

A Survey and Practical Application of Ethernet-APL, PROFINET Network and HMI

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EXTENDED ABSTRACT

Development of industrial communication protocols has accelerated over the years, leading to increasingly diverse applications. Traditional fieldbus systems are gradually being replaced by protocols based on the Ethernet standard, due to their ability to integrate Information Technology – IT and Automation Technology – AT devices, which are increasingly present in automation environments.

In this context, the Ethernet-APL physical medium emerged. Ethernet-APL (Advanced Physical Layer) is a physical medium that allows the use of protocols based on the Ethernet standard (such as PROFINET, Ethernet/IP and Ethernet Powerlink). It allows electrical connection for severe conditions; two-wire cabling, power and data transmission through the same pair of cables and the possibility of being used in intrinsically safe hazardous areas. Its speed and bandwidth are compatible with the Ethernet standard and the cable can have up to 1,000 meters long.

Objective of this paper is to carry out a practical study, by demonstrating an application that integrates the PROFINET network with a visualization and monitoring system using an Ethernet-APL physical layer. Utilizing PROFINET network devices, the study aims to establish the connection and monitoring of a temperature sensor. In order to achieve this, an Ethernet-APL-based medium will be used to configure a PROFINET network, program the PLC (Programmable Logic Controller) and its peripherals, and set up and program an HMI (Human-Machine Interface) to assemble the final practical application. Study will also assess the interoperability of the equipment.

The goal was to create a practical industrial automation application using the Ethernet-APL physical medium, integrated with the PROFINET protocol and monitored by an HMI, thus demonstrating the interoperability between the different communication protocols and equipments. The system must read the temperature from a PT-100 sensor, activate a set of light signals and pneumatic actuators, and present the information on the HMI. First figure shows the system components (KTP400; XF204 and ET200 SP) and their respective digital input/output cards. Second figure also illustrates the system components (PT-100; TMT86 and A111) and the APL cabling.

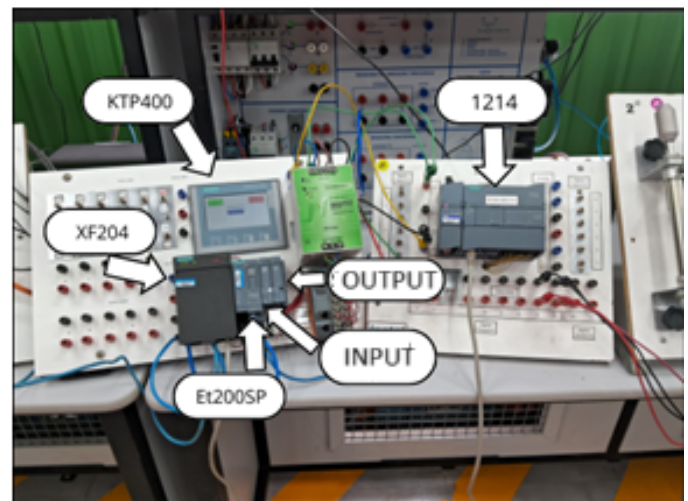


Fig. 1. Fine connections.

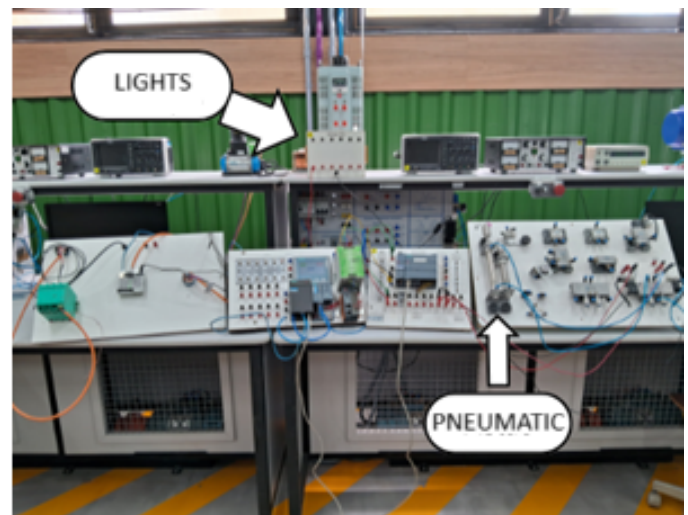


Fig. 2. Image of the entire system structure.

This paper addressed the importance and applicability of the PROFINET network, by using the Ethernet-APL physical layer in the industrial environment. The implementation of this network allows the integration and monitoring for hazardous applications.