

Arduino + Linux = ...

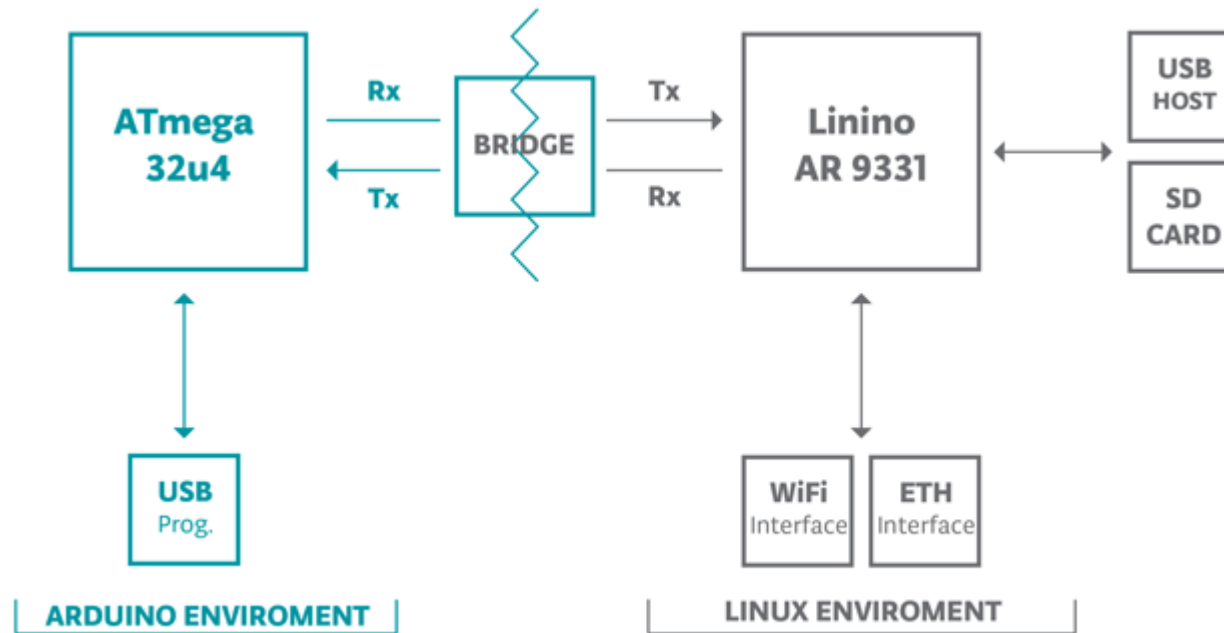
Štěpán Bechynský

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# Limits of Arduino

- Low performance for some operations
- Low memory
- Communication limits

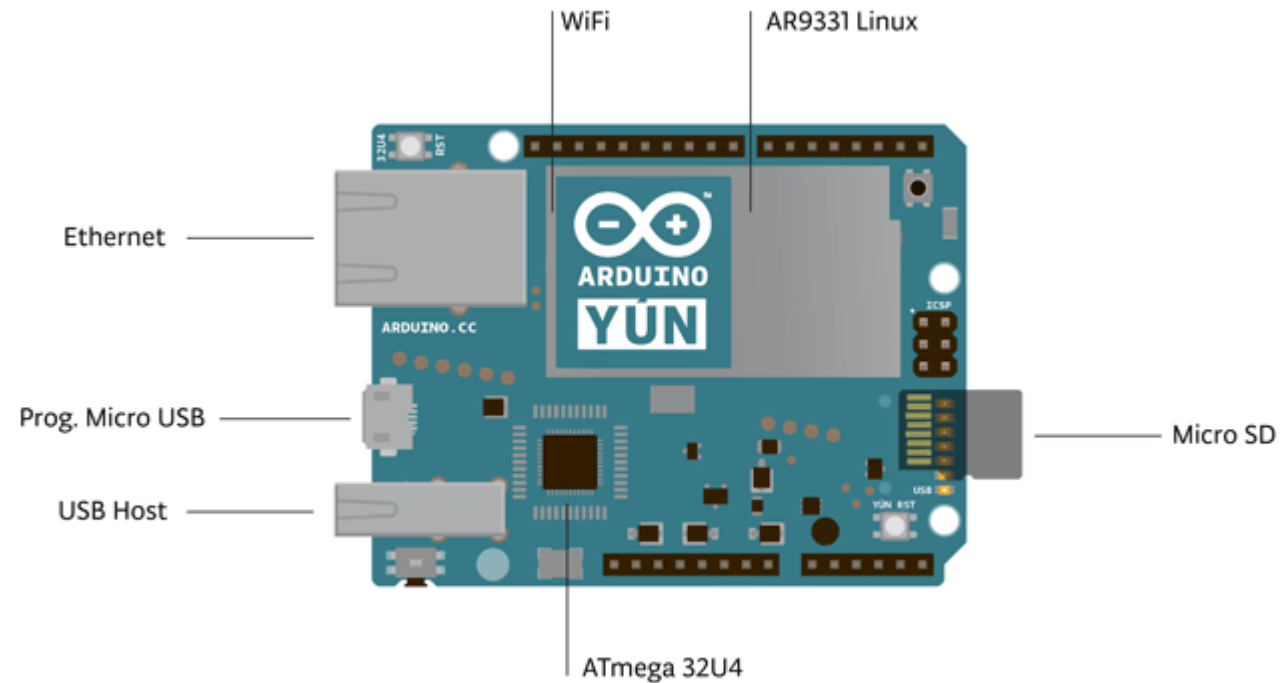
# Microcontroller ↔ Linux



# Bridge library

- Communication between Arduino and Linux
  - Serial1 is dedicated for communication
  - You can't use Serial1
- You can run any command on Linux and use output in Arduino
- Access to network connectivity
- You can control Arduino sketch from web page
  - Build in web server

# Arduino Yún



# Arduino Yún – Arduino

- Almost same as Arduino Leonardo
- Arduino IDE 1.5.4 and later
- No voltage regulator on board
  - Only 5V can be used
- Shield needs long pins

# Arduino Yún - Linux

- Linux based on OpenWrt
- Atheros AR9331
- 64 MB RAM, 16 MB Flash
- Wifi
- Ethernet

# DEMO

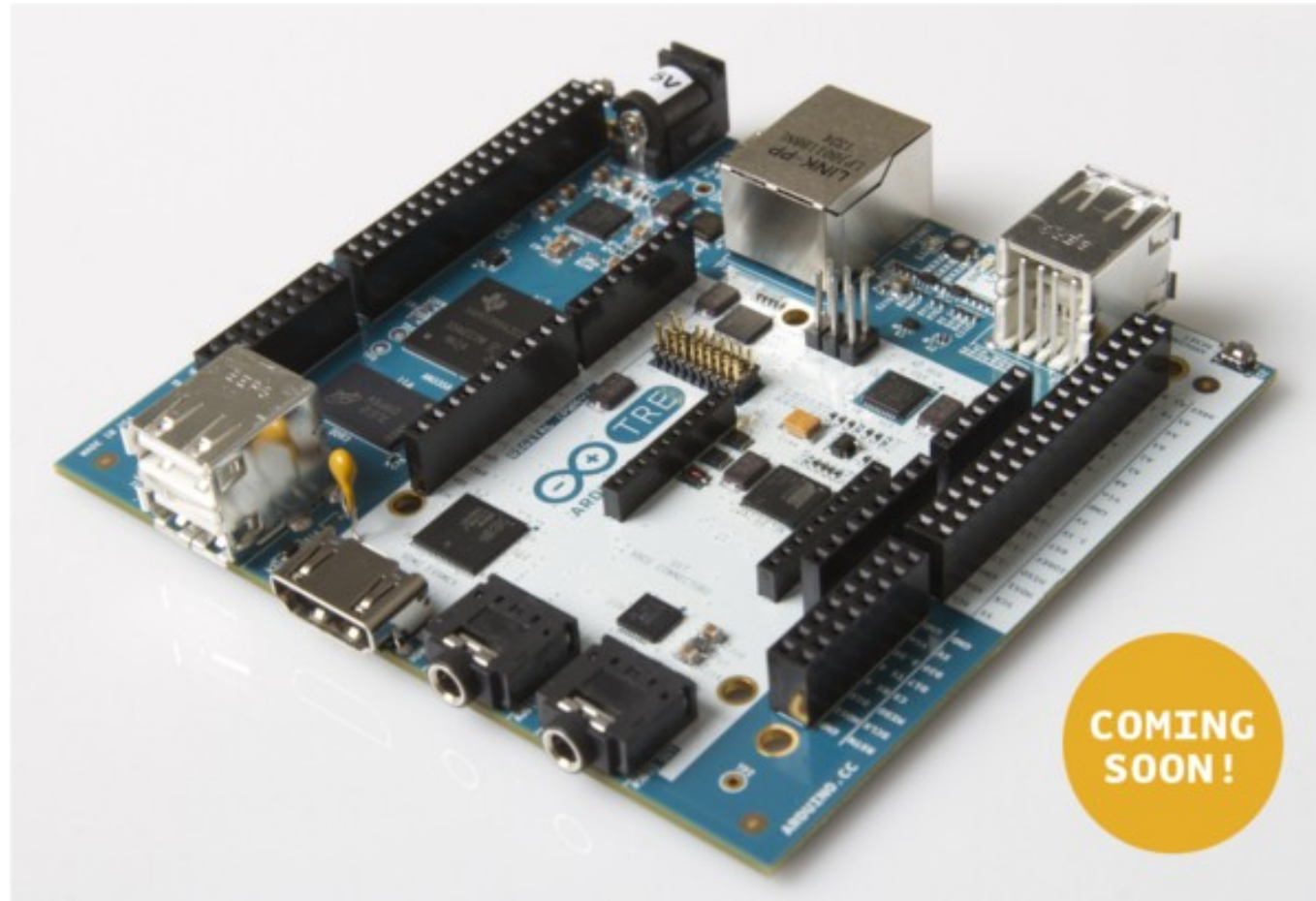
Arduino Yún and Bridge library



# Tips and tricks

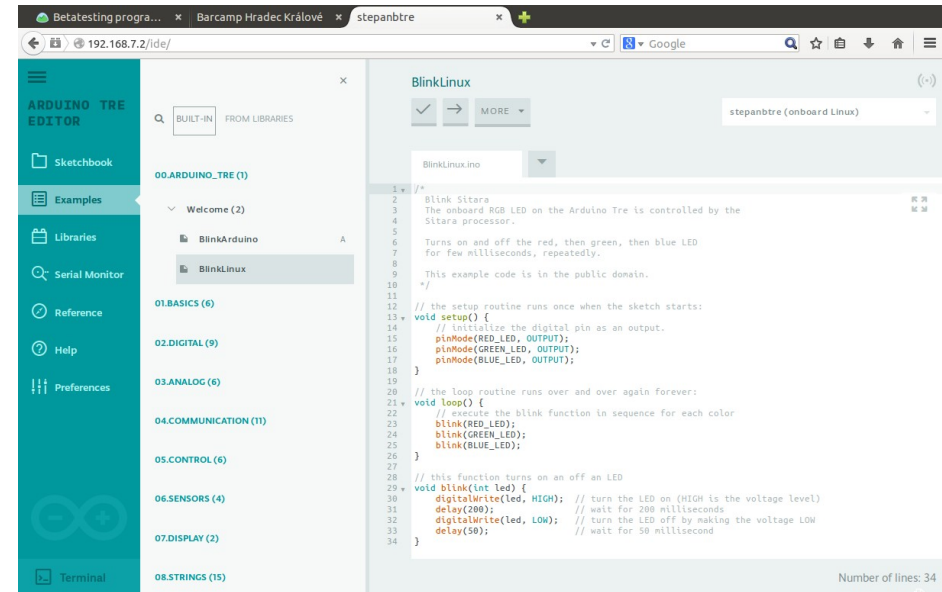
- Create *arduino* folder on SD card with *www* subfolder
- Use wifi or ethernet to upload sketch and web pages
- Use *opkg* package manager to install new software
- Python is preinstaled

# Arduino Tre



# Arduino Tre - Arduino

- Almost same as Arduino Leonardo
- Web based IDE on board
- Serial1 is dedicated for communication with Linux
  - You can't use Serial1



The screenshot shows the Arduino Tre IDE web interface. The browser address bar displays '192.168.7.2/ide/'. The interface includes a sidebar with navigation options: ARDUINO TRE EDITOR, Sketchbook, Examples, Libraries, Serial Monitor, Reference, Help, and Preferences. The main workspace is divided into three panes. The left pane shows a file tree with '00.ARDUINO\_TRE (1)' containing 'Welcome (2)', 'BlinkArduino', and 'BlinkLinux'. The right pane shows the code editor for 'BlinkLinux.ino', containing the following C++ code:

```
1 //  
2 Blink Sitora  
3 The onboard RGB LED on the Arduino Tre is controlled by the  
4 Sitora processor.  
5  
6 Turns on and off the red, then green, then blue LED  
7 for few milliseconds, repeatedly.  
8  
9 This example code is in the public domain.  
10 */  
11  
12 // the setup routine runs once when the sketch starts:  
13 void setup() {  
14 // initialize the digital pin as an output.  
15 pinMode(REDF_LED, OUTPUT);  
16 pinMode(GREEN_LED, OUTPUT);  
17 pinMode(BLUE_LED, OUTPUT);  
18 }  
19  
20 // the loop routine runs over and over again forever:  
21 void loop() {  
22 // execute the blink function in sequence for each color  
23 blink(REDF_LED);  
24 blink(GREEN_LED);  
25 blink(BLUE_LED);  
26 }  
27  
28 // this function turns on an off an LED  
29 void blink(int led) {  
30 digitalWrite(led, HIGH); // turn the LED on (HIGH is the voltage level)  
31 delay(200); // wait for 200 milliseconds  
32 digitalWrite(led, LOW); // turn the LED off by making the voltage LOW  
33 delay(50); // wait for 50 millisecond  
34 }
```

The bottom right corner of the code editor indicates 'Number of lines: 34'.

# Arduino Tre - Linux

- Debian
- BeagleBone
  - Processor Texas Instrument Sitara AM3359AZCZ100 (ARM Cortex-A8)
  - SRAM DDR3L 512 MB RAM
  - Ethernet 10/100
  - 4 USB 2.0 host ports
  - Video HDMI (1920x1080)
  - Audio HDMI, stereo analog audio input and output
  - Digital I/O Pins (3.3V logic) 23
  - PWM Channels (3.3V logic) 4
  - MicroSD card

# Arduino Tre - status

- Beta testing
- Latest Linux image 0.0.9

# DEMO

Arduino Tre web based IDE

Q & A