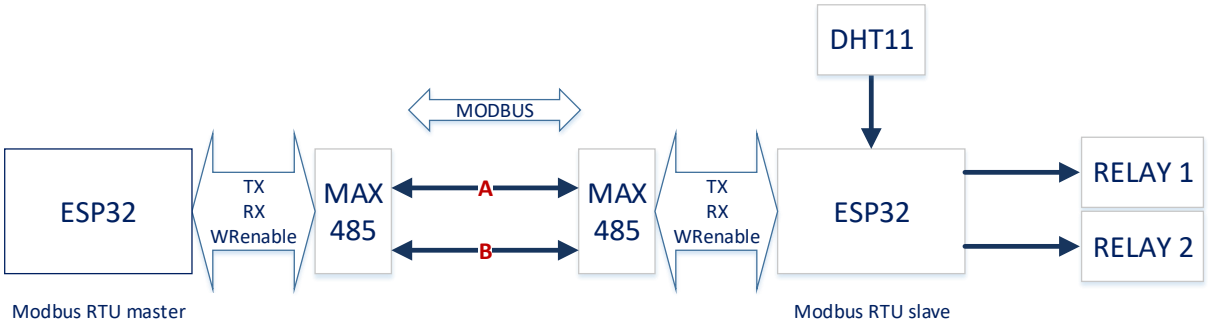
18.10.2022

Industrial Data Communications
HW1

1) Consider that you have ESP 32 based devices. First device is the master and the second is slave.
A temperature and humidity sensor (DHT11) and two relays are attached to the slave device. Relay 1 switches the heater and Relay 2 switches the humidifier.

Automation Scenario

- Master sends a query to the slave for the measurement of temperature and humidity. Slave responds.
- Master sends relay on/off commands with a query depending on the measurement values and the set values. (heater relay on/off, humidifier relay on/off). Slave takes action for the commands and responds with the necessary response



a) Design a circuit with ESP32s and max485 converters. You can use easyEDA(freeware).
b) Write Modbus functions for both master and slave including CRC calculation. Describe how CRC works. (it is better to use software serial functions for a new serial bus)
You can use holding register write/read functions in order to transfer data between master and slave. Slave device writes measurements to certain part of holding registers for master to read it and read certain parts of holding registers to turn on/off relays (It is upto designer's choice).
c) Observe all the traffic between master and slave by mirroring the software serial bus to serial bus between master ESP32 and PC.

Note: It is better if you build your circuit on a PCB, we will use the same board for further homeworks and project.