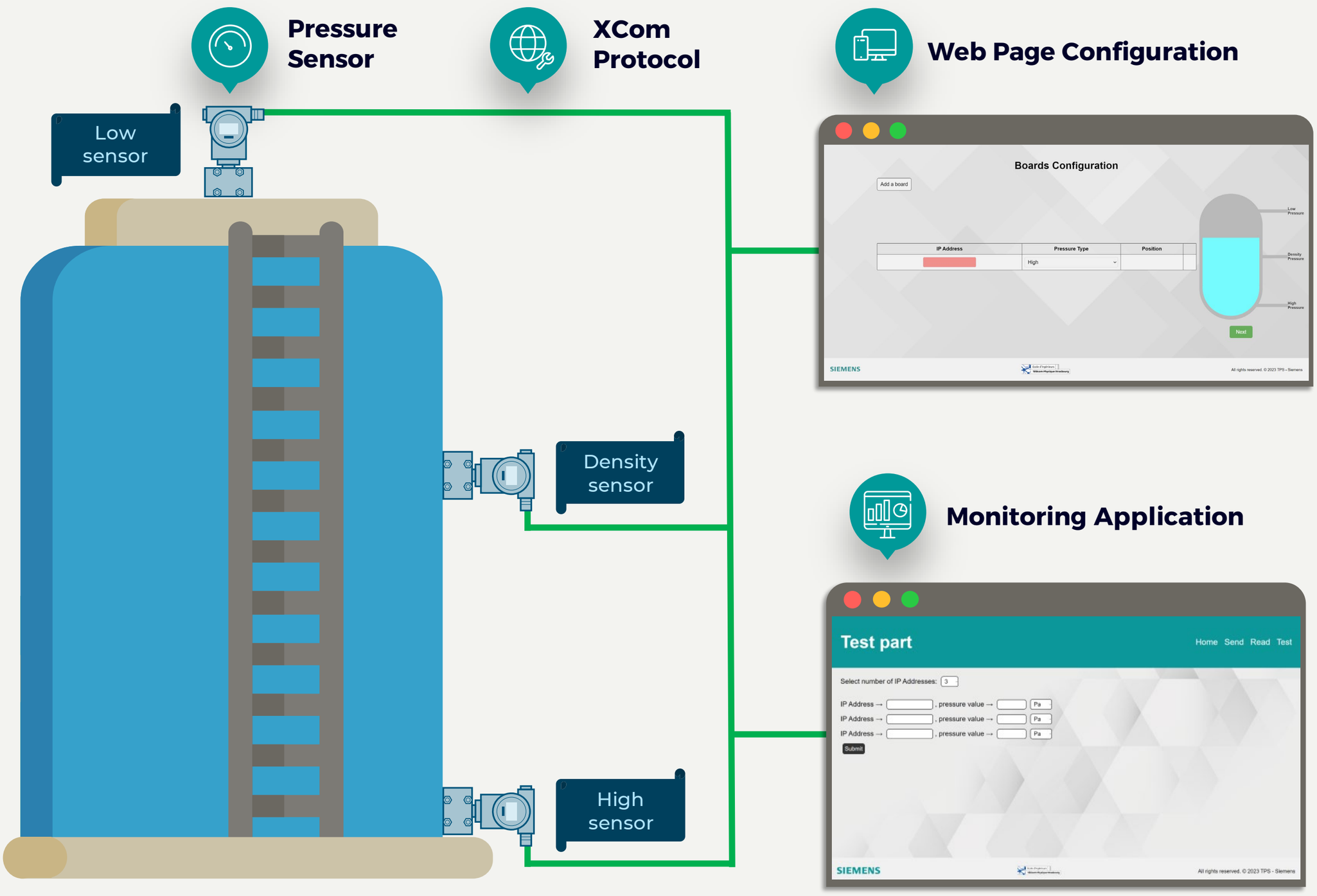
SIEMENS

IP-Based Communication for Field Devices

The aim of the project is to measure the level of a fluid inside a tank using several pressure sensors. To achieve this, a cyclic measurement and data exchange between the sensors is required. The project's mission is to define and implement a communication protocol which fulfill all requirements for the data exchange and time synchronization, as well as the complete firmware of the pressure sensors to perform the calculation of the level and density of the fluid.



Requirements

- Same firmware for all sensors
- Several possible system configurations
  - with high sensor knowing the gas pressure in the tank and the fluid density
  - with high and low sensors knowing the fluid density
  - with high, density and low sensors

Tools used

- Simulation of sensors by STM32 microcontrollers
- Use of Segger's C library for the sensor firmware:
  - Real-time operating system called embOS
  - IPv4/IPv6 TCP/IP stack called emNet
- Use of Ethernet network protocol between sensors

Features implemented

- **Main/secondary architecture :** one sensor is specified by the user to receive pressure values measured by the other sensors and to calculate the fluid level
- **Time-synchronization :** routine operated by the sensors to perform pressure measurements at the same time
- **Data exchange protocol (XCom) :** network protocol over Ethernet/IP/UDP to send and receive configuration or measurement data
- **Web Page configuration :** web page available on each sensor to configure the entire system
- **Monitoring application :** web application to monitor and test the correct operation of the project

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