PSI3542 - 2023 SISTEMAS EMBARCADOS PARA IOT AULA 08: ATIVIDADE 8 DISPOSITIVO IOT MQTT COM MICROPYTHON

SERGIO TAKEO KOFUJI

kofuji@usp.br

Software para Dispositivos IOT

- Opção 1:
 - Arduino-like. Bare Metal, único loop.
 - MicroPython
- Opção 2:
 - RTOS
 - MicroPython???
- Opção 3:
 - LINUX, ANDROID, etc.



Programação de Dispositivos IoT

- Linguagens
 - Linguagem de Montagem ("Assembly")
 - Linguagem "C", "C++"
 - "Linguagem de Programação Arduino" (mistura de "C"e "C++")
 - Linguagem Python
 - Linguagem "LUA"
 - Etc.

Low-Code e No-Code

• NODE-RED



microPython

MicroPython





MicroPython IDEs

- ✓ Mu Editor
- ✓uPyCraft IDE
- ✓Thonny IDE
 - ✓ Getting Started with Thonny MicroPython (Python) IDE for ESP32 and ESP8266 | Random Nerd Tutorials
- ✓ VS Code + Pymakr Extension
 - ✓ MicroPython Program ESP32/ESP8266 VS Code and Pymakr | Random Nerd Tutorials
- PyCharm
- MicroIDE

MicroPython no VSCODE

- MicroPython: Program ESP32/ESP8266 using VS Code and Pymakr.
 - <u>https://randomnerdtutorials.com/micropython-esp32-esp8266-vs-code-pymakr/</u>

Tópicos a serem abordados

- Instalação do firmware microPython
- Teste com o console REPL
- Script1: Blink
- Script2: DHT11

ATIVIDADE 9.1 INSTALAÇÃO DO FIRMWARE MICROPYTHON NO ESP8266/32

THONNY – IDE MICROPYTHON

- Utilizaremos Thonny(<u>https://thonny.org/</u>) como nossa IDE de desenvolvimento em Python
 - Referência: <u>https://randomnerdtutorials.com/getting-started-thonny-</u> <u>micropython-python-ide-esp32-esp8266/</u>



Fazer o download do Thonny e fazer a instalação no modo usuário



Instalar o Sistema Micropython no ESP32/8266

- Dependendo de seu dispositivo (ESP32 ou ESP8266), você terá que baixar o firmware do MicroPython(Arquivo .bin).
 https://micropython.org/download/ESP32_GENERIC/
- No Windows, será necessário instalar o driver do dispositivo USB (CP210x p/placas NodeMCU V2 e ESP32 ou o CH340G p/placas NodeMCU V3)
 - <u>https://www.robocore.net/tutoriais/instalando-driver-do-nodemcu</u>
 - https://embedded-systems-design.github.io/esp32-installation-and-setup/





Gravar o MicroPython no dispositivo...

Thonny options							~	
General	Interpreter	Editor	Theme & Font	Run & Debug	Terminal	Shell	Assistant	:
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MicroP	ython (ESP826	6)	\leftarrow					•
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SP82

Gravar o MicroPython no dispositivo...

Which kind	of interpreter should i nonny use for running your code?	
	ESP8266 firmware installer	×
This dialog If you need Note that t at micropy alternative	allows installing or updating firmware on ESP8266 using the mos d to set other options, then please use 'esptool' on the command l there are many variants of MicroPython for ESP devices. If the firm thon.org/download doesn't work for your device, then there may e es look around in your device's documentation or at MicroPython	st common settings. ine. nware provided exist better n forum.
Port	USB2.0-Serial (/dev/ttyUSB0)	Reload
Firmware	/home/fabricio/Downloads/esp8266-1m-20220618-v1.19.1.bin	Browse
Flash mod From i Dual I/ Erase f	e mage file (keep) O Quad I/O (qio) O (dio) Dual Output (dout) lash before installing	
	Install	cel

🖡 ESP32 fire	mware installer	\times							
This dialog allows installing or updating firmware on ESP32 using the most common settings. If you need to set other options, then please use 'esptool' on the command line. Note that there are many variants of MicroPython for ESP devices. If the firmware provided at micropython.org/download doesn't work for your device, then there may exist better alternatives look around in your device's documentation or at MicroPython forum.									
Port Firmware	Silicon Labs CP210x USB to UART Bridge (COM3) C:/Users/sarin/Downloads/esp32-20210902-v1.17.bin Browse								
−Flash mo ● From i ○ Dual I/	ode image file (keep) () Quad I/O (qio) /O (dio) () Dual Output (dout)								
✓ Erase f	lash before installing								

Execução de comando microPython

- Teste 1
 - print ("hello word")
 - print ("hello PSI3542 2023 ATIVIDADE 8 numerousp data ")
- Teste 2
 - import machine
 - pin = machine.pin(2, machine.pin.out)
 - pin.on()
 - pin.off()

Execução de script micropython

1º. script

- Edite e execute o script
 - from machine inport pin
 - from time import sleep
 - led = pin(2, pin.out)
 - While True:
 - led.value(not led.value)
 - sleep (1)

Dispositivo medidor de temperatura e pressão com microPython

ATIVIDADE 8.3

- ESCREVA UM SCRIPT QUE LEIA DADOS DE TEMPERATURA E HUMIDADE DE UM SENSOR DHT11 E IMPRIMA NO CONSOLE.
- Tome como base o roteiro:
 - <u>https://randomnerdtutorials.com/esp32-esp8266-dht11-dht22-micropython-temperature-humidity-sensor/</u>
- Conecte o DHT11 ao ESP32/8266 conforme o esquema seguinte.
- Atenção: Modifique o script para usar o pino GPIO usado na montagem!





MONTAGEM ESP32 + ESP32 DEVKIT V1 – DOIT version with 36 GPIOs **DHT11** VSPI MOSI EN GPIO23 ADC1 CH0 GPIO36 I2C SCL RTC GPIO0 Sensor VP GPIO22 Input only POWER Sensor VN GPIO39 UART O TX Input only RTC GPIO3 ADC1 CH3 GPIO1 GND . ESP-WROOM-32 Output ADC1 CH6 GPIO34 GPIO3 UART O RX RTC GPIO4 Input only . NO CONNECTED Input only RTC GPIO5 ADC1CH7 GPIO35 . GPIO21 I2C SDA RTC_GPIO9 TOUCH9 ADC1 CH4 GPIO32 VSPI MISO GPIO19 ADC1 CH5 GPIO33 RTC GPIO8 TOUCH8 GPIO18 VSPI CLK RTC GPIO6 DAC1 ADC2 CH8 GPIO25 GPI05 VSPI CSO RTC GPIO7 ADC2 CH9 GPIO26 UART 2 TX DAC2 GPIO17 RTC GPIO17 RandomNerdTutorials.com TOUCH7 ADC2 CH7 GPIO27 GPIO16 UART 2 RX HSPI CLK ADC2 CH6 GPIO14 GPIO4 ADC2 CH0 TOUCH0 RTC GPIO10 RTC GPIO16 TOUCH6 RTC_GPIO12 RTC GPIO15 HSPI MISO TOUCHS ADC2 CH5 GPIO12 GPIO2 ADC2 CH2 TOUCH2 TOUCH3 ADC2 CH4 GPIO13 HSPI CSO RTC GPI013 RTC GPIO14 HSPI MOSI TOUCH4 GPIO15 ADC2 CH3 * SHD/SD2 GPIO9 GPI00 ADC2 CH1 TOUCH1 RTC GPIO11 * SWP/SD3 GPIO10 SDI/SD1 * GPI08 NC * CSC/CMD GPIO11 GPIO7 SDO/SD0 GND GPIO6 SCK/CLK GND 000 • * Pins SCK/CLK, SDO/SD0, SDI/SD1, SHD/SD2, SWP/SD3 and SCS/CMD, namely, GPIO6 to GPIO11 are connected to the integrated SPI flash integrated on ESP-WROOM-32 and are not recommended for other uses.



Dispositivo iot MQTT Thingspeak sensor temperatura e umidade com micropython

- Implementar um canal no Thingspeak com dois campos e um broker MQTT
- Seguir (adaptar conforme o caso)
 - <u>https://randomnerdtutorials.com/micropython-mqtt-publish-dht11-dht22-esp32-esp8266/</u>
- Dica:
 - <u>https://www.tudosobreiot.com.br/blog/1103-iot-feito-facil-esp-micropython-mqtt-thingspeak</u>

Bom Trabalho!

kofuji@usp.br