**Communication Protocol (v1.0)**

**1. Data Packages from Master Board to Computer (JSON format):**

There are three types of data packages that the master board sends to the computer:

* **Photoeye State**:
  + {"Photoeye":"ON"} → Indicates that the photoelectric sensor is triggered (ON).
  + {"Photoeye":"OFF"} → Indicates that the photoelectric sensor is not triggered (OFF).
* **Status Report**:
  + {"Status": **Data** } → A status message that sends 8 bits of data, where each bit represents the state of a different component of the system.

**8-bit Status Data:**

Each bit in the status byte corresponds to a specific system state as follows:

| **Bit Position** | **Component** | **Bit Value** | **Description** |
| --- | --- | --- | --- |
| Bit 7 | Photoeye | b'10000000' | Photoeye state (ON=1, OFF=0) |
| Bit 6 | Computer | b'01000000' | Computer running (ON=1, OFF=0) |
| Bit 5 | POE Switch | b'00100000' | POE switch status |
| Bit 4 | Fun | b'00010000' | Fan status (ON=1, OFF=0) |
| Bit 3 | Channel 0 | b'00001000' | Channel 0 LED panel status |
| Bit 2 | Channel 1 | b'00000100' | Channel 1 LED panel status |
| Bit 1 | Channel 2 | b'00000010' | Channel 2 LED panel status |
| Bit 0 | Channel 3 | b'00000001' | Channel 3 LED panel status |
|  |  |  |  |

**2. Commands from Computer to Master Board:**

The computer sends specific commands to control the system components. Each command is a **string** that triggers an action on the master board. Here are the available commands:

**System Control Commands:**

* **"ALIVE"**: Indicates that the computer is running properly (must be sent at least every 30 seconds).
* **"RESET"**: Resets the entire system.

**Power and Channel Control Commands:**

* **"ALL ON"**: Turns all LED panels on.
* **"ALL OFF"**: Turns all LED panels off.

**Individual Channel Control:**

* **"CHANNEL0\_ON"**: Turns Channel 0 LED panel on.
* **"CHANNEL0\_OFF"**: Turns Channel 0 LED panel off.
* **"CHANNEL1\_ON"**: Turns Channel 1 LED panel on.
* **"CHANNEL1\_OFF"**: Turns Channel 1 LED panel off.
* **"CHANNEL2\_ON"**: Turns Channel 2 LED panel on.
* **"CHANNEL2\_OFF"**: Turns Channel 2 LED panel off.
* **"CHANNEL3\_ON"**: Turns Channel 3 LED panel on.
* **"CHANNEL3\_OFF"**: Turns Channel 3 LED panel off.

**POE and NUC Control:**

* **"POE RESET"**: Resets the POE (Power over Ethernet) network switch.
* **"NUC RESET"**: Resets the NUC computer power.

**Fan Control:**

* **"FUN ON"**: Turns the fan on.
* **"FUN OFF"**: Turns the fan off.

**LED Brightness Control:**

* **"LED\_BRIGHTER"**: Increases LED panel brightness.
* **"LED\_DIM"**: Decreases LED panel brightness.