Digital Twin Training and Upskilling plan

The below is a training plan targeted towards industrial automation in conjunction with a web dashboard. The identified skills are generalized as some members skills are higher in some areas than others.

1. **Kanban Methodology**. Kanban is the chosen methodology for the project members will need to be familiar and up to date with:

* The principles of Kanban. Workflow, visualization, learning how to prioritize and limit work in progress (WIP).
* Understanding of the Kanban board.
* Introducing Kanban into the project.
* Utilizing Kanban alongside a visual board such as Jira or Trello.

1. **JavaScript / React**. As the main deliverable is a web dashboard that is responsible for reading and controlling Programmable Logic Controllers, we have identified that JavaScript / React will be a suitable language for this.

* Transferring existing programming knowledge into JavaScript. Basics and advanced programming techniques.
* If react is needed, then understanding react architecture, react components, events, built-in hooks, and using in-built libraries.
* Implementing a simple React application.

1. **Factory I/O.** As professionally suggested, factoryio has been decided as the 3D simulation tool to replicate a factory.

- Familiarity with factoryio and what it is capable of.

- Factory simulation and creation as best as can be replicated to the client’s factory.

- Connecting factoryio to a Programmable Logic Controller (PLC).

- Simulating a production line according to the client’s requirements.

1. **Programmable Logic Controllers (PLCs).** PLCs are a new area of upskilling that the team will need to be familiar and capable of working with.

* Being familiar with common industrial protocols such as Ethernet/IP, OPC UA and Modbus.
* Configuring PLCs to communicate and transfer data with other devices.
* Familiarity with common debugging and troubleshooting techniques and issues.
* Coding PLCs to read and write data using a protocol.

1. **Factory I/O Web APIs.** Connecting factory I/O with a web dashboard is going to require communication over an API to read and write data.

* Understanding how to connect factory I/O with a web socket and web API.
* Creating and sending HTTP requests which may read and write data to either Factory I/O and the dashboard.

1. **NodeRed and SCADA.** NodeRed and SCADA are common tools used in industrial settings. To simulate a factory alongside PLCs, knowledge for NodeRed and SCADA may need to be investigated. SCADA systems consist of hardware and soft-ware which analyze and collect data from sensors. This data is processed and sent to control devices.

* NodeRed and SCADA familiarity
* Understanding, creating and managing flows.
* Integration with SCADA and NodeRed.

[*https://www.allaboutcircuits.com/technical-articles/an-introduction-to-scada-systems/*](https://www.allaboutcircuits.com/technical-articles/an-introduction-to-scada-systems/)

1. **Databases.** A database may be needed to hold and store machine and user login information.

* Recap on Database syntax.
* Understanding database schemas.
* Connecting the database to the web dashboard and PLC/computer.
* Hosting a database either locally or cloud based.

This training plan encompasses a diverse range of topics that are pertinent to a research and development project in industrial automation. It offers a thorough comprehension of crucial areas including Kanban methodology, Javascript / React, PLC protocols, Factory I/O, Factory I/O Web API’s, NodeRED and SCADA, and databases. Upon finishing the training, participants will possess the requisite abilities and expertise to build a virtual factory, manipulate it using various software tools, and manage and archive data associated with the factory.