Modbus Protocol

Modbus is a communication protocol widely used in industrial automation and control systems. It was developed in the late 1970s by Modicon. The protocol was designed to allow communication between programmable logic controllers (PLCs) and other devices such as sensors, actuators, and human-machine interfaces (HMIs).

Modbus is a master-slave protocol, which means that one device (the master) initiates the communication, while one or more other devices (the slaves) respond to the master's requests. The protocol is typically used in serial communication (Modbus RTU and Modbus ASCII) or Ethernet communication (Modbus TCP/IP).

Modbus protocol defines a set of commands or function codes that can be used to read or write data to the slave devices. For example, a master device can request the status of a digital input from a slave device, or write a setpoint value to a temperature controller. Modbus protocol is known for its simplicity, reliability, and flexibility, making it a popular choice for many industrial applications.

Summary of the implementation idea we got from referenced materials of similar implementations.

For this project, we're planning to implement a heat controller system and there we need temperature sensors. In the case of enabling communication between ESP8266 NodeMCU and temperature sensors (ex: PT100), the Modbus RTU protocol is used. The Modbus RTU protocol uses a master-slave architecture, where the NodeMCU acts as the master and the sensor acts as the slave. The Modbus RTU protocol defines a set of function codes that the master can use to read or write data to the slave. In this case, the master uses a Modbus read command to request temperature data from the slave. The slave responds to the read command by sending the temperature data back to the master in a Modbus-compatible format.

Further process: Once temperature data is read, they will be sent to the MQTT broker using the Wi-Fi module in Nodemcu. The SCADA and Database store the data with the time it receives the data. SCADA will display the data in graphical format.

When working with this 'Modbus' protocol in addition to sensors, actuators, and ESP8266 we would need MAX485 RS-485 to TTL converter.

(RS485 is involved in this case as it is the physical layer protocol used to transmit data between the NodeMCU and the sensor. The MAX485 converter module is used to convert the TTL signals from the NodeMCU into RS485 signals)

For the software part,

libraries required for Modbus communication on the ESP8266 are "ModbusMaster" and "SimpleModbusMaster."

REFERENCES

https://github.com/4-20ma/ModbusMaster

https://www.youtube.com/watch?v=NJAXs3T4NRg&t=2s

https://www.youtube.com/watch?v=i46jdhvRej4

https://www.youtube.com/watch?v=GXfCrkH7xxw&t=275s

Group Members :

E/18/354 Tharaka K.K.D.R.

E/18/318 Sandunika S.A.P.

E/18/022 Amarasinghe D.I.