

CG1112 Engineering Principles and Practices II for CEG

Semester 2 2018/19.

Tutorial 6

Protocols

1. Using Google or otherwise, explain the layers in the ISO 7 layer Open Systems Interconnect (OSI) model. Why is such a model needed?
2. To help you understand practical serialization / deserialization better, in this question we will deep-dive into the code in `serialize.cpp`:
 - a. Explain how the code in the `serialize` function in `serialize.cpp` works.
 - b. Explain how the code in the `deserialize` function in `serialize.cpp` works.
 - c. One problem with USART is that it sends data in fragments. So if we sent a packet of 64 bytes, the USART might send 32 bytes, then 12 bytes, then 4 bytes, then 16 bytes.
 - i) Explain how this might be a problem when trying to transmit a serialized data structure over USART.
 - ii) Look at the code in the `assemble` function, and give a rough explanation how this code solves this problem.
3. We will now deep-dive into the protocol that Alex uses to talk to his Arduino, to help you understand protocol design better. Looking at the code in `packet.h`, `Alex-Pi.cpp` and `Alex.ino`, explain:
 - i) What the fields in `TPacket` do.
 - ii) How `sendCommand` in `Alex-Pi.cpp` uses `TPacket` packet to send a command to move forward 50 cm.
 - iii) How this packet is serialized and sent to Alex.
 - iv) How, in `Alex.ino`, the serialized packet is deserialized.
 - v) How the packet is transformed into commands to the motors.