z AR FactoryPlanner

AR based zero defect factory planner – z_AR_FactoryPlanner

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Project Details and Motivation

The process, methodologies, and tools used for factory planning are still widely based on static 2D planning. Even though 3D based CAD tools have been for some time widely available, they often require significant skills to get value out of them and they have not been always optimised for factory planning. More importantly, they do not yet bring the capability to both quickly and easily capture the constraints of the existing facilities as well as capability to validate the designed layout and process in the real manufacturing environment such as using technologies like AR.

This project will develop and integrate an AR based factory planner to the ZDMP ecosystem so that manufacturing companies can easily document and analyse their factory layouts and processes as well as quickly prototype, analyse, and validate changes. This will greatly improve communication across multiple stakeholders on the existing manufacturing process and its parameters as well as speed up changes in the factory layout and process as a reaction to market changes and as steps towards the zero-defect manufacturing.

The zAR_FactoryPlanner foundation is in Ainak's existing ecosystem apps like Ainak AR Factory Planner mobile app that allows quickly defining the factory basic layout constraints (such as walls and pillars in the factory hall) and some of existing layout elements. In this project existing apps are integrated with the ZDMP ecosystem by bringing the factory layout data inside the zApp, integrate it with other components such as the NDI 3D Scan that allows to bring to the zApp optimised 3D layout elements e.g. from scanned sources and then validate the results in a real factory environment with the mobile AR app.

This layout visualisation below is a simple example of a factory 3D layout that can be created in minutes in an existing factory environment. This data and 3D visualisation brought inside the zApp allows the user to modify the layout and then bring it back to the real factory for validation of the layout using the mobile application. This opens up other opportunities such as visualisation of any factory data inside this 3D/AR visualisation.

Image 1: Complete factory 3D layout created by an AR app

Image 2: AR view of the layout on the factory floor

ZDMP Fit

This project will bring to the ZDMP ecosystem a new quick way of modelling and designing zero defect factory layouts leveraging augmented reality and 3D web-based technologies, because factory layout planning is an important but missing tool in the ZDMP ecosystem. The goal of the Zero-Defect Factory Layout Planner is to allow manufacturers to quicker adapt to market changes with modified factory layouts. This leads to better transparency in the production, less defects and better productivity and value stream in the modified situation. Value is especially in manual assembly lines in operations having multiple product lines and frequently changing customer and market requirements.

This innovation project is also an important step in making ZDMP apps 3D and AR enabled. It opens new opportunities for complementing partners in the ZDMP ecosystem e.g. IoT players and Digital Twins to start hooking into the 3D factory layout data for creating different 3D and AR visualisations for the factory data (e.g. quality, productivity etc).

Results to Date

The team has first focused in defining the requirements for the application as well as integrating existing Ainak ecosystem apps to ZDMP so that different components in the overall solution can pass data to each other, e.g. the user can use a mobile AR application to create factory layouts and save the layout in the ZDMP app and then also view, edit and pass the data in ZDMP app between different ZDMP components. We successfully integrated the data using ZDMP Application Builder and been able to visualise some data inside our initial ZDMP dashboard app. The next step is to integrate the new zApp with Secure Authentication and Authorisation to allow users to access all the data in all apps and hence better integrate to the ZDMP ecosystem. After that we see still if we could bring optimised 3D content inside the application e.g. from scanned source and then also try these technologies in a real lean planning workshop at TU Darmstadt.

Participant Details

- **Organization:** Ainak Oy
  - **Website:** ainak.io
  - **Contact Person: Timo Pastila** (timo@ainak.io)
  - **Profile:** Ainak is a Finland based start-up founded in 2018 and focusing on development, marketing and sales of AR based apps to renew completely how to do layout planning. We have built the world's first onsite layout planner that allows to capture and design spaces simply by a mobile application, continue the layout and process planning in web, collaborate and validate the results again in the real space with the mobile app.
- **Organization:** PTW / TU Darmstadt
  - **Website:** TU-Darmstadt.de
  - **Contact Person: J Barth** (J.Barth@PTW.TU-Darmstadt.de)
  - **Profile:** PTW is one of the leading production research institutions in Germany and Europe. The CiP (Center for Industrial Productivity) research group at the PTW conducts research on new methods of lean production combined with Industry 4.0, it operates the CiP process learning factory since 2007 for the validation of research results and consults companies for more than 14 years

Environment

The ZDMP – Zero Defects Manufacturing Platform – is a project funded by the H2020 Framework Programme of the European Commission under Grant Agreement 825631 and conducted from January 2019 until December 2022. It engages 31 partners (Users, Technology Providers, Consultants and Research Institutes) with a mission to "Provide the platform, components, services, and marketplace to achieve the right product, at the right time, with the right conditions using the right resources.". Further information can be found at www.zdmp.eu. ZDMP channels 3.2M€ of SME orientated funding to subprojects, such as this one to both facilitate SMEs with their innovations and increase the value of the ZDMP ecosystem,

Links

• **Primary Partner:**	timo@ainak.io
• **Secondary Partner:**	J.Barth@PTW.TU-Darmstadt.de
• **Sub project website/blog**	http://ainak.io/zdmp
• **Architecture Components**	Application Builder, Portal, Secure Authentication and Authorization, Application Runtime, NDI 3D Scan Transformation