Embedded Ruby Revolution:

A Hands-On Workshop with PicoRuby

hasumikin

EuRuKo 2024 in Sarajevo

12 Sept 2024

self.inspect

- Hitoshi HASUMI
  - @hasumikin (GitHub and Twitter)
- Creator of PicoRuby
- Contributor to CRuby and mruby
- Member of IRB maintainer team

Agenda

- Introduction to PicoRuby
- Quick Demo
- Hands-On Workshop
  - LED Blinking, Temperature Sensor,
    LCD Display, then All Work Together

Including basic training on microcontroller

Befoer that,

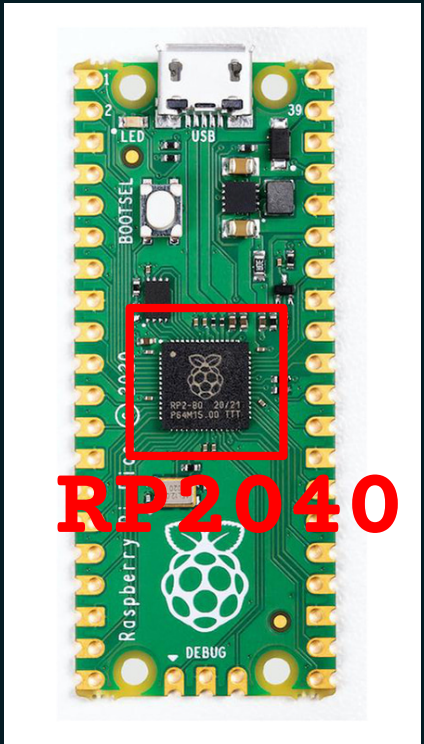
Introduction to PicoRuby

What is PicoRuby?

- Smallest Ruby implementation for microcontrollers
- Based on mruby's VM code design
- Targeting RP2040 (so far)
- Parser: Prism, merged this week 🎉
  - Used be my own parser
  - Now almost full-compatible with CRuby!!!

RP2040 and Raspberry Pi Pico

- Raspberry Pi Pico: Microcontroller board
  - MCU: RP2040
    - Cortex-Mzero+ (dual)
    - 264 KB RAM, 2 MB flash ROM
  - Generally runs without an OS
- Completely different from Raspberry Pi (Single Board Computer)



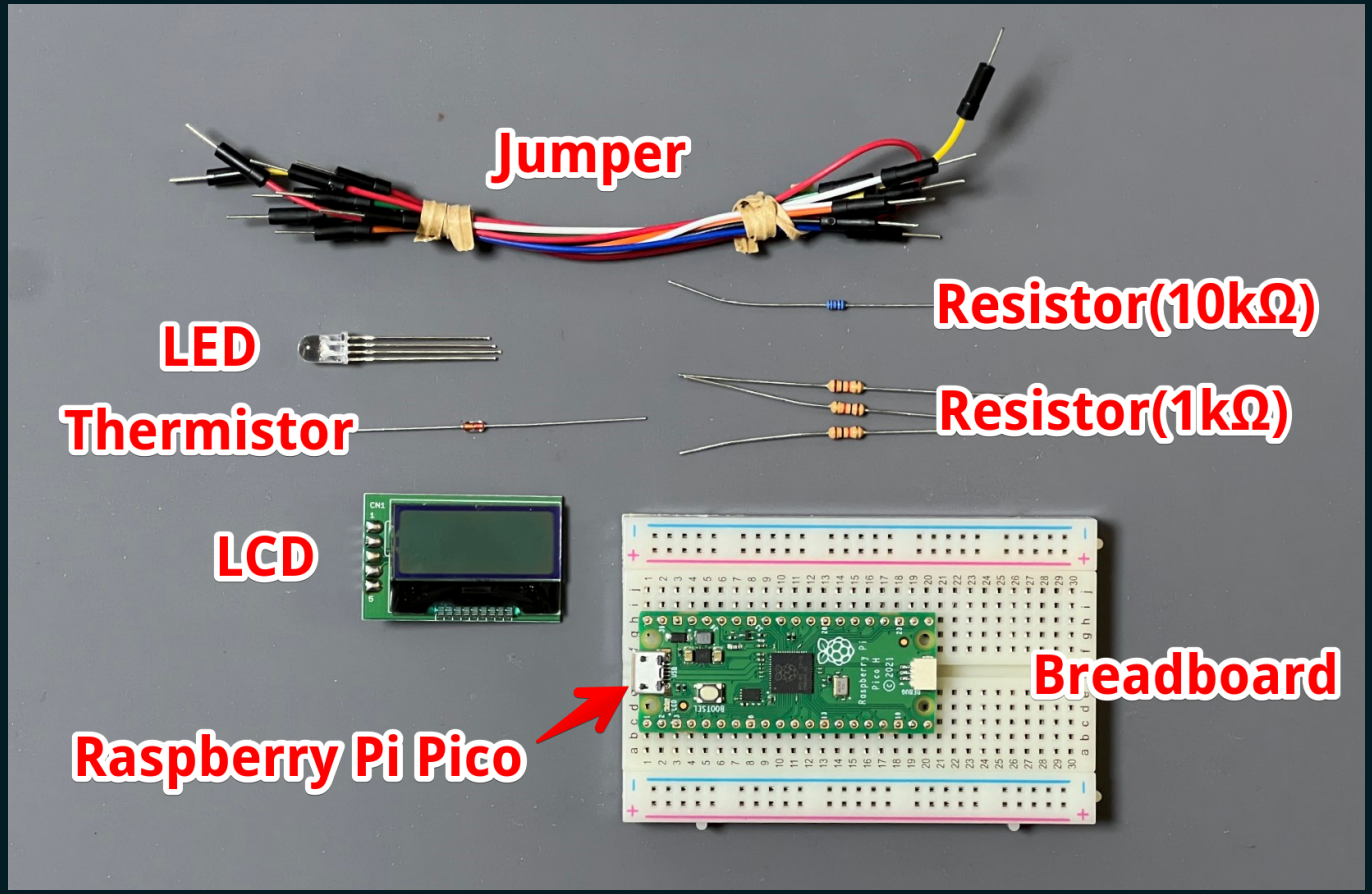
Quick Demo

What You Saw in the Demo

- Unix-like shell running on Raspberry Pi Pico
- You can use some commands like `cd`, `ls`, `mkdir`, and `irb`
- In IRB, your Ruby snippet is compiled into mruby VM code and executed on the fly
- If you put /home/app.rb, it will be executed automatically on startup

Hands-On Workshop

Please check: All parts are ready



You can take this kit home with you!

It's a gift from ITOC, a research institute in Shimane Prefecture (the most beautiful prefecture in Japan, where Matz and I live)!

Mutual Support Is Essential For A Successful Workshop!

Hands-On 1: Setup and LED Blinking

- LED is the most basic component in electronics
- You can control the LED by GPIO pins

Hands-On 2: RGB LED Fading

- You can control the brightness of the LED by PWM
- It simulates analog output by changing the duty cycle of the signal

Hands-On 3: Temperature Sensor

- Thermistor is a resistor whose resistance changes with temperature
- You can read the resistance via ADC

Hands-On 4: Character Display

- I2C is one of the serial communication protocols
- Low-level operation is messy, so you might want to use a library (gem)

Hands-On 5: Talk to Your Neighbor

- UART is another serial communication protocol
- Let’s talk to your neighbor’s Pico through UART!

Hands-On 6: All Work Together

- Make a new project with your own idea
- Share your cool PicoRuby application with us!
- Resouces:
  https://tinyurl.com/picoruby-setup
  https://tinyurl.com/picoruby-led
  https://tinyurl.com/picoruby-rgb
  https://tinyurl.com/picoruby-temp
  https://tinyurl.com/picoruby-lcd
  https://tinyurl.com/picoruby-uart

Stargaze at

github.com/picoruby/picoruby

Thank you!