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Webserver-controlled home automation with the Raspberry Pi

Simon Wiesmann

Prof. Dr. Robert Manzke

- Problem statement
- Raspberry Pi
- openFrameworks
- HTTP Server
- WiringPi

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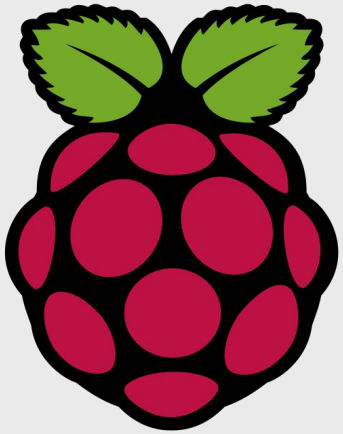
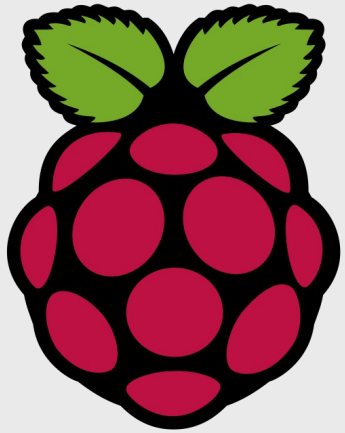
- Circuit
- Web Frontend
- Code
- Bigger, Better, Death Ray

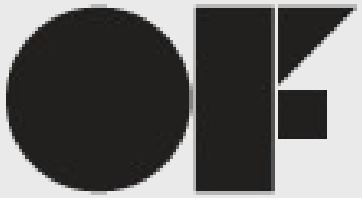
- Do basic home automation tasks
  - Turn on/off lights
  - Control servo (i.e. „garage door“)
- Via Browser
- Using a Raspberry Pi

- Cheap computing power
  - ~35€
  - 700Mhz ARM
  - OpenGL ES2.0 graphics
- Low power consumption
  - 300mA ~ 700mA
- Low learning curve
  - Python libraries



- 100 Mbit LAN port
- Big community
  - Documentation
  - Tutorials
- http://www.raspberrypi.org/





- C++ Library
- Multimedia
  - Window handling
  - OpenGL (ES)
  - Audio
  - Video
- Hardware support i.e.
  - Microsoft Kinect
  - Nintendo WiiMote

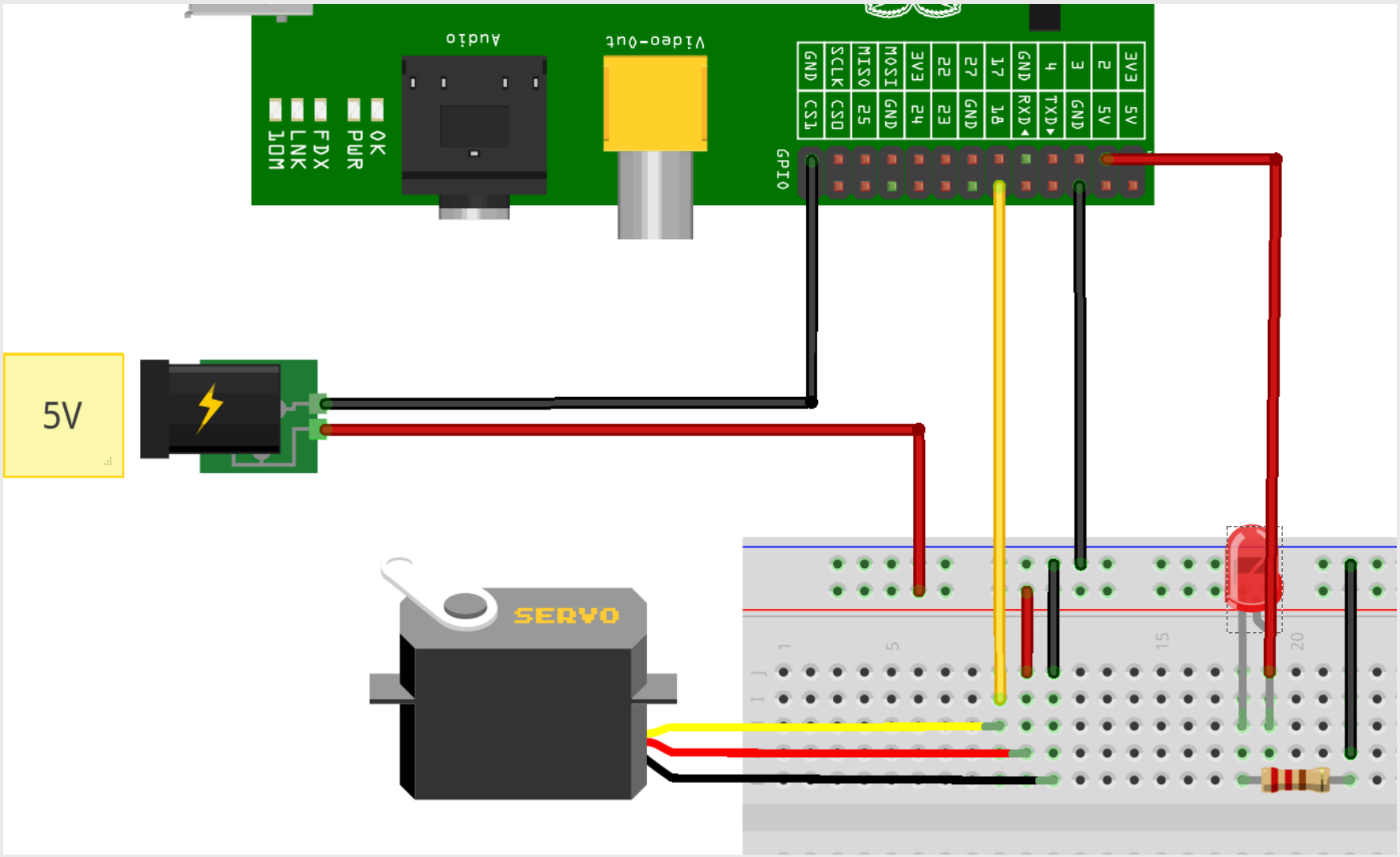
- Easy to set up
- Cross Platform
  - Desktops (Linux / Mac / MS Windows)
  - Mobile (iPhone / Android)
- **LOTS** of extensions
  - (http://www.ofxaddons.com)
- http://www.openframeworks.cc/

GO THERE! SERIOUSLY!
WATCH THE TEASER!

- ofxHttpServer
- Mongoose web server
  - C/C++
- Dependency friendly
  - One .c file, one .h file
- All the functionality you need
  - Serve static pages/files
  - Register actions for URLs

- C/C++ Library
- Convenient access to Raspberry Pi hardware in C/C++
- Mimics Arduino library called *wiring*

Circuit


Audio
Video-Out
OK PWR
FDX LNK 10M
GPIO
GND CS1
SCLK CS0
MISO 25
MOSI GND
3V3 24
22 23
27 GND
17 18
GND RXD
4 TXD
3 GND
2 5V
3V3 5V
5V
SERVO

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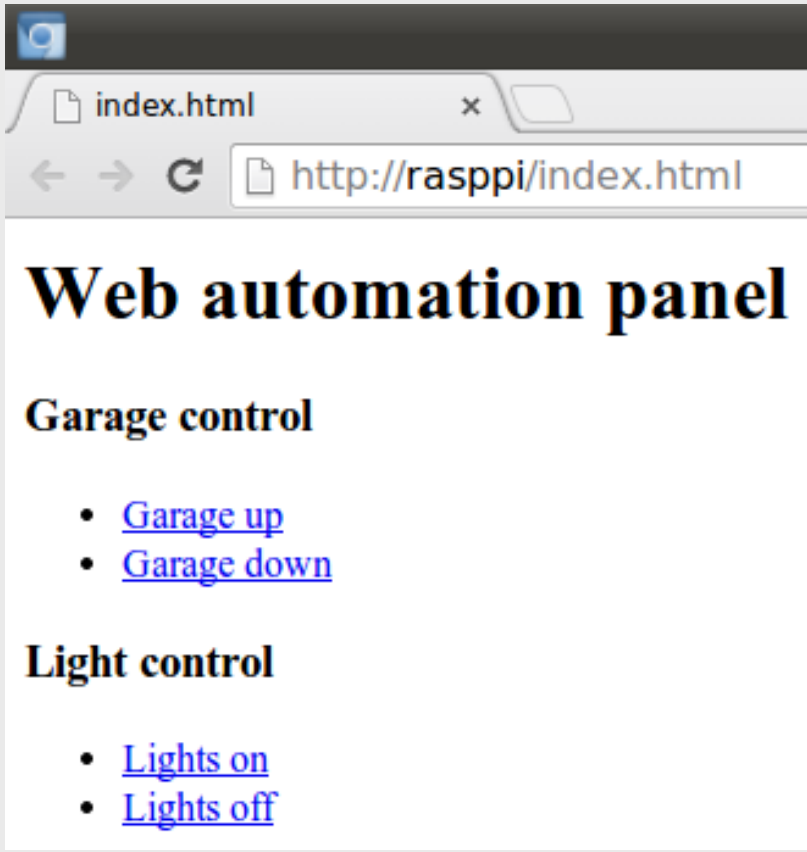
- HTTP GET to /actions/?<params>
  - ?control=garage_up
  - ?control=garage_down
  - ?control=lights_on
  - ?control=lights_off



Code – Setup

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```
 9 void testApp::setup(){
10
11     // initialize the web server
12     server.start("/home/pi/openFrameworks/apps/myApps/webAutomation/bin/httpdocs",
13                  8989);
14
15     // register our function httpGet() for GTTP GET requests
16     // at URL http://rasppi/actions/*
17     server.addHandler(this, "actions/*");
18
19     // WiringPi setup
20     if (wiringPiSetup () == -1)
21     {
22         fprintf (stdout, "oops: %s\n", strerror (errno)) ;
23         return;
24     }
25
26     // software servo driver
27     softServoSetup (0, 1, 2, 3, 4, 5, 6, 7) ;
28 }
```

Code – HTTP GET

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```
34 void testApp::httpGet(string url) {
35
36     // get URL parameter "?control"
37     string controlString = getRequestParameter("control");
38
39     // open garage
40     if(controlString=="garage_up") {
41         // clockwise servo rotation
42         softServoWrite (1,  800);
43         sleep(5);
44         // stops
45         softServoWrite (1,  575) ;
46
47     // close garage
48     } else if(controlString=="garage_down") {
49         // counter clockwise
50         softServoWrite (1,  300) ;
51         sleep(5);
52         // stops
53         softServoWrite (1,  575) ;
54     }
```

- Lab restrictions: 20V max
- Real world use
  - Relays
  - Servo driver
  - Air Conditioning
  - IR media control
  - Existing automation

Bigger, Better, Death Ray

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- REST API
- iPhone / Android App

Thank You!