smart.city.kempten - microcontrollers

The model contains three microcontrollers with different functionality, sensors and actors:

- Inner City One
  - 8 space parking area with display
  - smart waste at town hall (also shown on parking display)
  - MQTT upload of parking and smart waste data
  - wiring documented in wiring_inner_city_1.pdf
  - hardware used
    - Raspberry Pico 2 W
    - 3 multiplexers TCA9548A (two for parking spaces and one for waste containers)
    - 8 ToF sensors VL53L0X for parking spaces (via two multiplexers)
    - 3 light sensors GY302 / BH1750 for waste containers (via multiplexer)
    - 3 5mm LEDs for light barrier of waste containers
    - OLED display SH1106 for parking area and smart waste
- Inner City Two
  - 4 way traffic light at city hall, with traffic count and traffic count display for incoming street
  - MQTT upload of traffic count (6 sensors at main crossing)
  - 3 way traffic light
  - illuminated controller below street
  - wiring documented in wiring_inner_city_2.pdf
  - hardware used
    - Raspberry Pico W
    - 7 traffic light columns with 3 0805 SMD LEDs (red/yellow/green) each, mounted behind trans red/yellow/green 1*1 round LEGO plates
    - 6 magnetic hall sensors KY-024 for traffic count at main crossing
    - 3 5mm LEDs for illumination of controller (below street)
    - OLED display SH1106 for traffic count of street entering the model at the left side
- Iller
  - 6 space parking area with display,
  - smart waste (also shown on parking display)
  - 4 way traffic crossing with traffic count and traffic count display for incoming street
  - environment sensor with display
  - MQTT upload of parking area, traffic count and environment data
  - wiring documented in wiring_iller.pdf
  - hardware used
    - Raspberry Pico 2 W
    - 4 traffic light columns with 3 0805 SMD LEDs (red/yellow/green)

each, mounted behind trans red/yellow/green 1*1 round LEGO plates
  - 3 multiplexers TCA9548A (one for parking spaces, one for waste containers and one for displays)
  - 6 ToF sensors VL53L0X for parking spaces (via multiplexer)
  - 3 light sensors GY302 / BH1750 for waste containers (via multiplexer)
  - 3 5mm LED for light barrier of waste containers
  - 3 magnetic hall sensors KY-024 for traffic count at crossing
  - 1 BME280 for temperature, pressure and humidity and 1 GY302 / BH1750 for light level (via multiplexer)
  - 3 OLED displays SH1106 for traffic count, parking area/smart waste and environmental data (via multiplexer)

An USB connection of all controllers is available individually at the back side of the model via Micro-USB.

This connection mainly provides the power for the controllers via USB. Power consumption is currently below 1 W per controller, therefore all controllers may be powered by a standard 5V power adapter using y-cables.

However, the USB connections can be used to directly access the controllers individually without the necessity of removing them from the model, e.g. to update and configure them.