

## Stargazing telescope control for the Slovak Academy of Sciences

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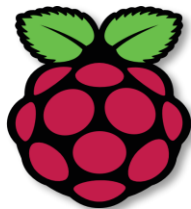


### Problem Description

- **Blocking control** – slow position adjustment
- **Fixed steps** – low positioning precision
- **Unclear protocol** – hard debugging and extension
- **Complicated web interface** – implemented directly in C/C++

### Goal (Outcome)

- **Simplify** the control system with new architecture and communication protocol
- **Enable** precise non-blocking movement based on astronomical coordinates



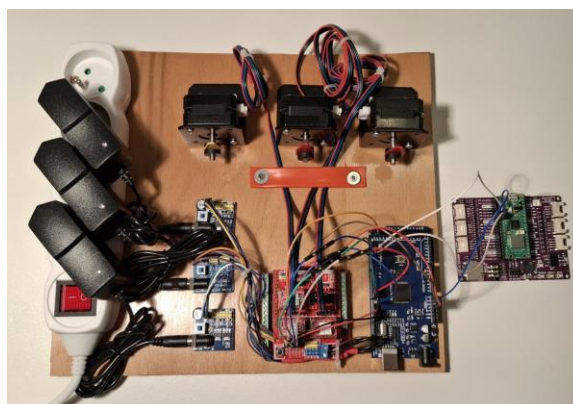
### Architecture

#### Hardware:

- **Arduino MEGA 2560** – motor control
- **Raspberry Pi Pico WH** – web server
- **Stepper motors and motor drivers**

#### Software:

- **Arduino** – C/C++, 16-bit timers, ISR
- **Raspberry** – MicroPython (HTML/CSS/JavaScript)
- **Communication** – serial interface



### Solution Features

- **Non-blocking** motor control
- **Simultaneous** movement of both axes
- **Maintained** internal coordinate state
- **Text-based** (simple) communication protocol
- **Web-based** control without external libraries
- **Code simplification** (~700 lines vs. ~2800)

### Current Status (Usage)

- Control via a **web interface**
- Commands sent to the **Arduino** over a serial connection
- Implementation is being tested and fine-tuned by **SAV** employee



### Coordinate System

#### Equatorial coordinates:

- **RA / HA** – right ascension (hour axis)
- **DEC** – declination axis

#### Movement defined in the format:

- **HH:MM:SS / DDD:MM:SS**

### Conclusion

- **Simpler** and more **transparent** architecture
- **Readable** communication protocol
- **Non-blocking** motor control
- **Solid foundation** for further tuning and real-world deployment