

# ASHVIN's Newsletter #8

March 2024

Welcome to our last updates from the ASHVIN project!

ASHVIN's engagement in developing digital twin technologies for smarter and safer construction sites has **completed its journey!**

In this last #8 issue, we approach the culmination of this 3,5 years, putting out our digital twin building results, the insights provided by stakeholders and last steps to create a lasting impact on the construction industry.



✳️ ASHVIN has developed a system with several technical layers that enable end-users to collect data from construction sites or infrastructure asset sites, analyse and monitor the collected data and visualise it through a dedicated **digital twin platform**.

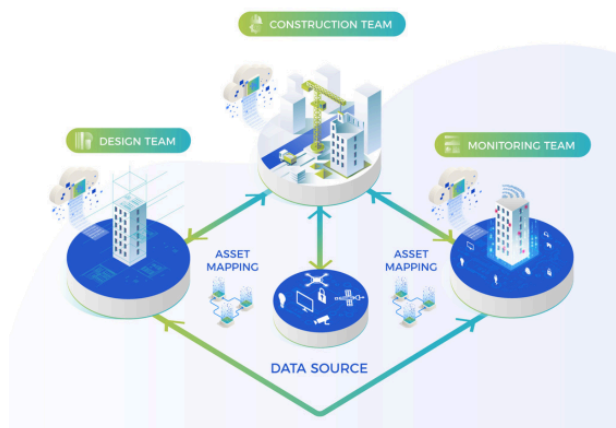
✳️ The ASHVIN toolkit, **composed of 10 digital smart building tools**, runs on the Digital Twin platform, enabling it to monitor and assess different aspects of the project based on its needs.

✳️ The ASHVIN system was validated in **23 real-world scenarios** from **3 project management phases**: design, construction and maintenance.

✳️ Over **3,200 social media followers**, 26 academic stakeholders, 4 industrial agents, and 8 construction associations and advocate organisations have engaged with ASHVIN's developments.

✳️ ASHVIN's research impact resonates through **19 peer-reviewed publications**, 100+ blog articles, and 24 public deliverables—proof of our commitment to Open Science principles.

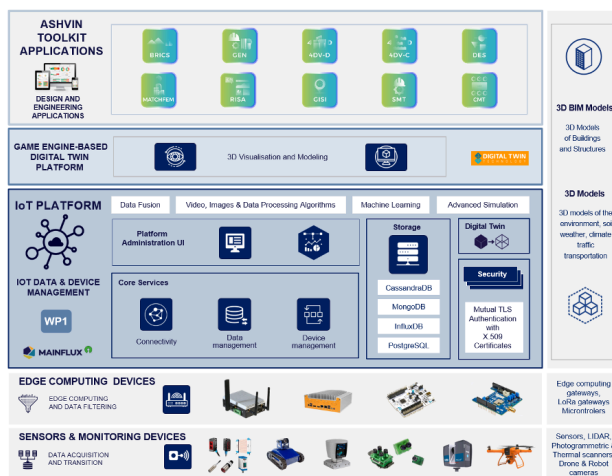
## TECHNICAL DEVELOPMENTS



### THE ASHVIN DIGITAL TWIN PLATFORM IN A NUTSHELL

Since 2020, we have developed a digital solution for the construction industry, deploying digital twin technologies to boost productivity, efficiency and safety of the

data is fed to the ASHVIN system via an Internet of Things (IoT) platform, allowing connectivity, data management and sensor/edge computing device management. This platform is integrated with the game engine-based digital twin platform (developed by **Digital Twin Technology**) that allows 4D visualisation. In addition, the **ASHVIN toolkit**, composed of 10 digital smart building tools, runs on the Digital Twin platform, enabling it to monitor and assess different aspects of the project, such as operational and structural safety factors, construction work progress by sectors, damage detection, early risk-prediction.



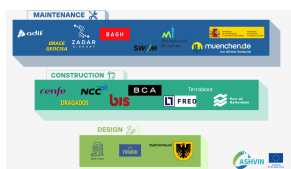
[Learn more!](#)



### OVER 15 NEW CONSTRUCTION PROJECTS JOINED THE DIGITAL TWIN PLATFORM

During the last project year, we aimed to open the ASHVIN Digital Twin solution to more construction and maintenance projects. From urban excavations in Germany, Taiwan, and the USA to three Croatian airports to support their maintenance, more external demo site projects have been onboarded to the ASHVIN digital twin platform. Our [latest article](#) presents insights from these demo sites dedicated to improving structural and operational safety, thanks to using ASHVIN's digital twin technologies.

## INSIGHTS AND CONTRIBUTIONS - STAKEHOLDERS



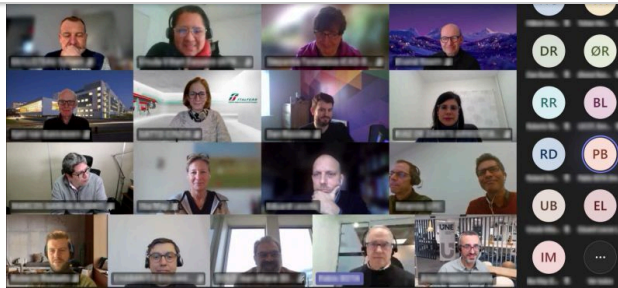
### MY DIGITAL TWIN EXPERIENCE WITH ASHVIN

In general, ASHVIN developments have been found helpful for public and private organisations in **understanding building performance**, **improving communication streams**, and **providing accessible data**. Users suggest tracking critical bridge components and integrating contractors in the construction phase.

### BEYOND THE FINAL PAGE - REFLECTIONS AND FEEDBACK BY ADVISORY BOARD MEMBERS

Throughout its lifetime, the ASHVIN project has been followed by a group of **six top-notch experts in the digitalisation of the construction sector**. Before closing the project, we gathered them to walk them through our developments and collected their **recommendations and feedback**.





### CONTRIBUTING TO FUTURE STANDARDISATION IN DIGITAL TWIN TECHNOLOGIES FOR THE BUILT ENVIRONMENT WITHIN CEN

Thanks to the research conducted at the demonstration sites, our project proposed a set of use cases supporting the future standardisation of digital twin technologies. Also, in January 2024, we joined an online meeting of the European standardisation working group that manages the standardisation of digital twins in a built environment, presenting ideas for a preliminary proposal for a new work item NWIP for a Technical Specification, "Digital twinning of bridges during diagnostic load testing."

[Learn more!](#)

## RESEARCH

### SCIENTIFIC PUBLICATIONS

We presented diverse scientific papers based on research conducted in the ASHVIN technical development and real-life demonstrations. Now, 19 scientific publications from the ASHVIN project are in open access and remain one of the key legacies of our research.



### FUSION OF ENVIRONMENTAL SENSORS FOR OCCUPANCY DETECTION IN A REAL CONSTRUCTION SITE

This study evaluates multiple late fusion methods for detecting occupancy using environmental sensors during construction. It compares late fusion with early fusion followed by ensemble classifiers and tests a novel weighted fusion approach. The data collected is publicly available as a dataset.



### TWO PAPERS PRESENTED AT THE ISARC 2022 IN COLOMBIA FROM ASHVIN DEMONSTRATORS CONDUCTED IN SPAIN

**Closing the Gap Between Concrete Maturity Monitoring and Nonlinear Time-dependent FEM Analysis** proposes a data automation pipeline between simulation and concrete maturity monitoring data for our office buildings demonstrator project in Barcelona. **Towards Automated Pipelines for Processing Load Test Data on an HS Railway Bridge in Spain using a Digital Twin** presents an automated pipeline to process sensor-based data produced during load tests on digitally twinned HS railway bridges based on our demonstrator in Plasencia-Badajoz.



### BUILDING CONSTRUCTION PROCESSES. CASE STUDY: A REINFORCED CONCRETE CAST-IN STRUCTURE

This **paper** summarises the findings obtained during the development of information pipelines between a construction site and its corresponding digital twin. Overall, the paper provides a real-life insight that challenges massive implementation of digital twins within the existing construction sites for the **office building demonstrator**.

### A FRAMEWORK FOR 3D MODELLING OF CONSTRUCTION SITES USING AERIAL IMAGERY AND SEMANTIC NeRFs

The **paper** was presented at the 30th international Conference MMM 2024. It proposes a solution that applies semantic segmentation algorithms to the data produced by NeRF (Neural Radiance Fields), effectively transforming drone-captured 3D volumetric representations into semantically rich 3D models based on our bridges in the highway network in Spain demonstrator.



## Groundbreakers in Digital Twinning



#ResearchStories

EXCLUSIVE INTERVIEW

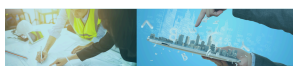


### RESEARCHERS BEHIND THE ASHVIN PROJECT

We are pleased to present our **#ResearchStories**, which comprises a series of interviews with the new generation of researchers participating in the ASHVIN project as part of their MSc, PhD, or Postgraduate studies. They share their research approach in ASHVIN and plan to continue exploiting this work beyond the project.

## APPLICATIONS

End-users and construction phases



### DIGITAL TWIN SOLUTION ENABLING DESIGN AND PLANNING

The design phase stands as a crucial stage in every construction project, determining the path to success. **ASHVIN's digital twin assists in creating accurate digital representations of construction projects**, helping architects, engineers and planners overcome design challenges. **Read our article about the capabilities of these digital technologies.**

### TRANSFORMING INFRASTRUCTURE DATA FOR STAKEHOLDER VALUE

Open data is gaining momentum in Europe's current political landscape, but its practical application lags. Recently, we hosted an **online webinar** where we shared practical perspectives and our approach through what we called the **A.D.A.P.T. framework** grounded in



participation, underscoring a shift towards more inclusive and informed governance in constructing and maintaining public infrastructures. [Read our article dedicated to this relevant topic.](#)

### DISSEMINATION



### EVENTS - MARK IN EUROPE AND WORLDWIDE

In Europe, ASHVIN showcased its digital building twins innovation at the **ECTP Conference in Brussels**, demonstrating its validation across ten European sites. In Rotterdam, ASHVIN laid the groundwork for a human-centric construction approach through the SEISMEC project, **powering the symposium "Better Work, Better Workplaces."** Additionally, findings from ASHVIN's demonstration project at Zagreb airport were presented at the **OLGA Project Conference** in Croatia.

Beyond Europe, ASHVIN was featured at the **Transport Research Board Annual Meeting in Washington, D.C.**, highlighting its infrastructure maintenance demonstrator and digital tools. It also appeared in Shanghai, China, at **TONGJI SEM Business School**, and in Australia, fostering collaboration within the **structural engineering community**, implementing **educational activities** and contributing to **cross-pollinating research activities with international centres**.

### JOINT FLASH - SHARING DIGITAL TWIN SOLUTIONS

Together with Cogito-project and BIM2TWIN, we have issued the **#2 and last Joint Flash newsletter** to present the key outputs of our developed digital twin solutions for the construction industry. The publication aims to share these projects' technical innovations, insights collected from the stakeholders, and the last steps before their end (March/April 2024).



[Read it!](#)

Our partners continue their engagement in research topics started within the ASHVIN project and their investment in developing digital twin solutions

✳️ PONT3. A National Project in which the Polytechnical University of Catalonia (UPC) will develop interoperable IFC information constructs for anticipating damage in ageing bridges. Funding Agency: Spanish Ministry of Science and Innovation.

✳️ Industrial Doctorate at Polytechnical University of Catalonia (UPC). Regional Project. Doubly-curved Catalan vaults and Digital Twins. Funding Agency. AGAUR. Catalonia.

✳️ Empowering the shift to a human-centric industry, the news **SEISMEC** project coordinated by Erasmus University of Rotterdam draws on lessons from the ASHVIN project and the digital transformation of the construction sector.

✳️ Coordinated by the Technical University of Berlin, **Reincarnate** aims to develop the technical and social means to give new opportunities to buildings, construction products and materials establishing circular practices, through a platform that integrates 10 innovations.

✳️ The **CIRCuIT project** aims to introduce a holistic approach backed by digital solutions and guidelines to enable this. With partners Infra Plan Konsulting, InGEO and Digital Twin Technology GMBH involved it will create an open-source digital platform that seamlessly integrates circularity analytics, supply chain matchmaking, and engineering tools like building information modelling and digital twin technology.

✳️ iDriving with two ASHVIN partners CERTH and Infra Plan Konsulting, it will be kicked-off in July 2024.

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## LEARN ABOUT ASHVIN RESULTS

**We will publish the final technical deliverables in the coming months, sharing the project's results and methodologies. Stay tuned to our social media channels as we continue spreading the word about the knowledge, innovation, and technology behind ASHVIN.**

**Thanks for supporting our work!**



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement **No 958161**. This document reflects only the author's view and that the European Commission is not responsible for any uses that may be made of the information it contains

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