

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
PS C:\Users\Caden Dengel\Desktop\school\cs4310\socket_prog_ass> python tcp_server.py
[2025-11-23 21:29:23] [TCP] Smart Hub TCP Server listening on 127.0.0.1:5050

Commands:
  list                - list connected devices
  send <dev> <COMMAND...> - send command to device
  quit               - stop server
smart-hub> [2025-11-23 21:29:27] [TCP] New connection from 127.0.0.1:14606
[2025-11-23 21:29:27] [TCP] Received registration from ('127.0.0.1', 14606): DEVICE Sensor01 TYPE temperature
[2025-11-23 21:29:27] [TCP] Registered device: Sensor01 TYPE=temperature from ('127.0.0.1', 14606)
send Sensor01 PING
[2025-11-23 21:33:50] [TCP] Sent command to Sensor01: PING
[2025-11-23 21:33:50] [TCP] From Sensor01: ACK Command Executed

Commands:
  list                - list connected devices
  send <dev> <COMMAND...> - send command to device
  quit               - stop server
smart-hub> |
```

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```
PS C:\Users\Caden Dengel\Desktop\school\cs4310\socket_prog_ass> python tcp_client.py
[2025-11-23 21:29:27] Connected to Smart Hub at 127.0.0.1:5050
[2025-11-23 21:29:27] Sent registration: DEVICE Sensor01 TYPE temperature
[2025-11-23 21:33:50] Received command: PING
[2025-11-23 21:33:50] Sensor01: Unknown command, but executing (simulated)
[2025-11-23 21:33:50] Sent ACK: ACK Command Executed
|
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
PS C:\Users\Caden Dengel\Desktop\school\cs4310\socket_prog_ass> python udp_server.py
[2025-11-23 21:29:32] [UDP] Smart Hub UDP Server listening on 127.0.0.1:6060
[2025-11-23 21:29:37] [UDP] From ('127.0.0.1', 57886): Sensor01,2025-11-23 21:29:37,temperature,24.1,SEQ:1
[2025-11-23 21:29:38] [UDP] From ('127.0.0.1', 57886): Sensor01,2025-11-23 21:29:38,temperature,24.0,SEQ:2
[2025-11-23 21:29:39] [UDP] From ('127.0.0.1', 57886): Sensor01,2025-11-23 21:29:39,temperature,23.8,SEQ:3
[2025-11-23 21:29:40] [UDP] From ('127.0.0.1', 57886): Sensor01,2025-11-23 21:29:40,temperature,24.4,SEQ:4
[2025-11-23 21:29:41] [UDP] From ('127.0.0.1', 57886): Sensor01,2025-11-23 21:29:41,temperature,24.5,SEQ:5
[2025-11-23 21:29:42] [UDP] From ('127.0.0.1', 57886): Sensor01,2025-11-23 21:29:42,temperature,24.2,SEQ:6
[2025-11-23 21:29:43] [UDP] From ('127.0.0.1', 57886): Sensor01,2025-11-23 21:29:43,temperature,23.9,SEQ:7
[2025-11-23 21:29:44] [UDP] From ('127.0.0.1', 57886): Sensor01,2025-11-23 21:29:44,temperature,23.5,SEQ:8
[2025-11-23 21:29:45] [UDP] From ('127.0.0.1', 57886): Sensor01,2025-11-23 21:29:45,temperature,23.8,SEQ:9
[2025-11-23 21:29:46] [UDP] From ('127.0.0.1', 57886): Sensor01,2025-11-23 21:29:46,temperature,24.2,SEQ:10
[2025-11-23 21:29:46] [UDP] Sent status to Sensor01 at ('127.0.0.1', 57886): STATUS RECEIVED 10/10 PACKETS
|
```

```
PS C:\Users\Caden Dengel\Desktop\school\cs4310\socket_prog_ass> python udp_client.py
[Sensor01] Sending packet SEQ:1 - Temp=24.1°C
[Sensor01] Sending packet SEQ:2 - Temp=24.0°C
[Sensor01] Sending packet SEQ:3 - Temp=23.8°C
[Sensor01] Sending packet SEQ:4 - Temp=24.4°C
[Sensor01] Sending packet SEQ:5 - Temp=24.5°C
[Sensor01] Sending packet SEQ:6 - Temp=24.2°C
[Sensor01] Sending packet SEQ:7 - Temp=23.9°C
[Sensor01] Sending packet SEQ:8 - Temp=23.5°C
[Sensor01] Sending packet SEQ:9 - Temp=23.8°C
[Sensor01] Sending packet SEQ:10 - Temp=24.2°C
[Sensor01] Received status from server: STATUS RECEIVED 10/10 PACKETS
[Sensor01] UDP socket closed
PS C:\Users\Caden Dengel\Desktop\school\cs4310\socket_prog_ass> []
```

Example TCP server commands:

```
smart-hub> send Sensor01 SET_INTERVAL 3
smart-hub> send Sensor01 ACTIVATE_ALARM
smart-hub> send Sensor01 PING
```

This project simulates a smart home network where IoT devices communicate with a central Smart Hub using both TCP and UDP. Together, these components demonstrate how real-world IoT systems balance reliability and performance using different network protocols.