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Raspi tether for eCraft2learn

Summary

Create a tethering mechanism for microcontrollers (Arduino compatible), allowing embedded development in a browser –- using block languages –– targeting microcontrollers w/o the need for direct connections or PC computer cables. Allows programming to be carried out also from tablets and phones when applicable.

Overview

A Raspberry Pi carries an installation of the Arduino IDE which (since version 1.6.5) includes good official support for performing compilation and flashing of Arduino sketches in a headless fashion driven from the command line. This feature is already used in for example the VisualStudio Code Arduino extension from Microsoft and the very same arduino-builder tool is also backing the new official web-based IDE from Arduino.

By wrapping this in a network service on the Raspberry Pi, reachable either using a REST API or via secure messaging like the MQTT publish/subscribe protocol, we make it easy for other tools to submit Arduino sketches in source form to the Raspberry Pi for subsequent compilation and flashing onto Arduino supported boards via USB cables. This also ensures the solution can run “without the cloud”, even concurrently using the Raspberry as an access point/server and using computers/tablets/phones that connect to the Raspberry over wifi as programming devices operating some kind of IDE such as Snap.

SCOPE

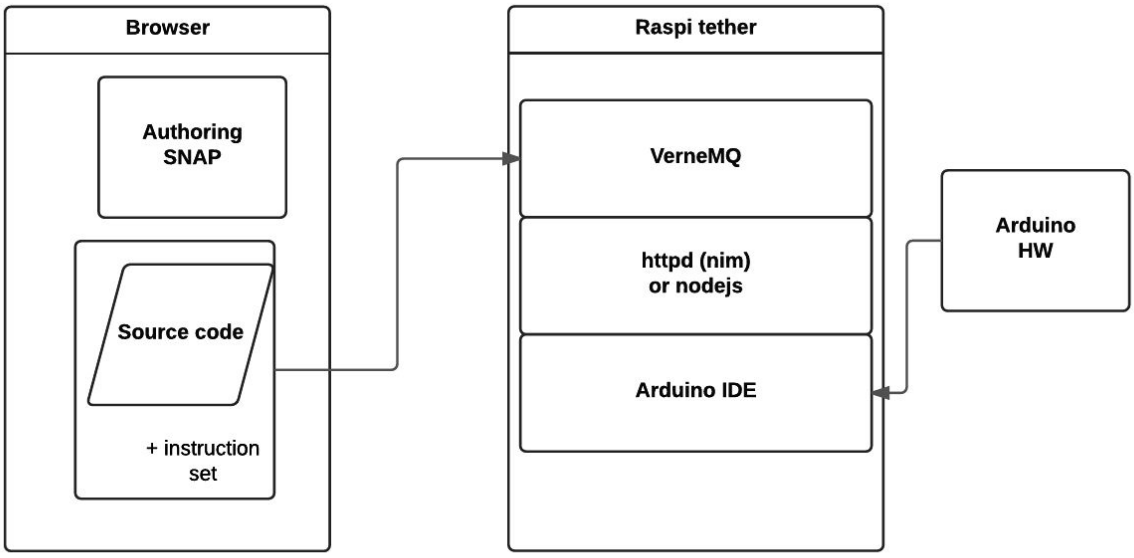
First iteration allows a simple sketch (text file containing Wiring code) to be transferred to the Raspi from the editing browser.

PREREQUISITES

Raspberry Pi

- SD card
- USB cable

We're running the Arduino IDE locally. There will also be a web service nim/node, which governs the RESTful interface, and a MQTT implementation (Verne MQ), all components of which are implemented using standard protocols, are easily replaceable and with a pure web approach without plug-ins or widgets to run.



Usage

For authoring, any browser environment supporting websockets can be used, i.e. any modern browser on computers, tablets and phones. The javascript-based SNAP environment for authoring will work fine. The Raspberry Pi is be equipped with a version of the Arduino IDE [arduino-1.x.y-linuxarm.tar.xy] from arduino.cc as well as an MQTT broker and http daemon for RESTful services. Tethered to the Raspberry via USB is the target hardware microcontroller.

Everything you'll need is on the SD card. The Raspberry is booted, and if no local WiFi is available, the Raspi can act as access point (AP), same goes if you're travelling and need to have a self-contained set-up. Without a cloud connection, the MQTT broker runs locally on the Raspi as well.

REFERENCES

Verne MQ
https://vernemq.com/downloads/

Arduino IDE on Raspberry,
https://medium.com/@ronm333/installing-the-arduino-ide-on-the-raspberry-pi-82301ab381b9

Raspberry Pi as AP
https://www.raspberrypi.org/documentation/configuration/wireless/access-point.md