

```

# --- MQTT設定 ---
def mk_mqtt():
    client = mqtt.Client(client_id=f"mcp-{DEVICE_ID}", protocol=mqtt.MQTTv5,
                          callback_api_version=CallbackAPIVersion.VERSION2)
    client.on_connect = on_connect
    client.on_message = on_message
    client.connect("127.0.0.1", 1883, 60)
    threading.Thread(target=client.loop_forever, daemon=True).start()
    return client
def on_connect(client, userdata, flags, rc, properties=None):
    client.subscribe(RAW_TOPIC, qos=0)
    client.subscribe(ZCLIP_TOPIC, qos=0)
    publish_status(retain=True)
def on_message(client, userdata, msg):
    # Handle RAW/ZCLIP payloads
    try:
        ensure_bootstrapped()
        data = json.loads(msg.payload.decode("utf-8"))
    except Exception as e:
        log.warning(f"bad payload: {e}")
        return
    if msg.topic.endswith("/raw"):
        raw = np.array(data["raw"], dtype=np.float32)
        X = (raw - SCALER_MEAN) / SCALER_STD
        X = np.clip(X, -K_CLIP, K_CLIP).reshape(1, -1)
    elif msg.topic.endswith("/zclip"):
        X = np.array(data["z"], dtype=np.float32).reshape(1, -1)
    else:
        return
    run_inference(X)

```