

How to Cook an Egg ...



Goal

The goal is to:

Control an IoT device (Raspberry Pi)

Just Using OSGi Services

And the ECF Remote Service Implementation




Required Knowledge

You know what an OSGi Service is.



Menu

- Hardware
- Software
- 
- ECF – Remote Services
- Nebula Widgets



Hardware

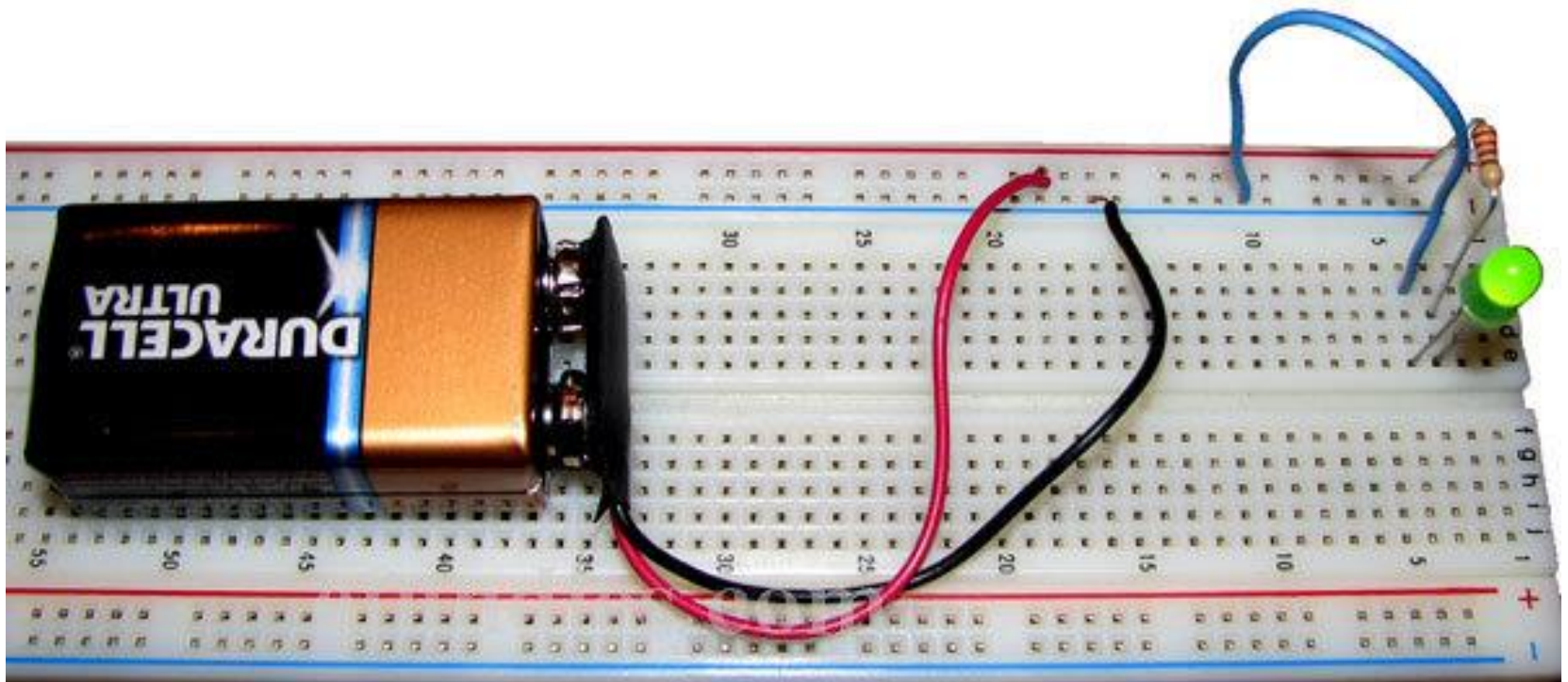


The Mainframe

Raspberry Pi: \$39.50



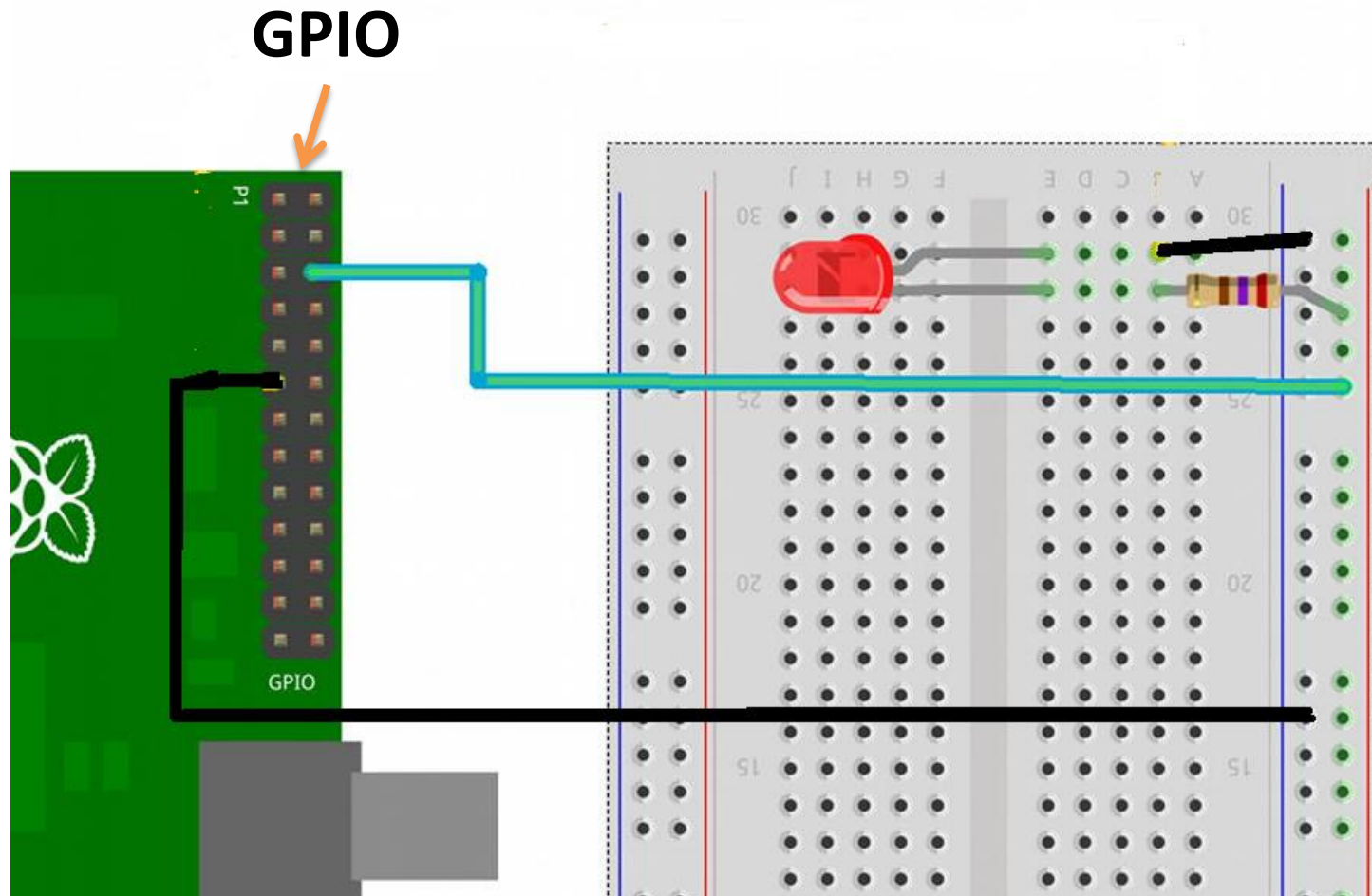
Breadboard



Half-Sized Breadboard: \$6.50



Breadboard to Raspberry Pi



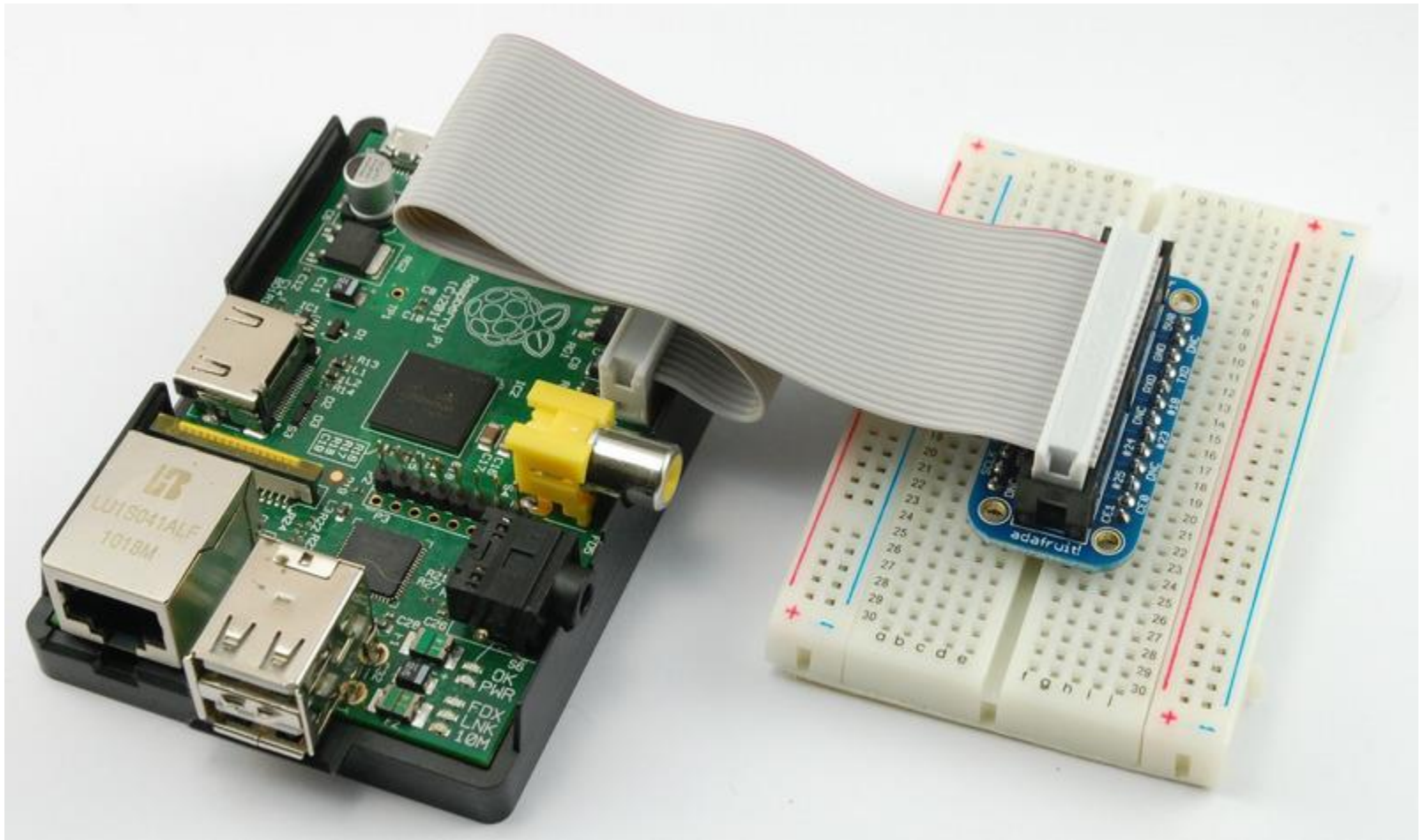
We are going to map and OSGi Service to pin0 and pin1.



Cobbler: \$6.50

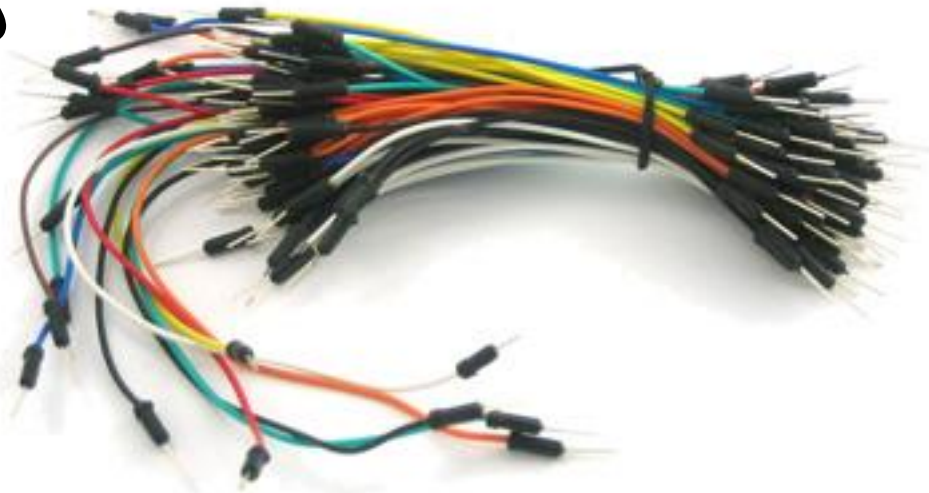


GPIO to Breadboard



Cables for Breadboard

Cables: \$1.00

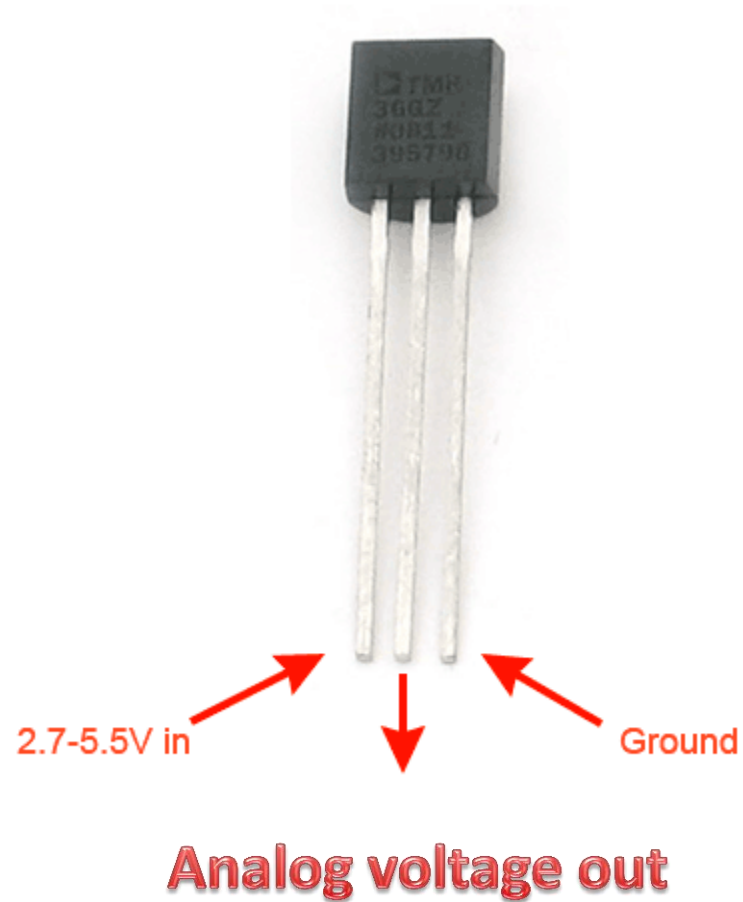


LM35/TMP36 Temperature Sensor

LM35: \$1.50



LM35 Temperature Sensor



LM35 Temperature Sensor

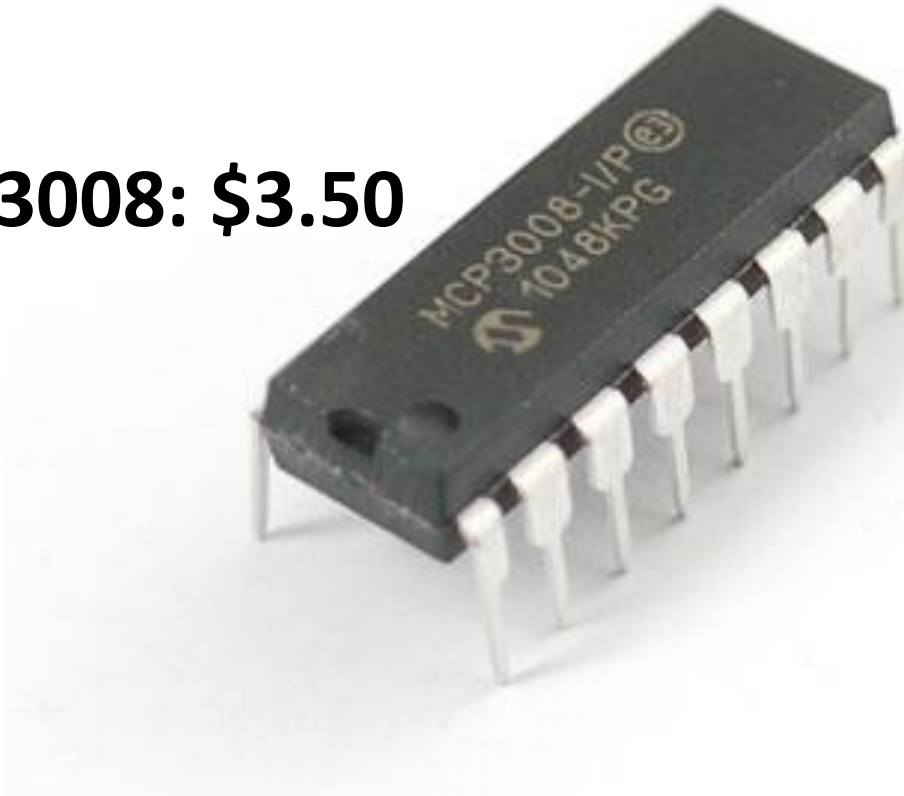


ANALOG?



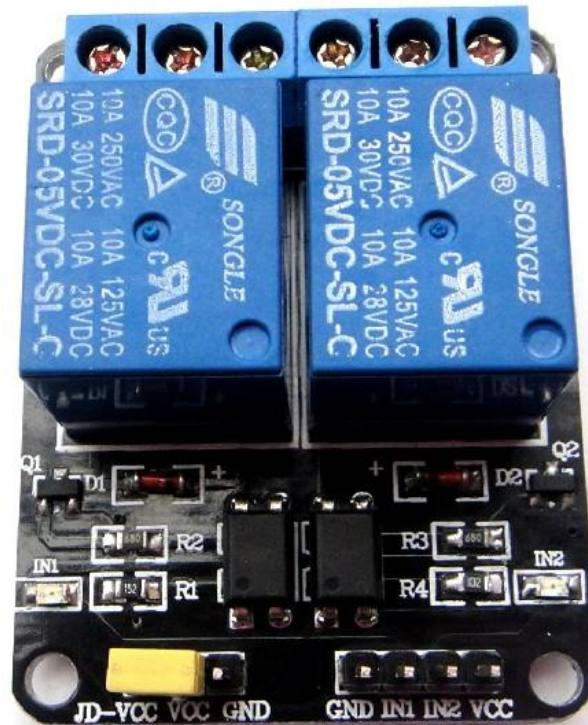
MCP3008 ADC

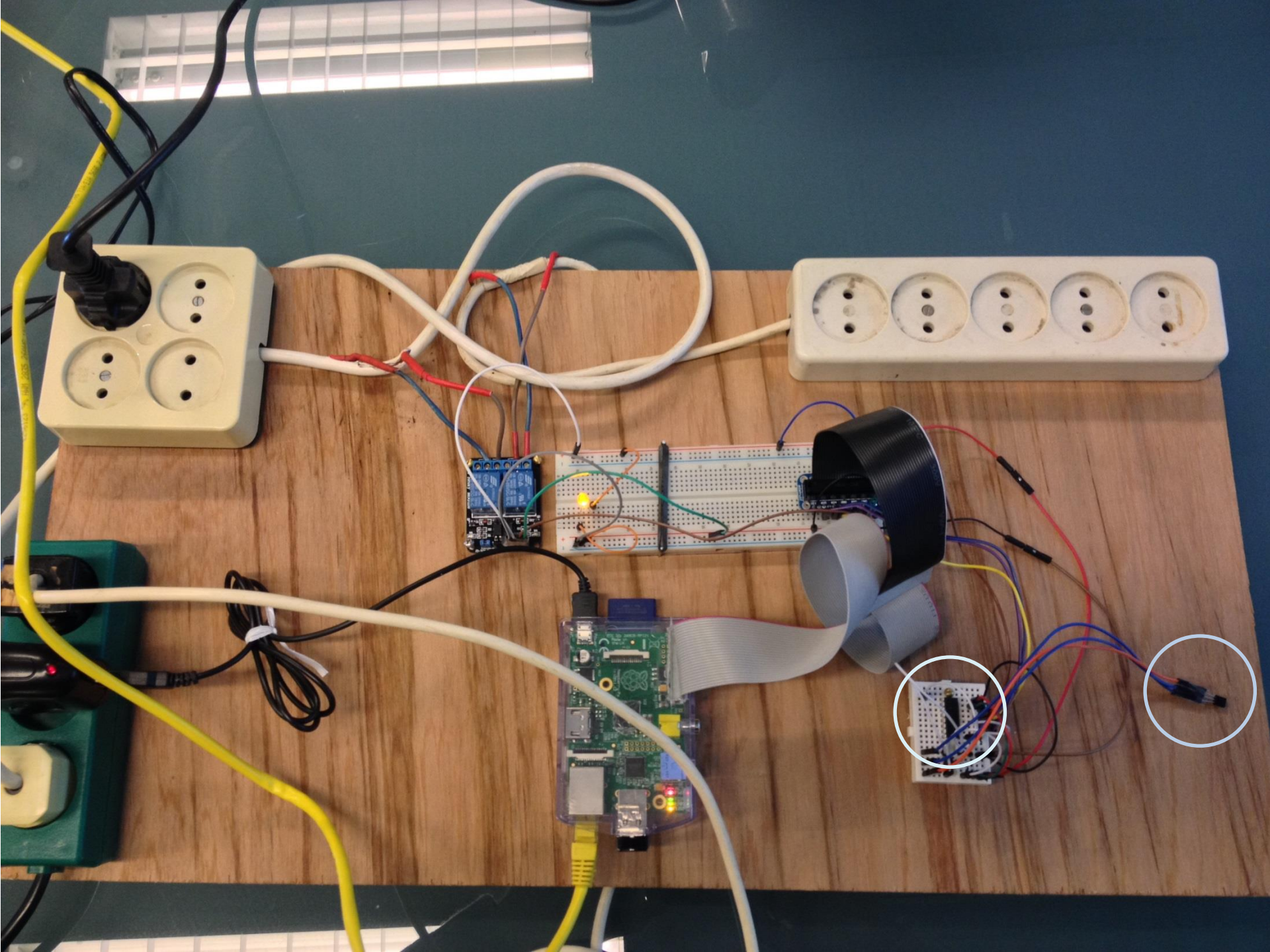
MCP3008: \$3.50



2 Channel Relais Board

Relais Board: \$5.00





DANGER



ELECTRICITY



Software



Software Stack

- Linux – Debian Wheezy
- Java 8
- WiringPi
- PiPolos – Server
- Egg UI - Client



Software Stack

PIPOLOS – Plain Old OSGi Server for the Raspberry Pi

Minimal OSGi Server

It contains:

- Equinox
- Gogo console
- Start Script: `pipolos.sh (-debug)`



Software Stack

PIPOLOS – Plain Old OSGi Server for the Raspberry Pi

In addition (but can be removed):

- Jetty
- Felix Webconsole (<http://eggpi:8888/system/console>)
 - admin/admin
- Felix File Install
- ECF Remote Services
- ECF Raspberry Pi Example Implementation
- PI4J



Software Stack

PIPOLOS – Plain Old OSGi Server for the Raspberry Pi

Build:

```
git clone https://github.com/wimjongman/pipolos.git  
cd pipolos  
mvn verify
```



Software Stack

PIPOLOS – Plain Old OSGi Server for the Raspberry Pi

Run:

unzip pipolos-linux.gtk.x86.zip file into a directory of your choice then ***chmod a+x pipolos.sh*** to make it executable and run it through ***sudo ./pipolos.sh***



Software Stack

Egg Client

Build:

```
git clone https://github.com/wimjongman/eggclient.git  
cd eggclient  
mvn verify
```



<exhale>

Demo



Hacking Competition

Host: ???

- Get the RCP client for your platform (smb);
- Change correct settings in the ini file (your ip);
- Clients for mac and linux need to set execution bits;
- Your firewall will probably block our ports.

Control the light:

First one to achieve this gets E 5,- plus a public honoring.



ECF

- Best kept secret of Eclipse.
 - 9 Years on the Release Train
 - Used by many projects (P2, Mylyn, Oomph, etc..)
 - OSGi Remote Service Admin Implementation
 - Other kinds of Communication
-
- Project Lead: Scott Lewis



ECF – Remote Services

- Remoting property:

service.exported.interfaces=*

```
pinProps.put("service.exported.interfaces", "*");  
ServiceRegistration<IGPIOPinOutput> pinReg = Pi4jGPIOPinOutput  
    .registerGPIOPinOutput(getPinNumber(), pinProps, getContext());
```



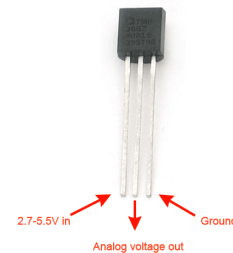
LM35 Temperature Sensor

```
package org.eclipse.ecf.raspberrypi.gpio;

/**
 * LM35 is a temperature measurement device.
 *
 * @author Wim Jongman
 */
public interface ILM35 {

    /**
     * Temperature changed on the specified host.
     *
     * @param pHost
     * @param pTemperature
     */
    public void setTemperature(String pHost, double pTemperature);

}
```



LM35Async Temperature Sensor

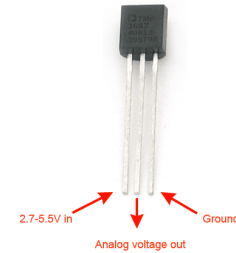
```
package org.eclipse.ecf.raspberrypi.gpio;

import java.util.concurrent.CompletableFuture;

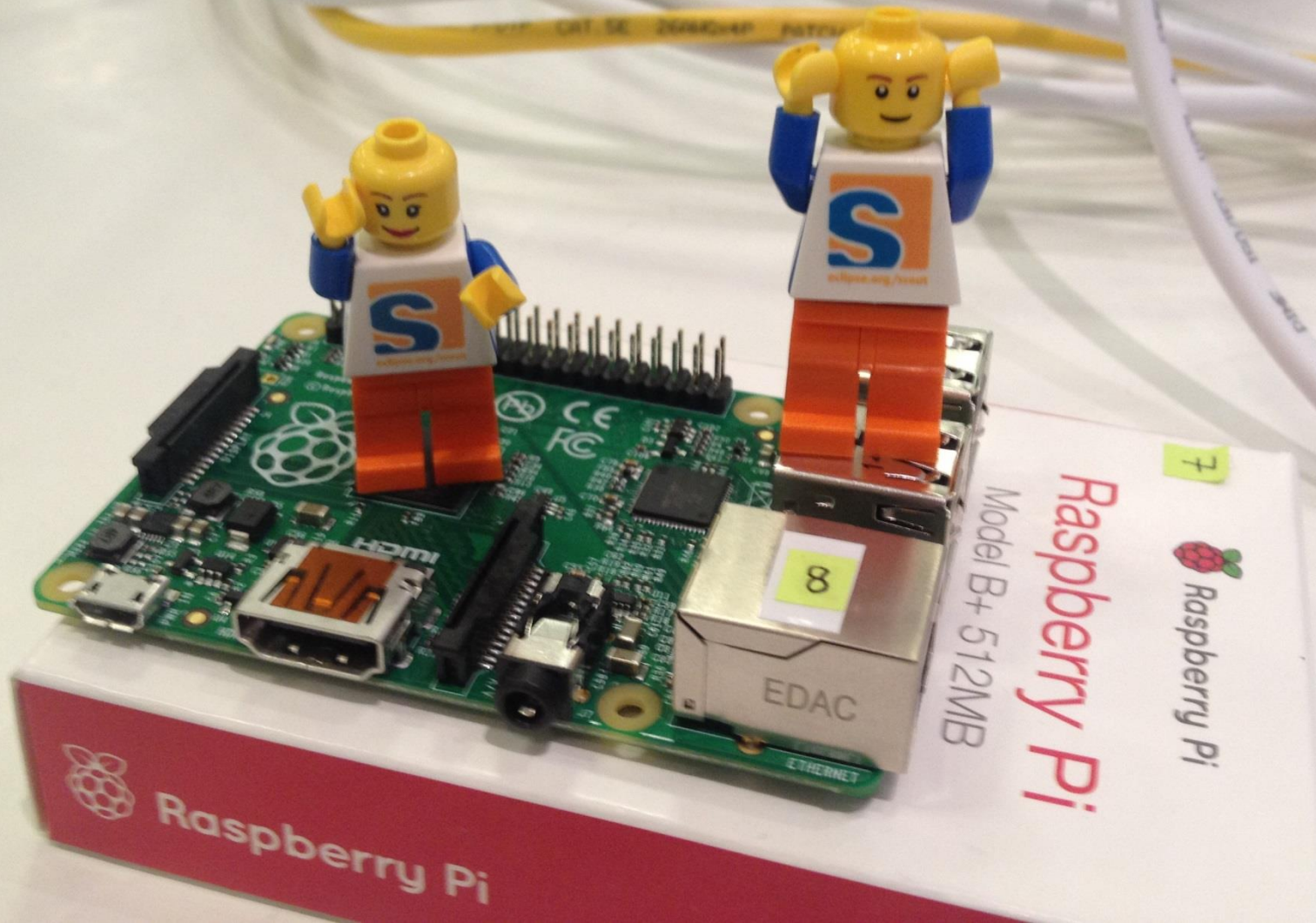
/**
 * LM35 is a temperature measurement device.
 *
 * @author Wim Jongman
 * @see ILM35
 */
public interface ILM35Async {

    /**
     * Temperature changed on the specified host.
     *
     * @param pHost
     * @param pTemperature
     */
    public CompletableFuture<Void> setTemperatureAsync(String pHost, double pTemperature);

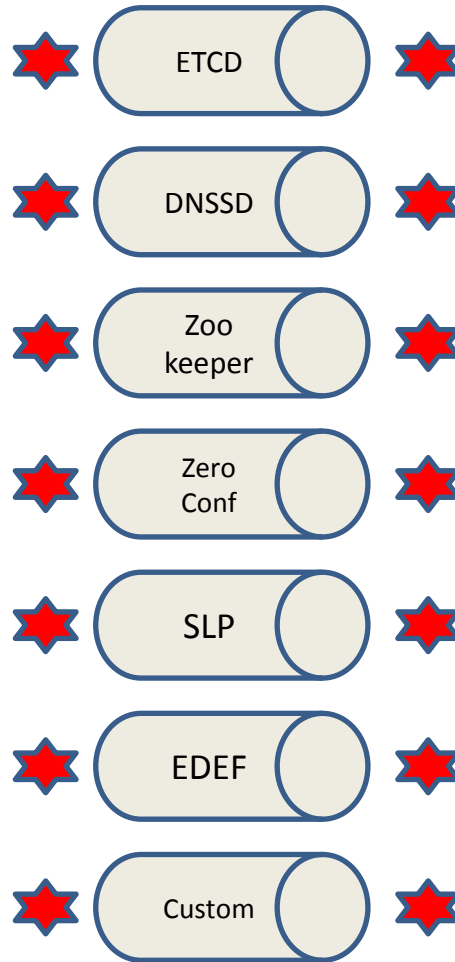
}
```



ECF - Discovery



ECF - Discovery



ECF - Distribution



What could possibly go wrong?



The Eight Fallacies of Distributed Computing

Peter Deutsch

Essentially everyone, when they first build a distributed application, makes the following eight assumptions. All prove to be false in the long run and all cause *big* trouble and *painful* learning experiences.

1. The network is reliable
2. Latency is zero
3. Bandwidth is infinite
4. The network is secure
5. Topology doesn't change
6. There is one administrator
7. Transport cost is zero
8. The network is homogeneous

For more details, read the article by Arnon Rotem-Gal-Oz



What could possibly go wrong?

- Firewall
 - ECF Generic Server Ports (dft = 3288)
- Network Settings (egg.ini)
 - Decf.generic.server.hostname=(ip/host)
must be reachable from other hosts
- JmDNS Discovery
 - Dnet.mdns.interface=(ip/host)
can do only one network



Proof ..



Thank You!

Wim Jongman

CTO @ Remain Software / Industrial-TSI
Nebula Lead
ECF and E4 Committer
Eclipse RCP and Tycho Trainer

Don't forget to rate this talk.

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