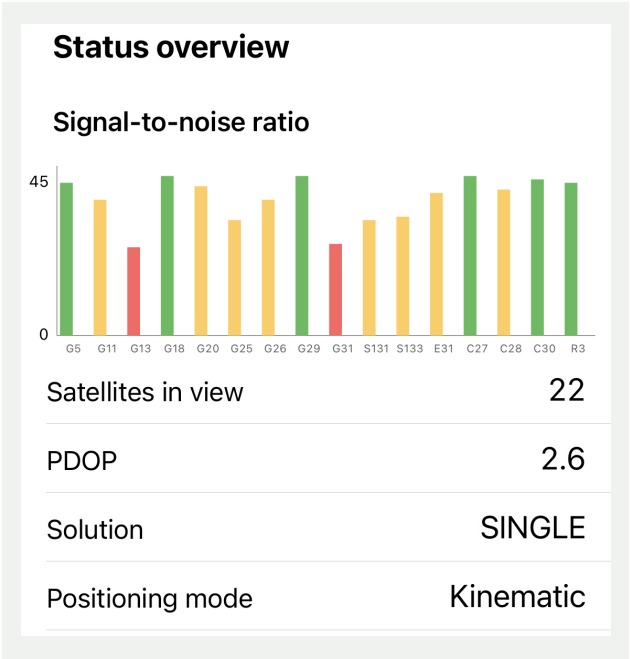


Figure 6. GNSS receiver diagnostics, with location details removed. [P9]



Figure 7. Wired test fixture beside agricultural equipment. [P9]

The first-version processing trail

The documented first version read GPS and Arduino data through separate serial inputs. It parsed the readings, associated distance with time and position, converted location to relative coordinates, recorded the data and generated 2D and 3D visualisations. The documentation describes moving-average smoothing and Plotly outputs. [4]

This processing trail covers the early version. LiDAR and depth-camera work came later. The photographs and receiver diagnostics show the setup, rather than a map or accuracy test. [P1, P9]

Parallel inputs

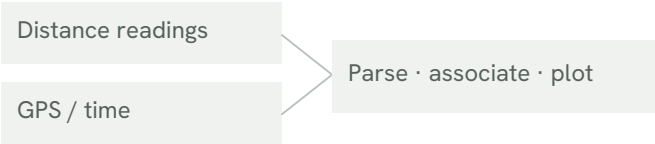


Figure 8. Early processing pipeline, redrawn from documentation. [4]

For my next measurement project, I would define how readings are positioned and aligned, then choose a reference for evaluating the result. Working with colleagues showed why those assumptions must match the machine’s physical task.

Ascendant Trials

Making locally running game clients agree.

EPITA team project · Networking and shared integration

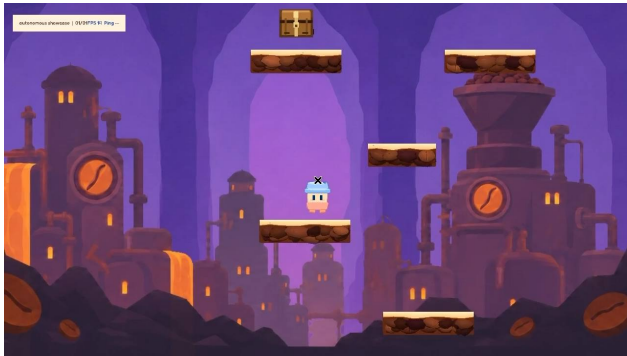


Figure 9. Ascendant Trials gameplay showcase. [P9]

Python · Ursina · WebSocket · JSON

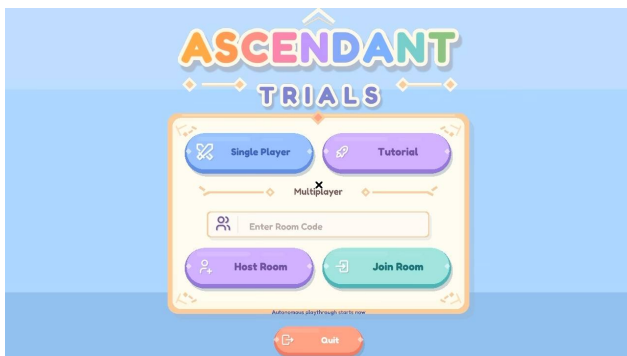


Figure 10. Main menu with room-entry controls. The game images show an autonomous showcase, not a live multiplayer test. [P9]

Integration is team work

We checked progress at project checkpoints and almost daily near the end. January records show prototypes and planned integration. May records show later development. Next time, I would check shared events such as restarts and level changes earlier. [P1, P4, P7]

My responsibility

My main responsibility was multiplayer networking and server management. Near delivery, I also contributed to controls, transitions, shared mechanics, some level content and menu/UI work, and revamped the website. These were contributions to a team project. [P1, P7]

Technical choices

The project used Python and Ursina, JSON-driven content and a WebSocket room-messaging layer. The server handled room state and message exchange while gameplay ran on players' computers. Clients therefore needed coherent actions and shared events, not just a connection. [P4, P5]

A concrete development trace

We encountered synchronisation problems and stuttering. On 27 May 2026, client changes preserved urgent reset messages and applied remote reset sequences once. A paired server change let urgent snapshots bypass ordinary traffic limits. The retained records document these changes without a measured before/after performance result. [P1, P7]

Ecorobotix

Contributing inside an existing software environment.

Summer 2026 internship · Professional integration

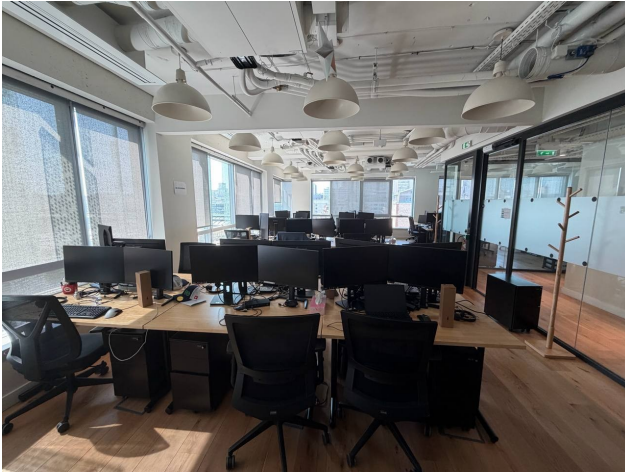


Figure 11. Ecorobotix office during my internship. [P9]

Working within an existing team

At Ecorobotix, my work had to fit existing services, customer-facing interfaces and team processes. I worked closely with colleagues, including an infrastructure colleague. [P1]

A clearer handover

A useful handover explains why a task was started, what depends on it and how completion will be checked. I want those points documented before responsibility changes hands. Review, merge, deployment and a checked user-facing result are distinct stages of progress.

Integration work

I worked on a custom MCP integration layer connecting an internal agent with selected applications and documentation. My contribution was the connection between existing tools and the agent. [P1]

A documented development step

Professional review records show an MCP integration change attributed to my account entering the team's monorepo and CI workflow. It was merged on 26 August 2026, with a related pipeline reported as passing. Production deployment is not established by these records. [P8]

Continuing an existing task

I also continued a web-application data transition that my supervisor had started before going on leave. It mattered to customer interfaces and required learning an existing system. Completion of the transition is not established in the retained evidence. [P1]

Three competencies

Strengths, limits and the next improvement.

Critical self-assessment

1 Build useful systems

My strength is working across boundaries: an interface and dataset, sensors and processing, or an agent and service. Provenance and TRIC taught me that connecting components is not enough. Competing apps and the difficulty of forming a coherent map made the useful outcome harder to define. My next step is to write one acceptance criterion before expanding an implementation.

2 Learn, debug and verify

I learned unfamiliar tools while building, from Dart dependencies to sensor inputs and multiplayer integration. The game history records specific reset, traffic-limit and collision changes. I need clearer checks tied to each version. For my next project, I would keep a brief record of the symptom, hypothesis, change and result of the check. [P3, P7]

3 Collaborate and communicate

I can take responsibility for one area while helping integration beyond it. Game checkpoints and internship collaboration made that valuable. Broad involvement also makes contributions harder to explain. I want to record interfaces, ownership and unresolved dependencies at each checkpoint, rather than describe my role as a bit of everything. [P1, P7]

Communication beyond the code

Communication was part of delivery: the Provenance film explained the product, game reports separated milestones, and professional reviews documented changes. A useful explanation connects the problem, my action and its evidence. [5, P4, P8]

I am moving from making individual components work to judging the usefulness of the whole system and explaining where my contribution fits.

What comes next

Deeper foundations, clearer evidence, useful work.

Direction and conclusion

Mobile applications, sensor systems and software integration interest me because they connect code to information or a physical task. My earlier learner portfolio describes motivation around useful projects, APIs and real-world data. These experiences give me areas to explore as I continue through EPITA. [P2]

Robotics has remained part of my background, from VEX to TRIC. My bilingual education also shapes how I study and collaborate. I want deeper technical foundations and the ability to explain the problem beyond my own component. [P1, P2]

A practical development plan

Before building: identify the user or receiving system, research alternatives and write one acceptance criterion. Use it to define the first version.

During development: keep repeatable checks and a short diagnostic record. For mapping, document alignment assumptions and a comparison method. For multiplayer, check restarts and transitions.

When collaborating: record interfaces, handovers and unresolved dependencies. Distinguish review, merge, deployment and a verified result when reporting progress.

These four experiences trace my progression from an individual application to shared and existing systems. Their main lessons came from differentiation, data representation, client synchronisation and handovers. I want my next projects to define success more deliberately and retain clearer evidence of it.

AI assisted source organisation, editing and PDF layout. The January game presentation also records AI-assisted website scaffolding and a generated tower mock-up. [P4]

Sources and image notes

Project references and supporting records.

- [1] Congressional App Challenge. (2024, January 31). Provenance: 2023 District of Columbia at-large winner. congressionalappchallenge.us/23-DC00/
- [3] Beliard, A. Provenance application repository and project documentation. github.com/TotoB12/provenance-app
- [4] Beliard, A. TRIC: first-version mapping and visualisation documentation. github.com/TotoB12/TRIC
- [5] Provenance App. Congressional App Challenge – Provenance [submission video]. youtube.com/watch?v=fekkZ_nhhys
- [P1] Beliard, A. (11–12 October 2026). Personal contribution, academic status and project accounts.
- [P2] Beliard, A. Learner portfolio (A1-2), CV 2026 and academic motivation records.
- [P3] Beliard, A. Provenance submission answers and promotional-video script [historical project records].
- [P4] Ascendant Trials team. (January 2026). First Technical Report Defence.
- [P5] Beliard, A. (January 2026). Networking Technical Report: rooms, lobbies and early multi-client checks.
- [P6] TRIC Robotics. (2025, January 25). Work certificate: internships, multi-sensor contributions and self-leveling deployment.
- [P7] Ascendant Trials repositories. (Reviewed 11 October 2026). Selected May 2026 collision, reset and urgent-snapshot changes.
- [P8] Ecorobotix. (August 2026). MCP integration review, merge and pipeline notifications [private records].
- [P9] Images and app demonstration provided by me for this portfolio. VEX: January 2024. Early TRIC scanner: approximately May–June 2023.

Image notes. Portrait and nutrition detail are cropped. Location details are removed from the GNSS screen.