NODE

BIT Automation - AGV Manager
Case Study: Automobili Lamborghini – St. Agata Bolognese (BO) Italy
Introduction:

✓ NODE is an AGV Manager developed by BIT Automation in Italy.
✓ It is completely written in C# .NET and WPF for the UI part.
✓ It uses MS SQL Server database and can use Oracle database.
✓ It can run on every Windows OS.
✓ It can communicate with PLC via OPC, I/O modules or directly.
✓ Communication with SAP and factory ERP is foreseen.
Automobili Lamborghini – Case Study

• NODE is the system used to handle the 43 AGVs running in the Lamborghini URUS assembly line.
• We handle with the same manager 3 different types of AGV coexisting in the same layout.
• The system real time communicates with the plant’s Siemens PLC S7 via UDP protocol and handles many I/Os.
• The UI Client is downloadable by any user in the network and ready to be used.
System Overview - Architecture

NODE Server

NODE SQL DB

PLANT PLC

CLIENTS

AGV Type 1 (28)

AGV Type 2 (4)

AGV Type 3 (10)
System Overview - Operativity

• The plant PLC handles the progression of the assembly line.
• When the TAKT timer expires (around 30 minutes) all the assembly stations (23 in total) are marked in the PLC as ready to go.
• The Node system reads this information from the PLC and if some other conditions are true, it gives a command to ALL the assembly AGV (type 1 and 2) to move to the next assembly station with the car.
• Every times the timer expires the mouse AGV fleet (type 3), start the taking trolleys full of assembly components to the line from the warehouse in a fixed sequence and then go back to the chargers.
System Overview – AGV UI

AGV Type 1
AGV Type 2
AGV Type 3
Assembly Line
Takt TIMER
From this page the operators can check the status of each assembly station (based on the color) and interact with the station itself (check station I/Os for example).
System Overview – PLC UI

From this page the operators can check the status of all the plant PLC’s I/Os and interact with them (for example force a DigInput value to 1 or to 0).
From this page the operators can check the status of a specific AGV (e.g. status bits, active order, battery voltage, speed, etc...).
System Overview - Order Status

From this page the operators can check the status the active orders in the plant (in this case the mouse AGV orders) and interact with them (cancel, create, edit)
Other cases

• NODE system can be used to **replace an old AGV Manager** (e.g. for an old Digitron system) and handle the AGVs, if the AGV communication protocol is available.

• NODE system can even **handle AGVs from different manufacturers** (e.g. Digitron AGVs and AGVE LGVs) in the same plant, sharing the same layout, if the AGV communication protocol is available.
And much more...

NODE system has many other functionalities:

• System maintenance windows to check and edit system parameters in real-time, no restart required! (e.g. traffic rules, system timers, IP address, etc...)

• It can display different floors of the same plant.

• We can add had-hoc functionality based on the customer requirements.

• We can simulate with a built in AGV simulator.

• And much more!