Tracer ARB – the Augmented Reality Application for the ATLAS Paper Prints

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Applications to be developed and the timetable

1. Tracer-VR: Virtual Reality Application for the tours at Point-1

2. Tracer-ART: Augmented Reality application for learning the ATLAS detector hardware

3. Tracer-ARB: Augmented Reality extension of the printing materials

4. Tracer-ARL: Augmented Reality Landscape

5. Tracer-ARD: Augmented Reality application for navigation inside the detector

All applications will work in Browsers!

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WP02	Tracer/VR	Geometry descriptions of Point-1 infrastructure and services	Q4 2022
		Full functionality application	Q4 2023
	Tracer/ART	R&D work	Q4 2022
		Prototype with basic functionality	Q4 2023
		Extended functionality	Q4 2024
	ARB	Five 3D Scenes per year	Q4 2026
	Tracer/ARL	R&D work	Q4 2025
		Full functionality application	Q4 2026
	Tracer/ARD	Identification and development of contents of the virtual rooms	Q4 2024
		Development of 3D geometries of the virtual rooms	Q4 2025
		Development of the AR navigation functions in the virtual rooms	Q4 2026

- Tracer ARB is the Augmented Reality mobile application developed for the ATLAS paper prints

- It should be an **extension** of the paper prints and not their **replacement**

- The application run in the browser without any installations

- Compatible with the majority of the browsers

- The application brings 3D scenes on top of the paper images

- Those scenes are developed by the Georgian team

- Currently, we are using a commercial JavaScript library powered by 8thWall inc.

MAGNET SYSTEM

ATLAS uses two different types of superconducting magnet systems – solenoidal and toroidal. When cooled to about 4.5 K (–268°C), these are able to provide strong magnetic fields that bend the trajectories of charged particles. This allows physicists to measure their momentum and charge.

Field lines of the solenoidal magnetic field

Field lines of the toroidal magnetic field
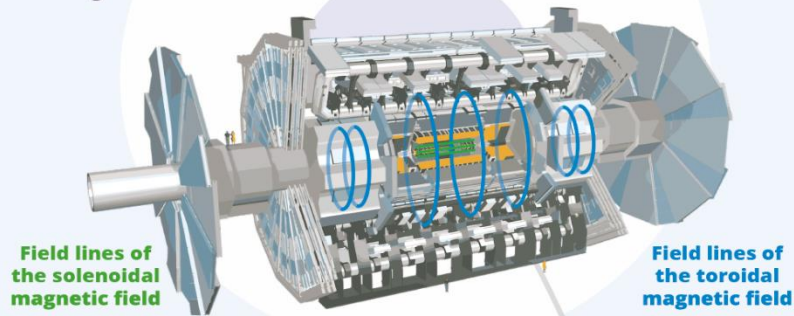
CENTRAL SOLENOID MAGNET

The ATLAS solenoid surrounds the inner detector at the core of the experiment. This powerful magnet is 5.6 m long, 2.56 m in diameter and weighs over 5 tonnes. **It provides a 2 Tesla magnetic field in just 4.5 cm thickness.** This is achieved by embedding over 9 km of niobium-titanium superconductor wires into strengthened, pure aluminum strips, thus minimising possible interactions between the magnet and the particles being studied.

TOROID MAGNET

The ATLAS toroids use a series of eight coils to provide a magnetic field of up to 3.5 Tesla, used to measure the momentum of muons. There are **three toroid magnets** in ATLAS: two at the ends of the experiment, and one massive toroid surrounding the centre of the experiment.

At 25.3 m in length, the central toroid is the **largest toroidal magnet ever constructed** and is an iconic element of ATLAS. It uses over 56 km of superconducting wire and weighs about 830 tonnes. The end-cap toroids extend the magnetic field to particles leaving the detector close to the beam pipe. Each end-cap is 10.7 m in diameter and weighs 240 tonnes.

https://atlas.cern

ATLAS EXPERIMENT
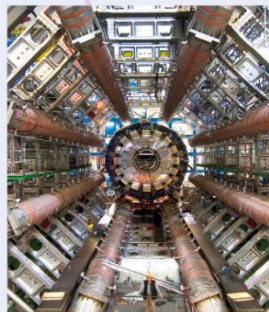
Scan the QR code below => Open page

NIANTIC 8thWall

ATLAS Outreach Fact Sheet

nec

Launch

Share Project

Report this project

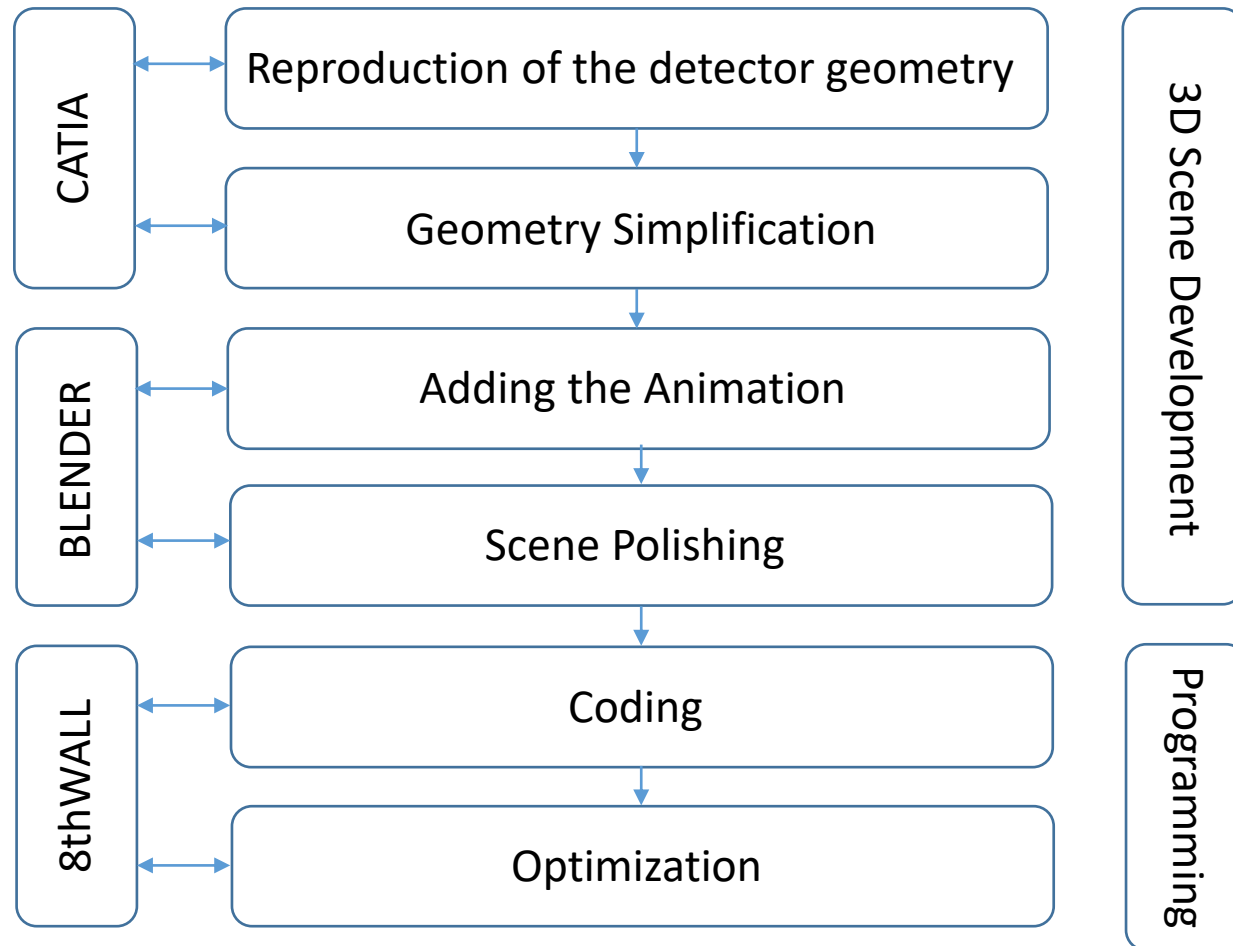8 Our Terms & Conditions, Privacy Policy, and Copyright Dispute Policy

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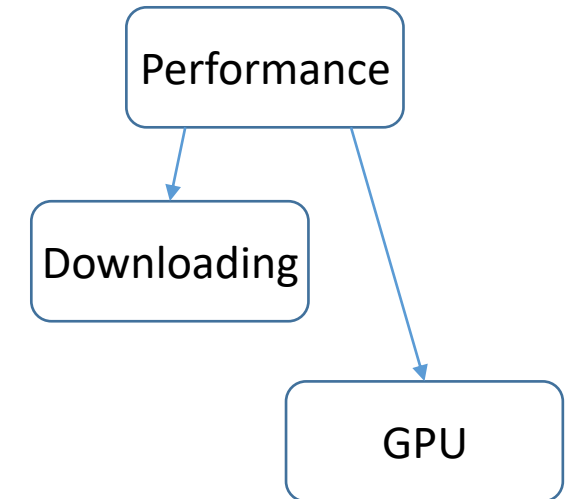Product | Pricing | Discover | FAQ | Careers | Contact
Twitter | Slack | YouTube | Facebook | Instagram | LinkedIn | GitHub

Click here => After ~20 seconds the camera will activate => Watch one of the images

■ We are using several platforms for the application development:

CATIA
- Reproduction of the detector geometry
- Geometry Simplification

BLENDER
- Adding the Animation
- Scene Polishing

8thWALL
- Coding
- Optimization

3D Scene Development

Programming

■ Main issue
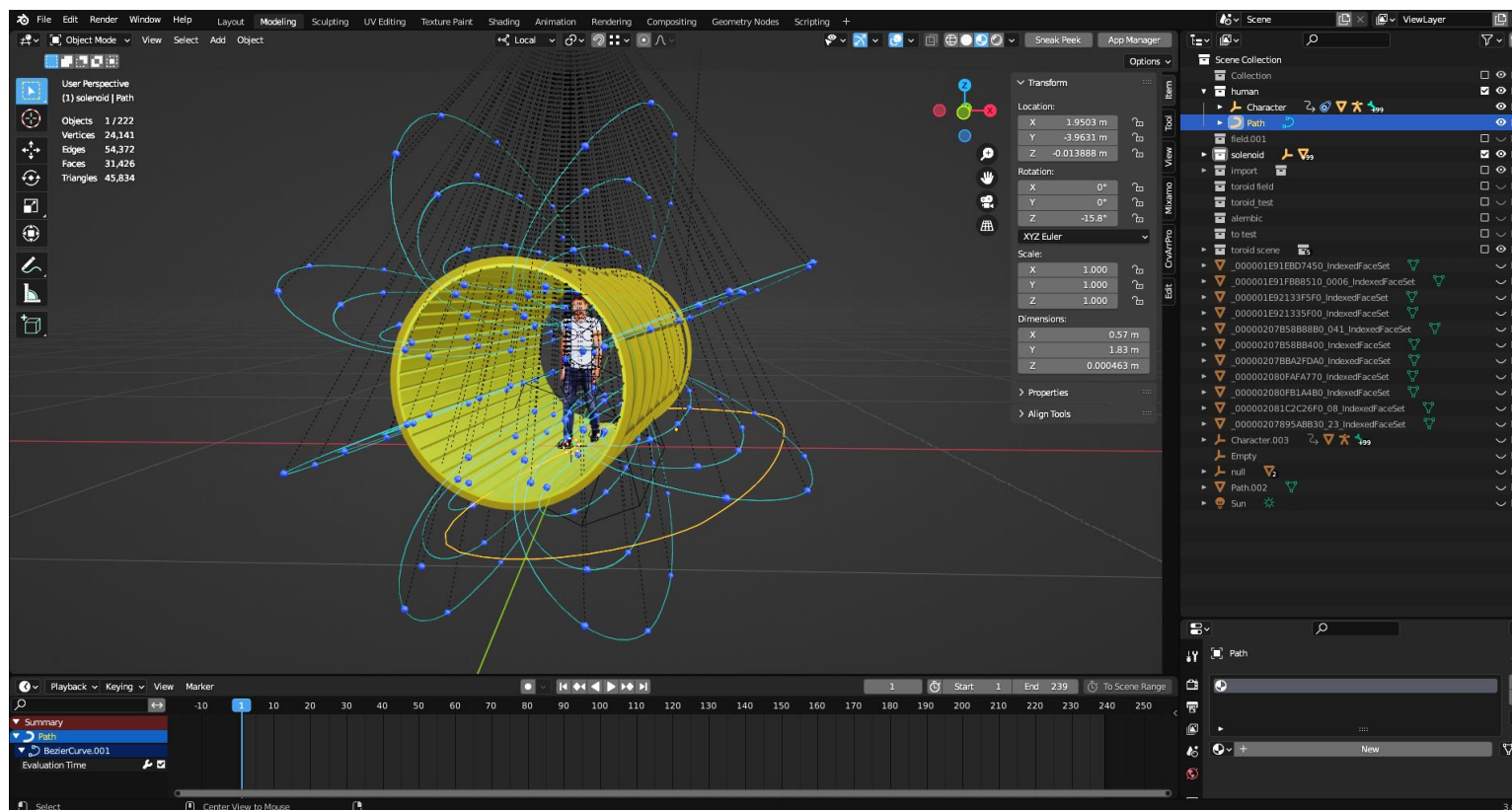
Performance → Downloading

Performance → GPU

Geometry Simplification (CATIA):

- Removal of Parts

- Replacement of the rounded primitives

- Setting-up the approximation
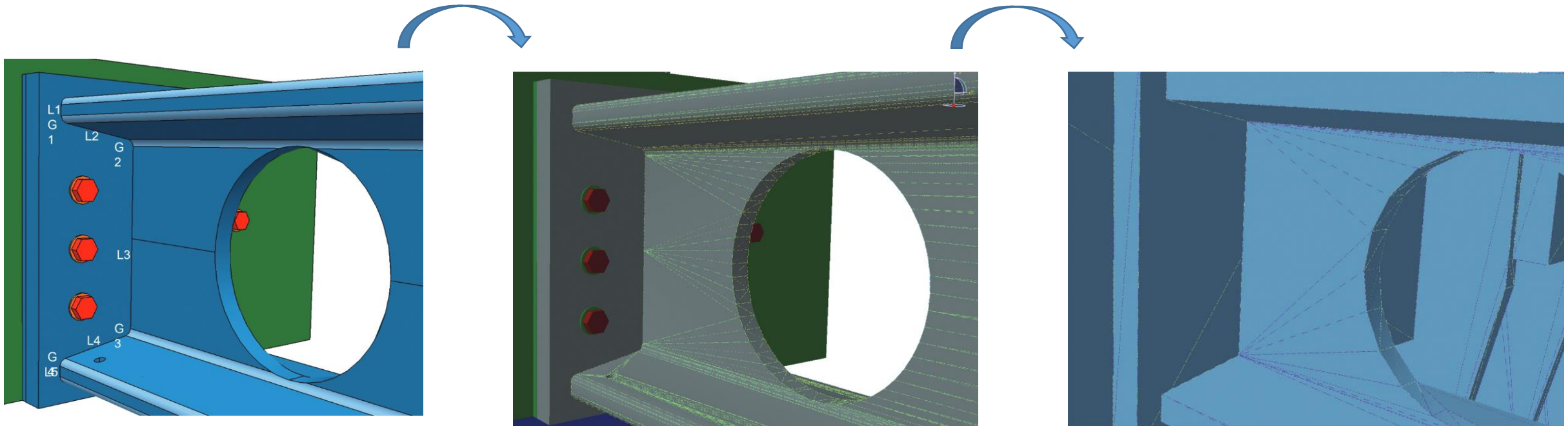
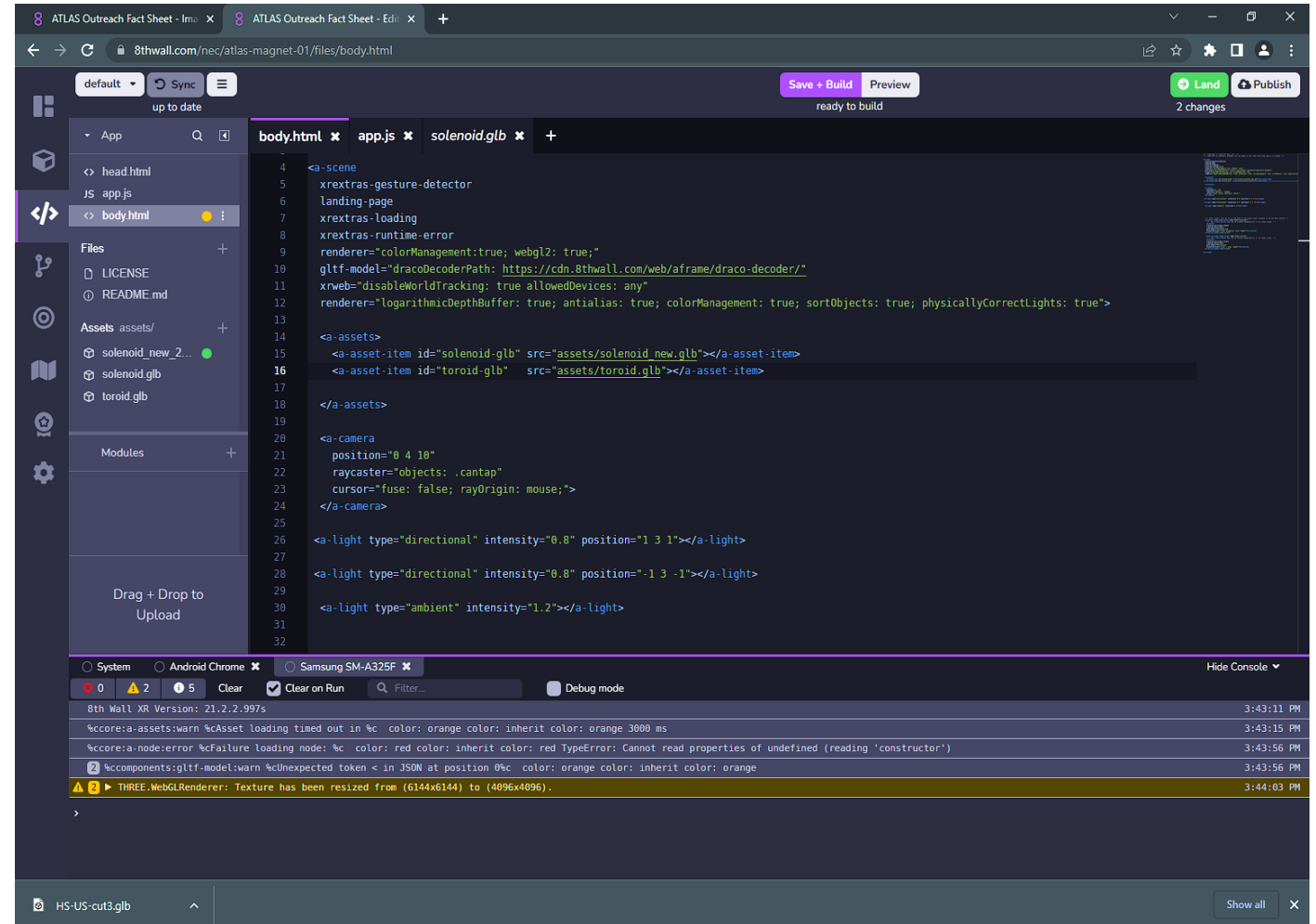## Adding the Animation (Blender):

- Choosing the scenario

- Creation of the moving objects

- Adding path

Tracer ARB Development

Coding (8thWall):

- Uploading 3D scenes

- Adding the A-Frame functions

- Choose lighting

I. Performance:

- Simplify geometries and reduce number of facets as much as it possible to free-up the GPU load

- Reduce size of scenes to make download faster. For the moment 3 scenes presented above have ~46Mb size and it took ~20 seconds for downloading

II. Replace 8thWall commercial library with the own one (time consuming)

III. Find the ways for better cohabitation of the gyroscopic control with the touch control (many of the RD work)

Thanks!