PORTFOLIO 2024

BENJAMIN GALLOIS

WELCOME NOTE

Welcome to my professional portfolio. I am a versatile and innovative developer with a PhD in Physics, specializing in computer vision, blockchain, and data analysis. My diverse experience in these fields has equipped me with a unique set of skills that I leverage to solve complex problems and deliver high-quality solutions.

MY STORY

2020

PhD in Physics from Sorbonne University, Paris, where I researched the chemical perception of young zebrafish. During my studies, I developed FastTrack, a versatile and open-source tracking software that remains widely used in laboratories around the world.

2021

Started my freelance career in computer vision, developing both small algorithms for individuals and comprehensive software solutions for companies.

2022

Started freelancing as a blockchain developer in the Polkadot ecosystem, building solutions using Rust and the Substrate framework.

COMPUTER VISION

I specialize in developing sophisticated computer vision algorithms and complete solutions, including user interfaces, using the SciPy ecosystem, OpenCV, and Qt framework. My work ranges from fundamental algorithm development to full-scale application deployment.

YOU&EYE PHOTO

Eye photography, while producing stunning artwork, presents challenges such as standardizing eye images and removing defects. We developed a semi-assisted software to address these issues:

- Automatic Preprocessing: Uses a custom deep learning model to detect and center the pupil, resize it on the iris, and remove glares, all within 15 seconds on an ordinary laptop.
- Interactive User Interface: A Qt (PySide2) interface allows users to manually process and retouch images.
- Artistic Enhancement Tool: Combines multiple irises with effects to create unique artwork.

This software is deployed in over 10 shops across Europe, simplifying the eye photography process and enhancing creative possibilities.

FASTTRACK

Tracking objects in video recordings can be challenging. Free, open-source options are often difficult to install, while closed-source solutions are expensive and restrictive.

FastTrack is a cross-platform tracking software designed to be easy to install and use.

- Technology Stack: Developed in C++ using Qt for the UI, OpenCV for image processing, SQLite for data storage, and Google Test for unit testing.
- Cross-Platform: Provides Windows installers, macOS (dmg), and Linux (AppImage) for easy integration.
- Documentation: Includes a developer manual (Doxygen) and user manual (Docusaurus).

FastTrack offers a user-friendly solution with robust functionality, eliminating installation hassles and high costs.
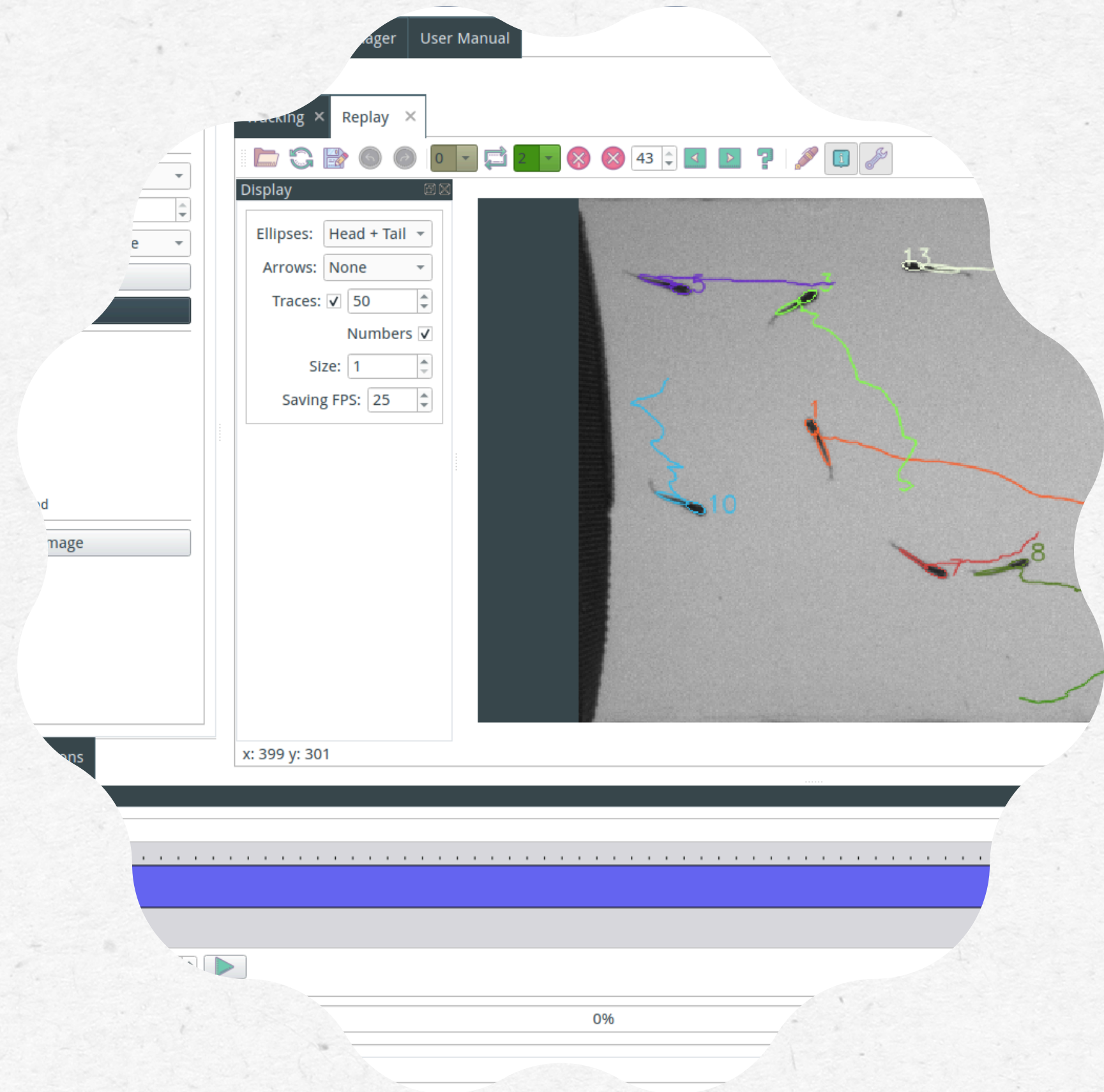
MISCELLANEOUS

I worked on several diverse image processing projects to enhance image quality and improve visual focus. Here's a summary of the key tasks and solutions I developed:

- Resizing and Saliency Focus: Designed an algorithm to resize a poster while keeping the most salient part of an image in focus, regardless of the poster's aspect ratio. This involved computing the most salient point using saliency maps and image moments, and adjusting the image's size and position accordingly.
- Texture Inpainting: Developed a prototype for texture inpainting to restore small regions in images with textured backgrounds. The algorithm utilized image quilting and KDTree for texture generation, which proved effective for small inpainting tasks.
- Card Detection and Segmentation: Created a Python script for card detection and segmentation from a dataset of 1500 cards. The script prepared the dataset, trained a model achieving precision of 0.989, recall of 0.995, and mAP of 0.994, and provided a Python class for integrating detection into analysis pipelines.
- Image Deformation Correction: Addressed scanning issues related to affine and perspective deformations. Implemented a method to correct these deformations by identifying and mapping four reference points with pixel accuracy based on color landmarks.
- Glare Removal: Developed a method to remove reflections from glossy scanned images by combining multiple photos with slight perspective changes. The process involved rigid and non-rigid image registration and pixel selection based on minimum intensity.
- Moiré Pattern Removal and Image Correction: Tackled scanning issues such as moiré patterns and high-resolution image compatibility. Developed algorithms to remove moiré patterns using Fourier space and low-pass filters, detect and correct blur, and handle high-resolution 16-bit images using Scikit-image for certain algorithms.

MISCELLANEOUS
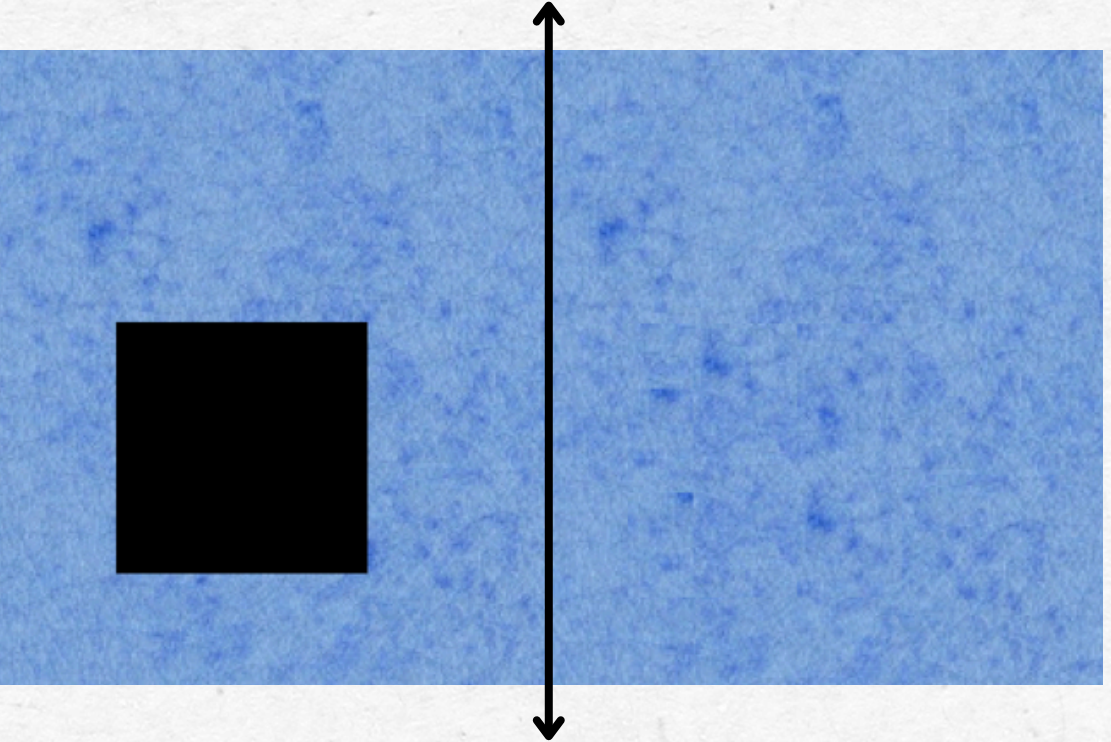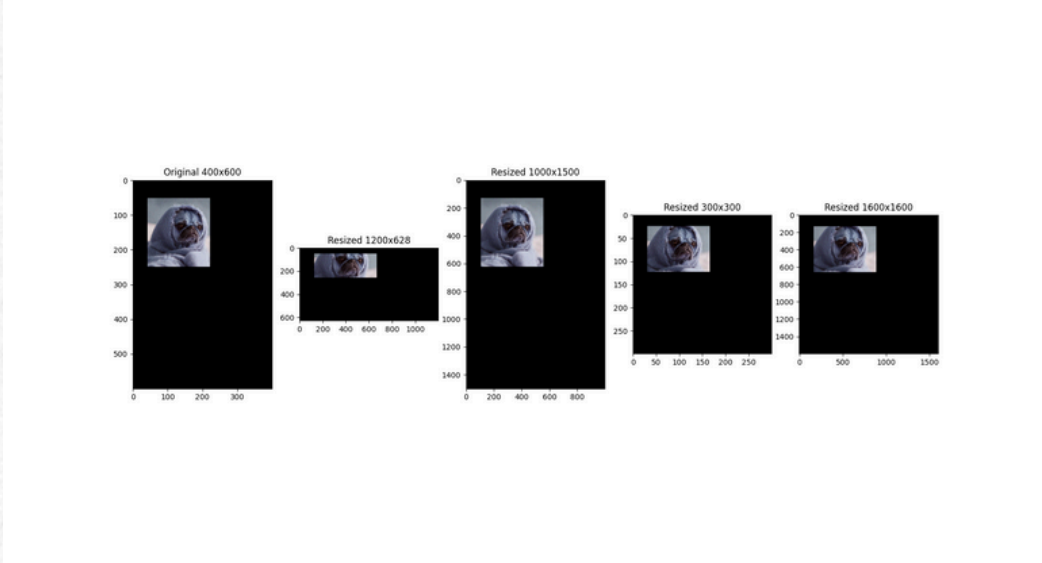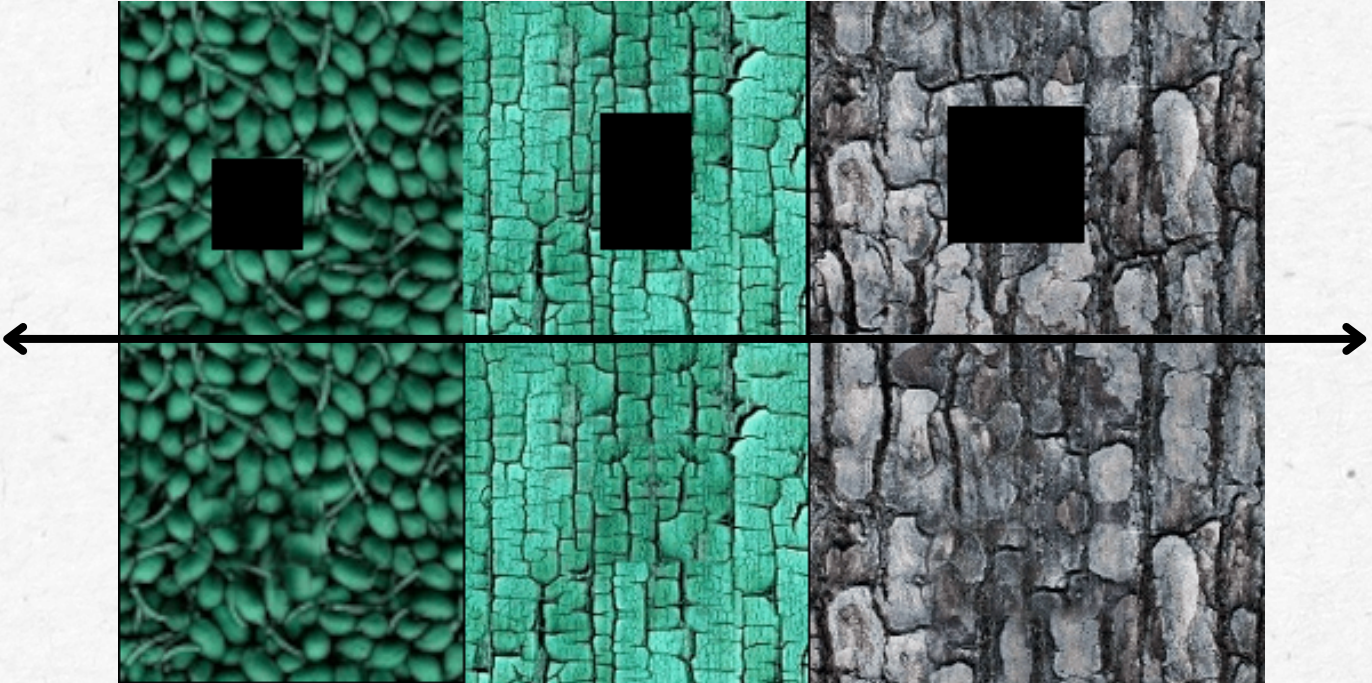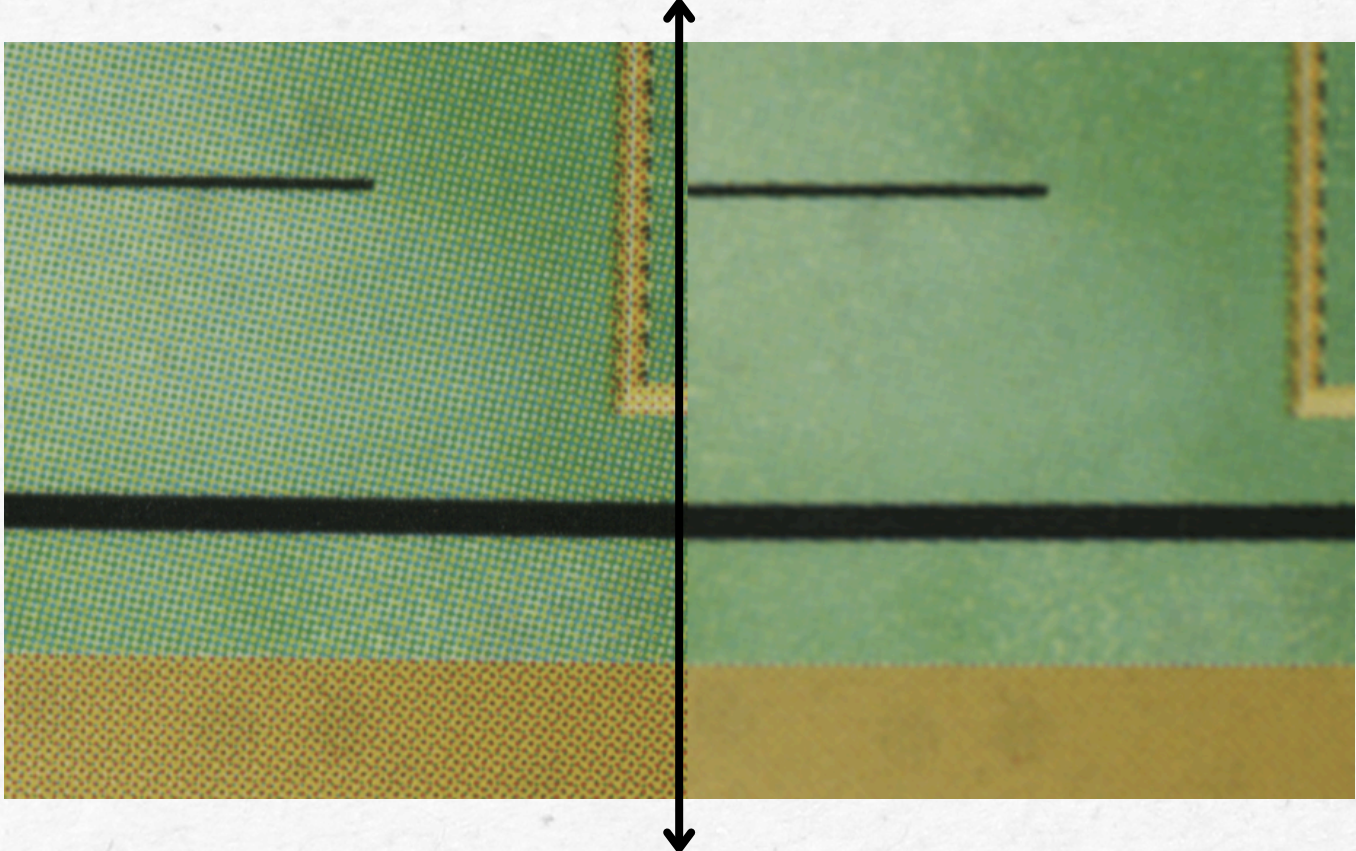
BLOCKCHAIN

As a freelancer in blockchain development, I specialize in building solutions within the Polkadot ecosystem using Rust and the Substrate framework. My focus is on creating scalable and secure blockchain applications that leverage the unique capabilities of these technologies to meet diverse client needs.
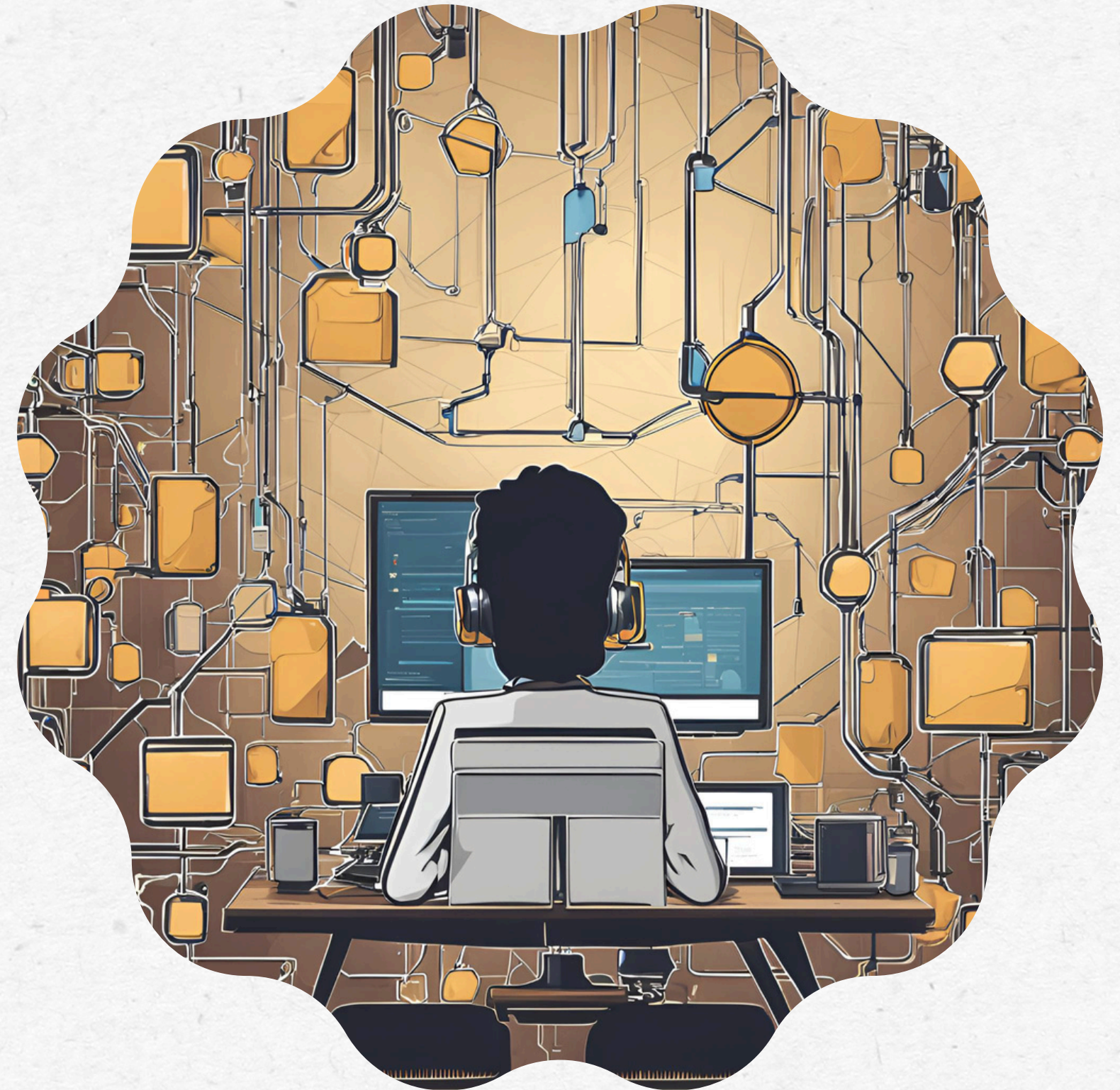
DUNITER

The Duniter project implements the "monnaie libre" theory, focusing on creating a decentralized, community-driven currency system.

Key Contributions:

- Benchmarking: Developed comprehensive benchmarks for the complex custom pallet of the chain, ensuring performance and reliability.
- Zero-Fee Innovation: Created a novel approach to achieve a zero-fee yet secure Substrate-based blockchain, enhancing accessibility and efficiency.
- Framework Upgrades: Led the upgrade of the Substrate framework, integrating the latest advancements and improvements.
- Bug Fixes: Addressed and corrected bugs within the chain to ensure stable and reliable operation.
- Refactoring: Refactored several components of the chain to improve performance and maintainability.

SCIENCEVAULT

ScienceVault is an innovative solution for managing scientific data integrity, built on the Substrate framework. It enables users to submit and verify data transparently and securely. Scientific data integrity is crucial for credibility, and ScienceVault addresses vulnerabilities by ensuring open and transparent data monitoring, allowing users to replicate and verify findings. Entities can submit data, which is hashed, timestamped, and stored on the blockchain. Links to data sources can be shared for verification, and a reputation system rewards trustworthy entities while penalizing bad actors. ScienceVault promotes trust and transparency in scientific data management.
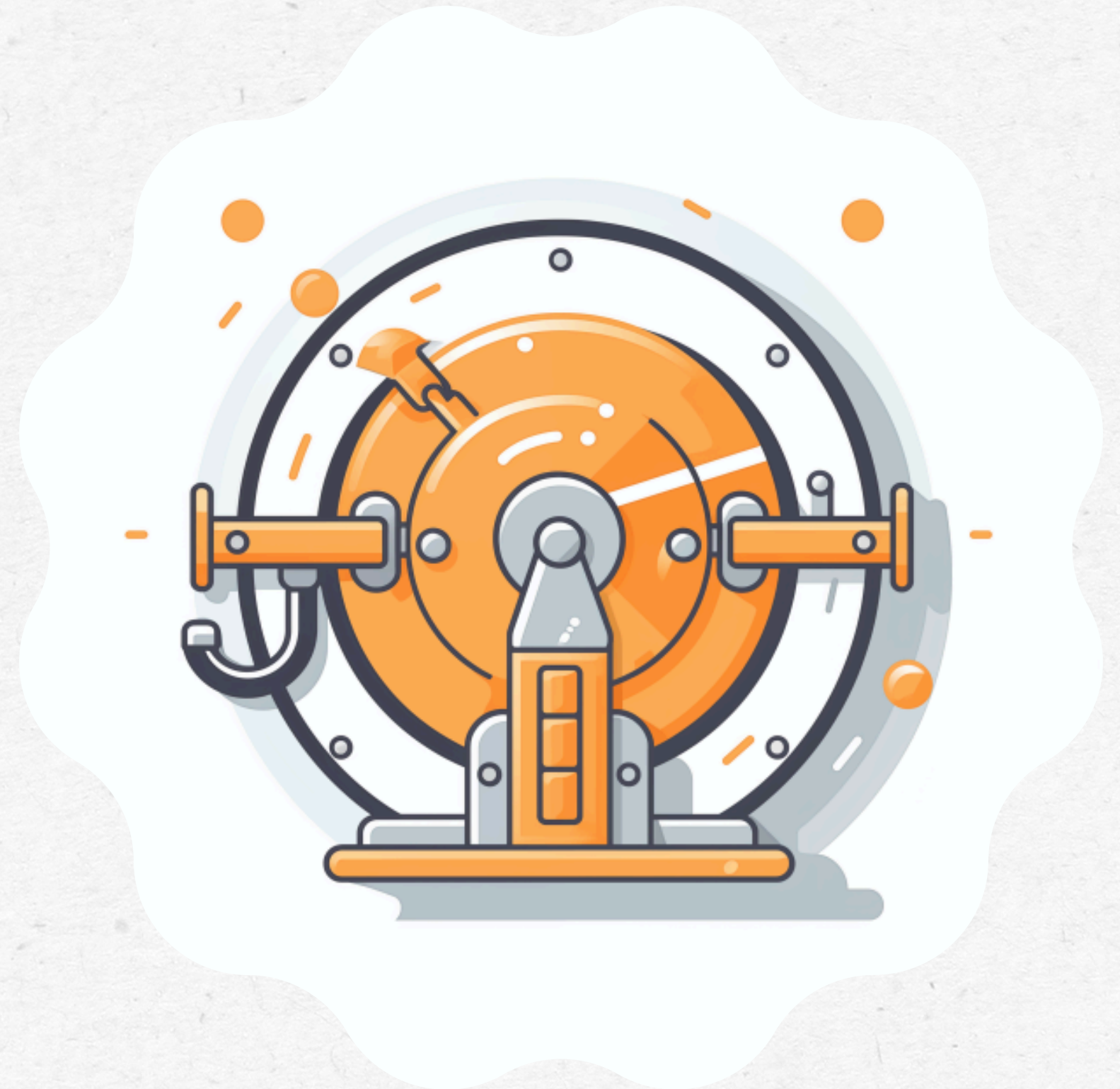
SPORT DATA CONSULTING

I offer sports data analysis consulting with a focus on cycling data. My science-based services include designing and implementing tools to optimize on-course power profiles, improving performance without increasing physiological effort. I provide terrain-based CdA analysis to fine-tune cycling positions and equipment, reducing costs while enhancing performance. My goal is to help cyclists achieve their best performance through detailed and customized data analysis.
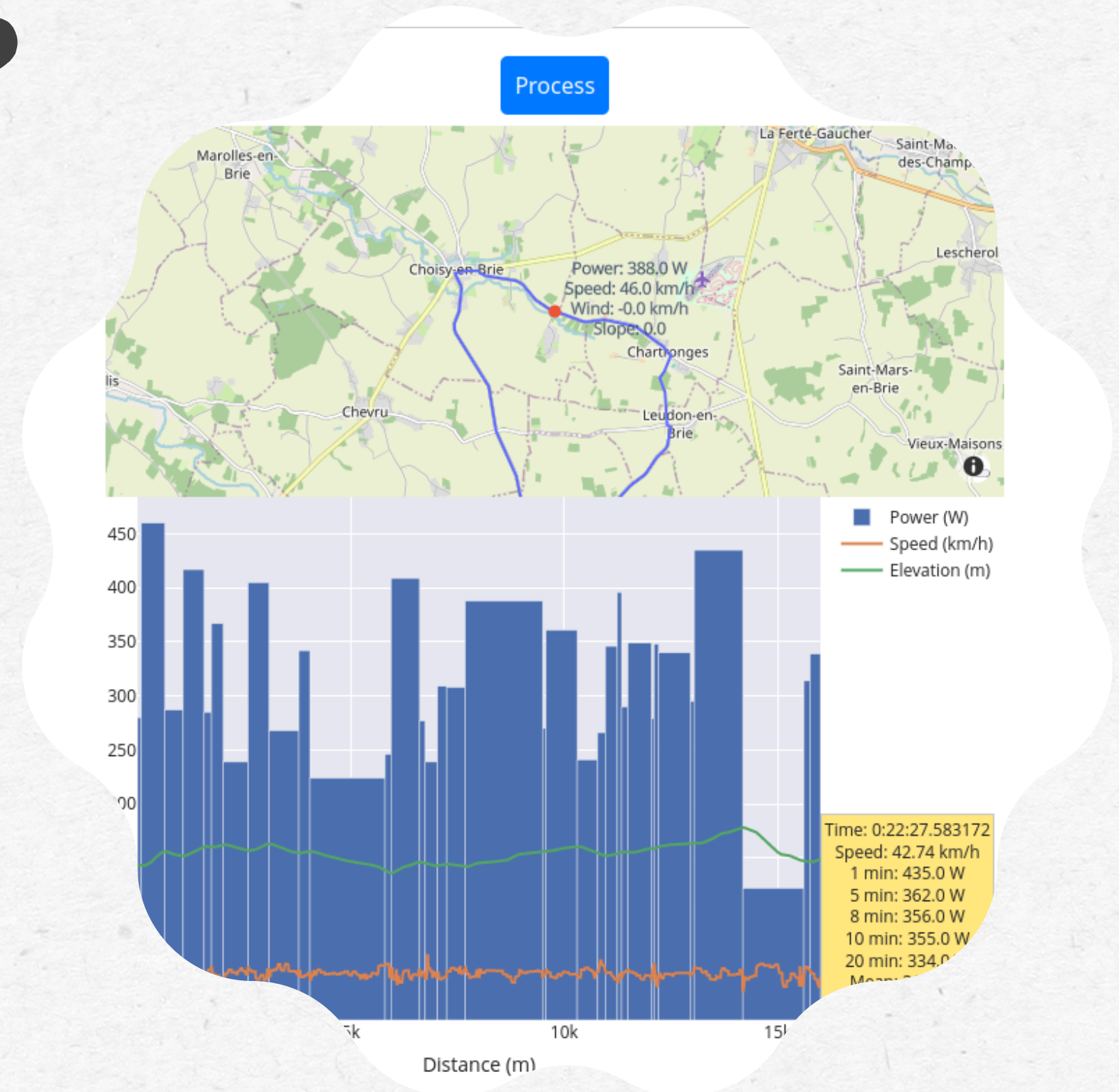
CORE PRINCIPLES

PRECISION

In every project, I ensure accuracy and reliability in all outputs. By adhering to rigorous standards and thorough testing, I deliver solutions that meet the highest levels of precision.

INNOVATION

I continuously seek innovative solutions, leveraging the latest scientific research and technology. My interdisciplinary background allows me to creatively tackle challenges and develop cutting-edge solutions.

COLLABORATION

Working closely with clients and teams, I prioritize clear communication and collaboration. This ensures that the solutions I develop are tailored to meet specific needs and achieve desired outcomes.

TESTIMONIES

01

Outstanding experience! Benjamin has delivered what many other developers couldn't, very competent developer, will be working again with him very soon!

02

It was great to work with Benjamin. He's very knowledgeable about computer vision, with a straightforward and optimized implementation.

03

Outstanding experience! Went above and beyond. Benjamin has delivered what many other developers couldn't, very competent developer! Supported me every step of the way. Hope to work again with him very soon

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