





Cisco Networking Academy  
Mind Wide Open

# IoT Prototyping Workshop

Eugene Morozov

Technical Manager CEE-RCIS

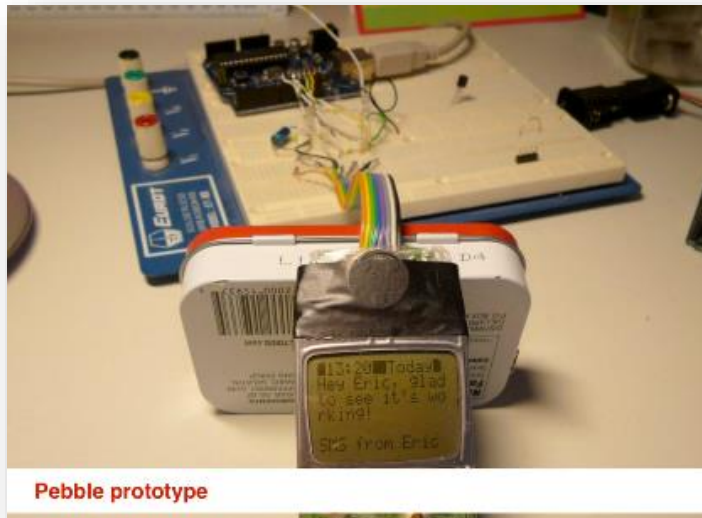
17 September 2016, Bielefeld



# Eric Migicovsky is 26 years old and has a vision: creating Pebble!



**What is Pebble:** *"It is a smart watch, something that connects to your phone and brings some of the functionality of your phone to your wrist"*



With his team he created a prototype with pieces of Old Nokia Phone and and some open hardware.

On April, 2012 he was looking for 100.000\$ to realize his idea.

Six VC and Investors put him down.

**So he created this video**





00:01

00:08



# Pebble Raises \$3 Million+ in Four Days, What Kickstarter Means for Entrepreneurs



3 comments, 3 called-out

+ Comment Now

+ Follow Comments



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## Pebble: E-Paper Watch for iPhone and Android

A Product Design project in Palo Alto, CA by Pebble Technology · [send message](#)

PROJECT HOME

UPDATES 4

BACKERS 23,341

COMMENTS 1,594

[REMIND ME](#)



**23,341**

BACKERS

**\$3,336,475**

PLEDGED OF \$100,000 GOAL

**31**

DAYS TO GO

THIS PROJECT WILL BE FUNDED ON FRIDAY  
MAY 18, 11:00PM EDT.

**BACK THIS PROJECT**  
\$1 MINIMUM PLEDGE

**PLEDGE \$99 OR MORE**

200 BACKERS **SOLD OUT** (0 of 200 remaining)

EARLY BIRDS Help us get started! One Jet

[Like](#) 41,737 people like this. Be the first of your friends.

[Tweet](#)

[Embed](#)

<http://kick.as/funfVS>

ABOUT THIS PROJECT



# Pebble: E-Paper Watch for iPhone and Android

by Pebble Technology

[Home](#)[Updates](#) 37[Backers](#) 68,929[Comments](#) 14,752[Palo Alto, CA](#)[Product Design](#)

**Funded!** This project successfully raised its funding goal on May 19, 2012.



## 68,929

backers

# \$10,266,845

pledged of \$100,000 goal

## 0

seconds to go



Project by  
**Pebble Technology**  
Palo Alto, CA  
[Contact me](#)

**K** First created · 28 backed

**f** Eric Migicovsky 720 friends

**Website:** [getpebble.com](http://getpebble.com)



121,502 people like this. Be the first of your friends.

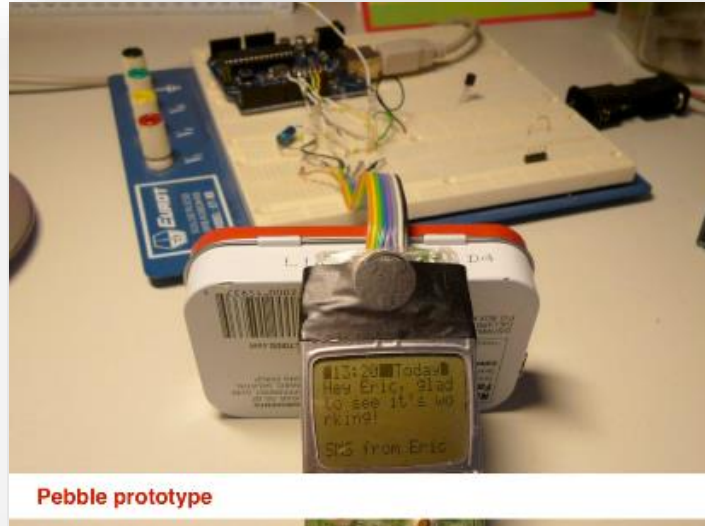
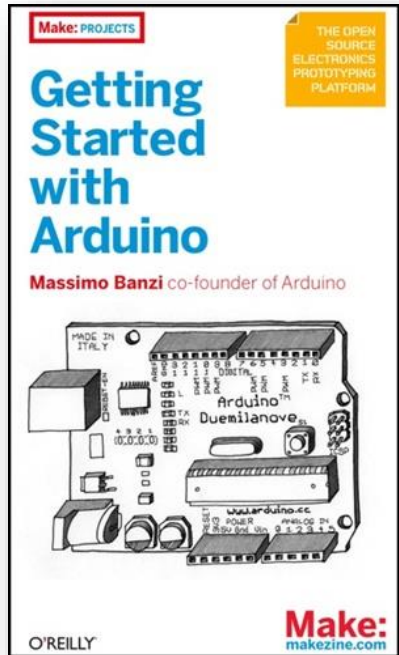


Embed

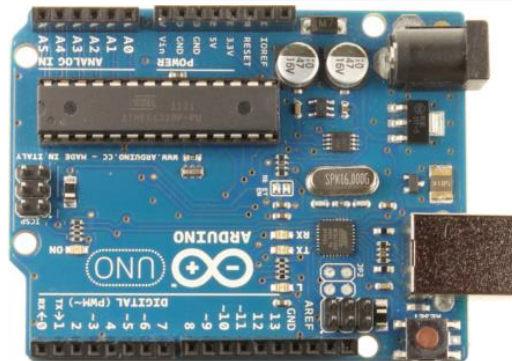
<http://kck.st/HumIV5>

# Arduino

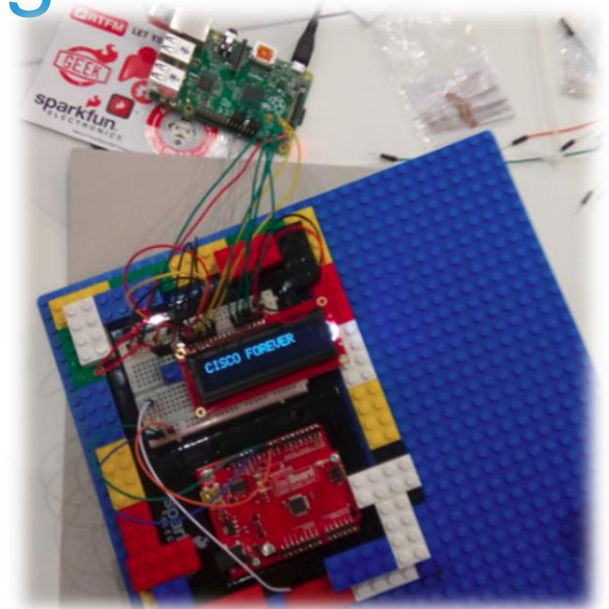
The prototype of Pebble was done using an Open Hardware project named “Arduino”



Pebble prototype



# What will be your smart thing?





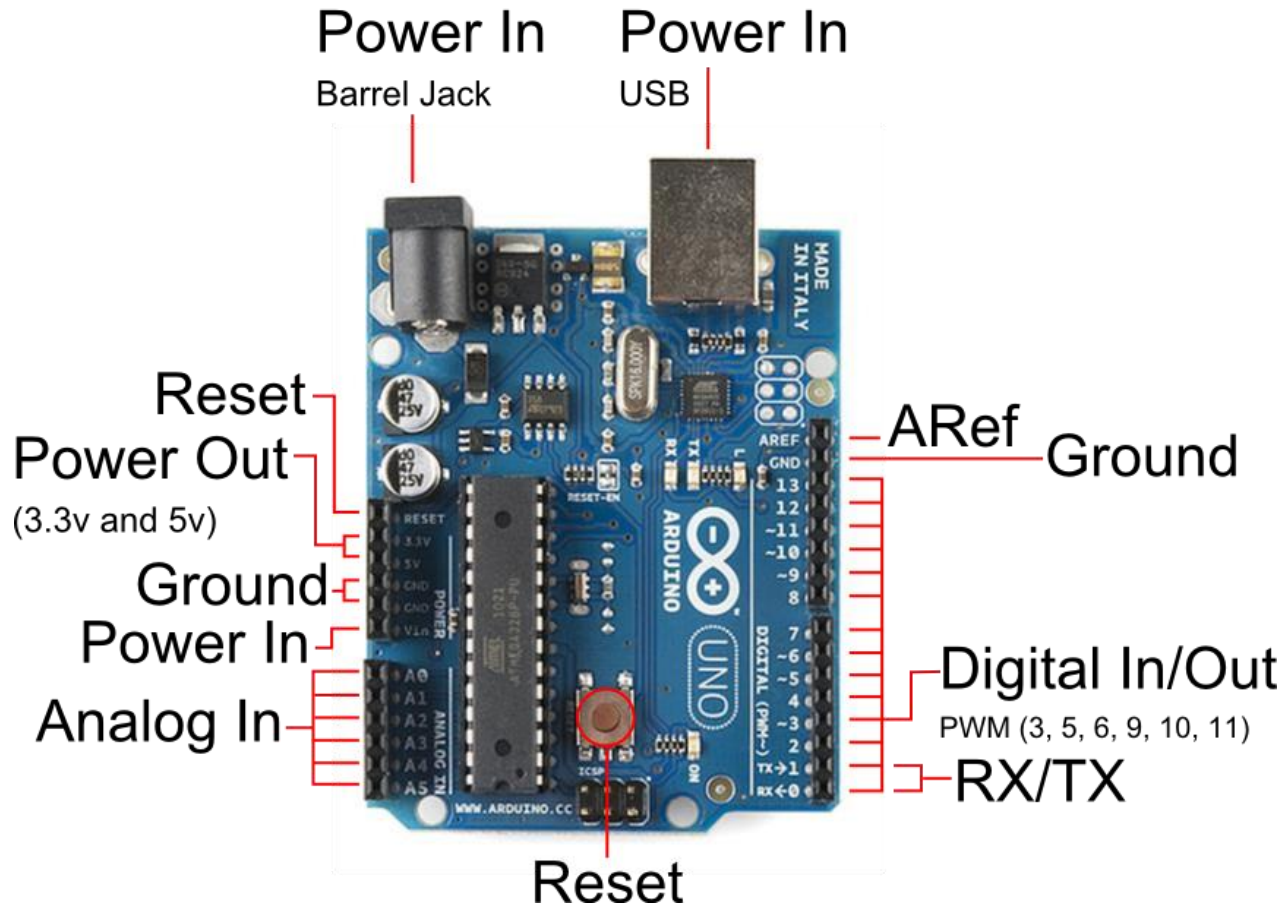
# Prototyping



# Arduino



# Arduino pins





# Arduino Options

- Arduino Original 20 EUR+VAT
- Arduino clones from \$5
- Arduino Starter Kit 80 EUR+VAT



No USB Cable



UNO R3 MEGA328P  
ATMEGA16U2 for Ardu

US \$6.00 / piece  
Free Shipping



NO R3 MEGA328P  
0G for Arduino UNO

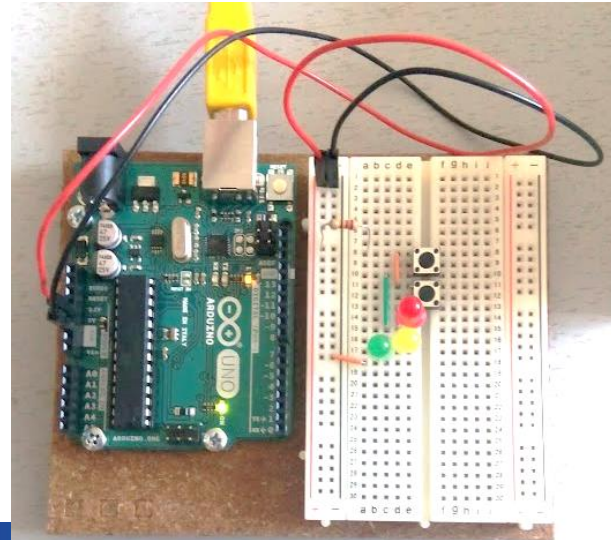
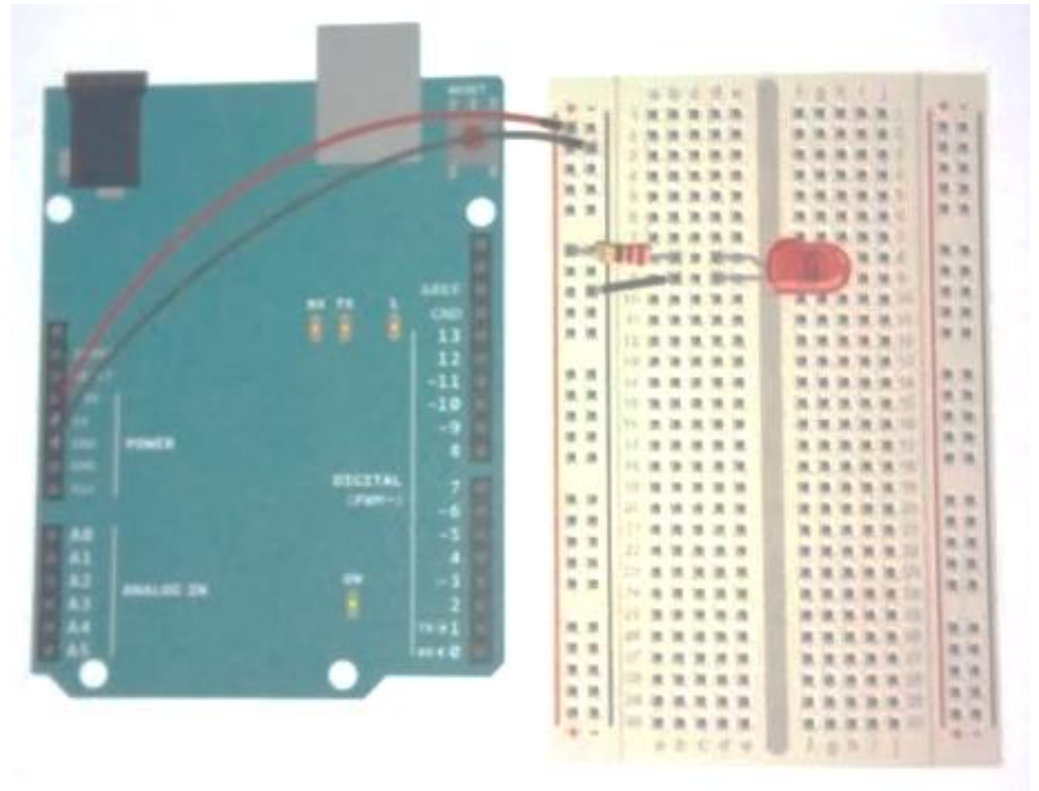
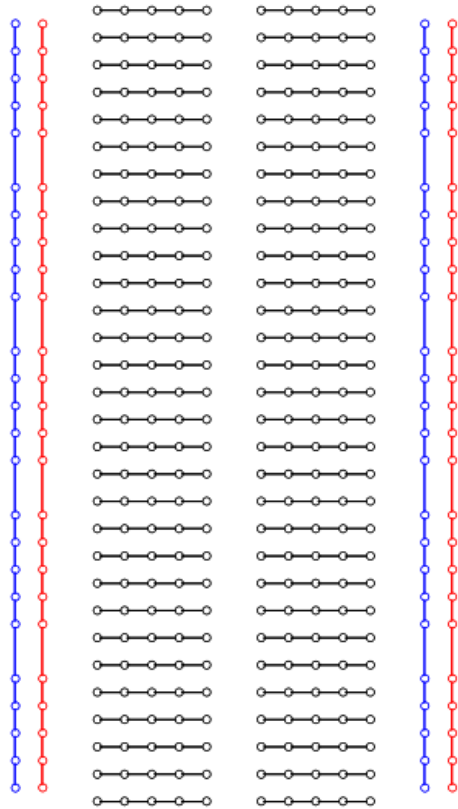
ece



# Breadboard

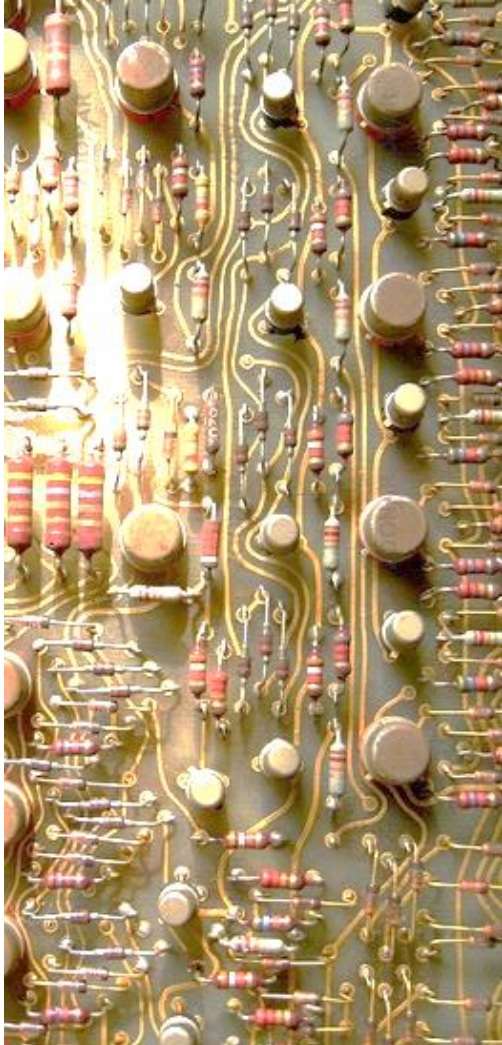


# Breadboard

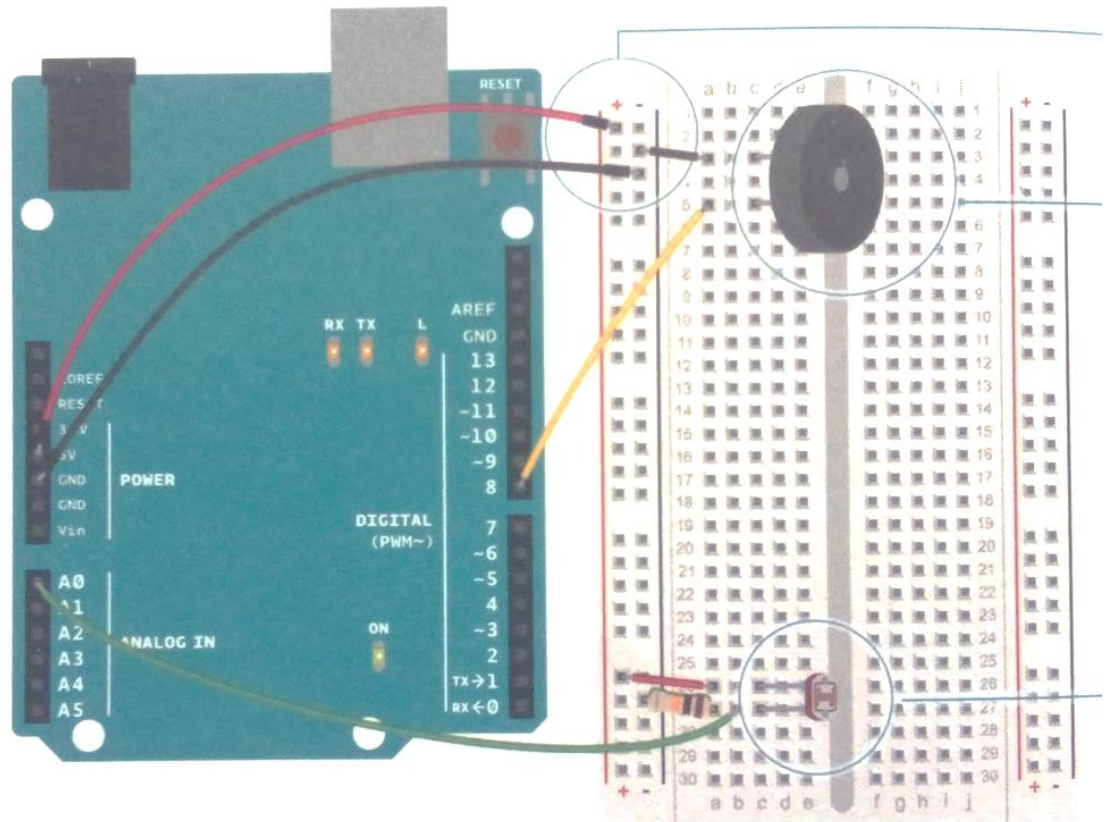




# Amateur Electronics 2.0



## Hardwired vs Software-controlled



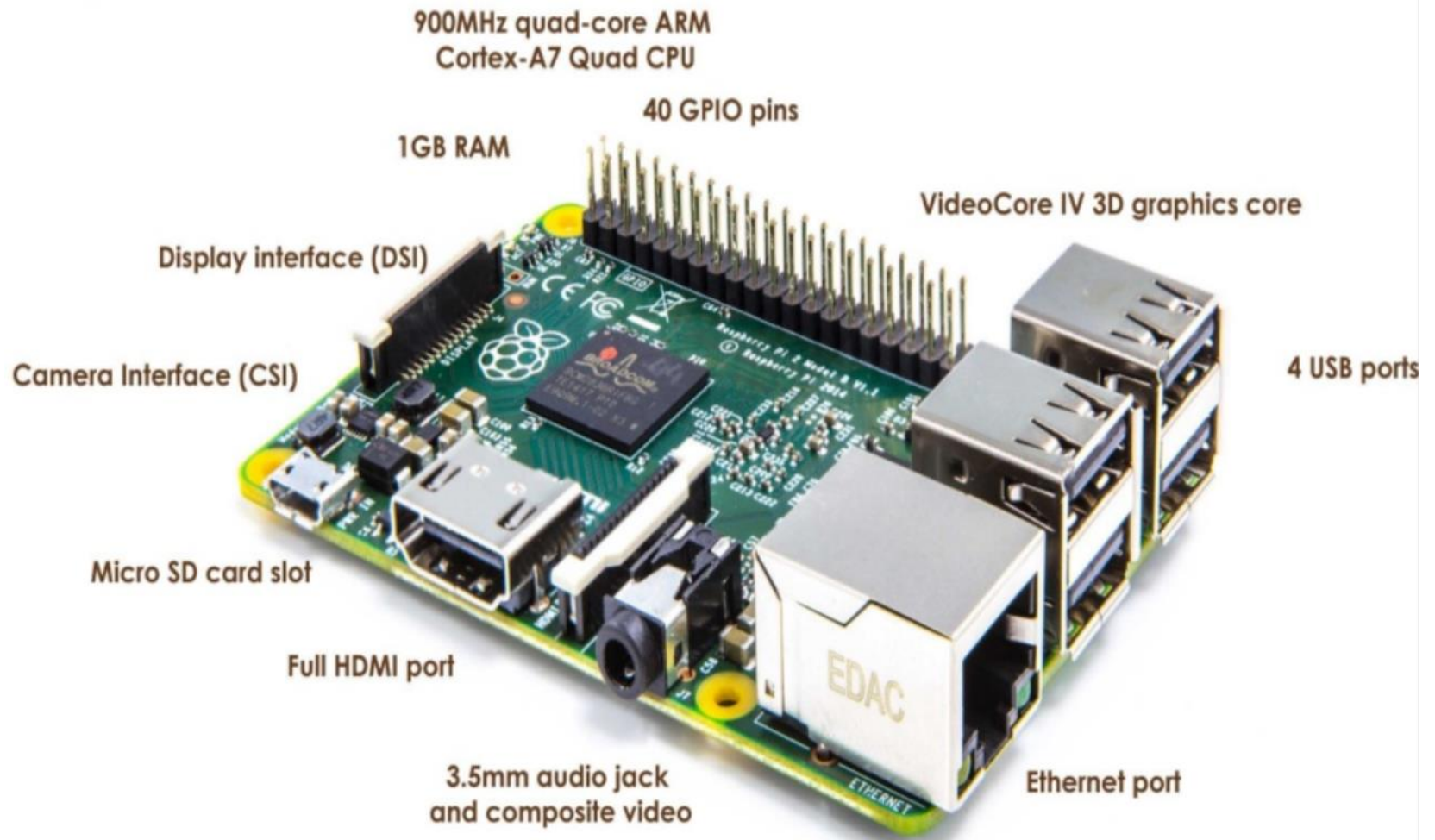


# Raspberry Pi





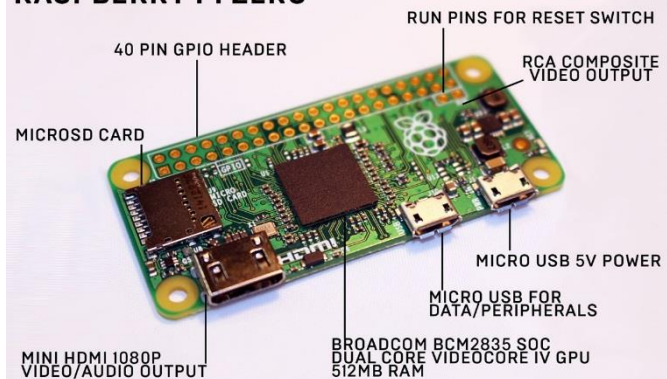
# Raspberry Pi 2 Model B



# Raspberry Pi Zero - \$5 computer



## RASPBERRY PI ZERO



58 Years on...



# Prototyping Cloud



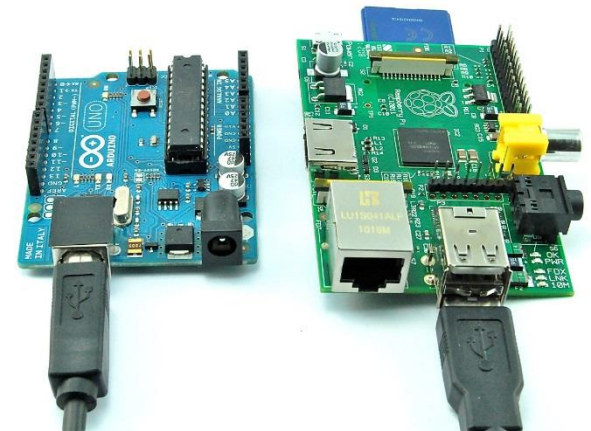


image+config



Web:  
programming,  
visualization, data  
analytics, M2M, etc.

REST API  
XMPP





# Visual Programming

led blink \*

main.visual

Dashboard

Program

Social

UPM

GoPiGo

Pin Access

Peripherals

Sensors

Embedded

Internet

Robots

Signals

Multimedia

Boards Specialized

Older

Bitcoins

Print on screen "Led on pin 0 should blink"

Print on screen "Press the Stop button to stop"

repeat while true

do

Set On LED on pin 0

delay 500 milliseconds

Set Off LED on pin 0

delay 500 milliseconds

Hide code

↺

↻

Python

Java Script

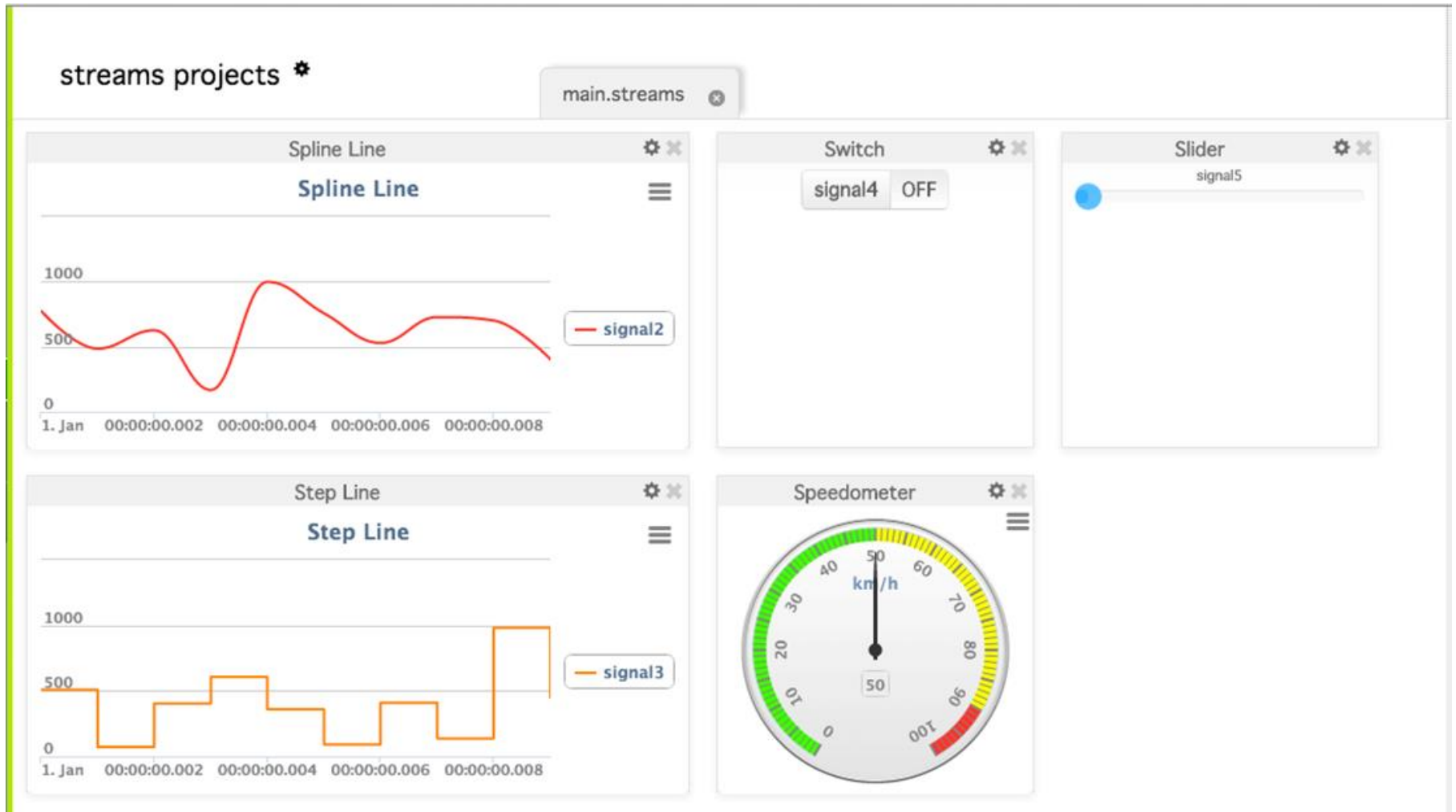
```
from wylidrin import *  
  
from time import *  
  
pinMode (0, 1)  
  
print('Led on pin 0 should blink')  
print('Press the Stop button to stop')  
while True:  
    digitalWrite (0, 1)  
    sleep ((500)/1000.0)  
    digitalWrite (0, 0)  
    sleep ((500)/1000.0)
```

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Cisco Public

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# Graphs: Input from Sensors



# Step 1: Bringing it online



# Log in to demo account

- <http://www.netacad.com>
- Use demo username and password with your team number
- Go to the course
- Click “Prototyping Lab Cloud”

netacad  
workshop

NetAcad Username	NetAcad Password
team01	Proto1746
team02	Proto1746
team03	Proto1746
team04	Proto1746
team05	Proto1746
team06	Proto1746
team07	Proto1746
team08	Proto1746
team09	Proto1746
team10	Proto1746
team11	Proto1746
team12	Proto1746
team13	Proto1746
team14	Proto1746
team15	Proto1746



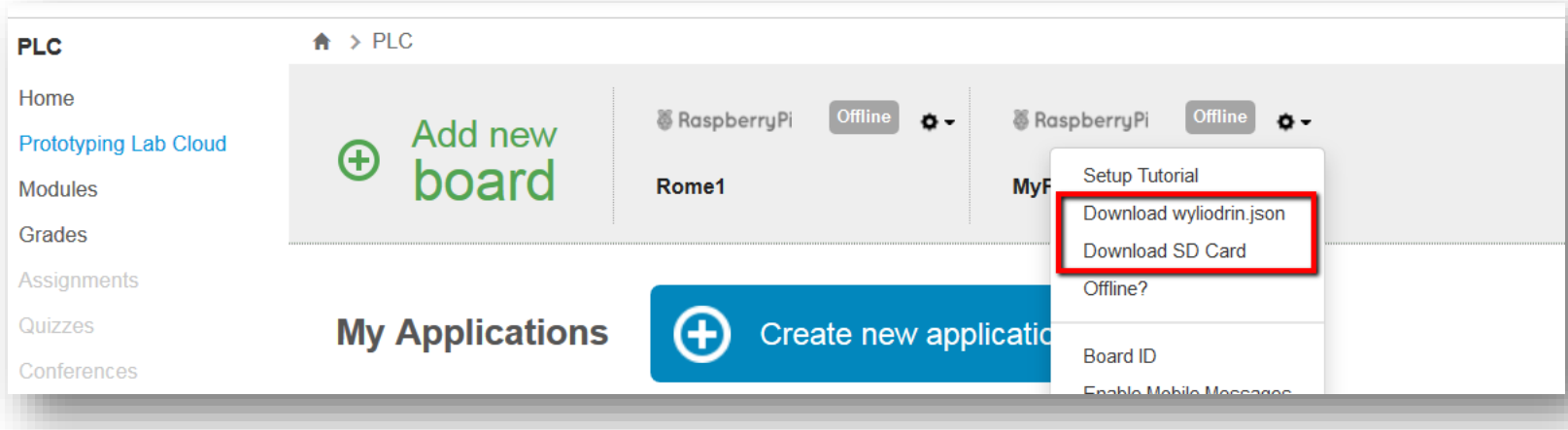
# Add new device



The screenshot shows the Cisco Networking Academy interface. At the top, there's a navigation bar with 'My NetAcad', 'Inbox 10', 'Settings', 'Logout', and 'Help'. Below this is a header with the Cisco logo and 'Cisco Networking Academy' text, along with the tagline 'Mind Wide Open'. A secondary navigation bar includes 'Courses', 'Grades', and 'Calendar'. On the left, a sidebar lists various sections: PLC, Home, Prototyping Lab Cloud, Modules, Grades, Assignments, Quizzes, Conferences, Discussions, People, Announcements, Pages, Syllabus, Outcomes, Files, and Settings. The main content area is titled 'PLC' and features a red-bordered box containing the 'Add new board' button (a green plus icon) and a list of existing boards: 'RaspberryPi' (Offline) and 'Rome1'. Below this, there's a 'My Applications' section with a 'Create new application' button. The applications are displayed in a grid, including 'FreeWalk', 'DoorLock1', and 'VaultGate1', each with a 'Settings' gear icon. The text 'netacad workshop' is written in red over the applications section.

- Before adding yours, you may remove all existing boards and projects by clicking  then “Remove”

# Downloading image and config



## 1. Flash OS image to SD card

- Image download size: 1.4 GB
- Image write time: 10-15 min

(already done to save time)



## 1. Download and copy the configuration file (wylodrin.json) to your microSD card



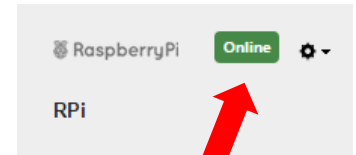
```
1 {  
2   "jid": "21777_rome1@pl.ioehackath",  
3   "password": "hatauwgtzo",  
4   "socketpassword": "nqdtwawegu",  
5   "owner": "21777@pl.ioehackath",  
6   "timeout": 2000,  
7   "maxBuffer": 200,  
8   "firewall": false,  
9   "ping": 50,
```

# Connecting and starting your RPi

- 1 Insert the MicroSD card



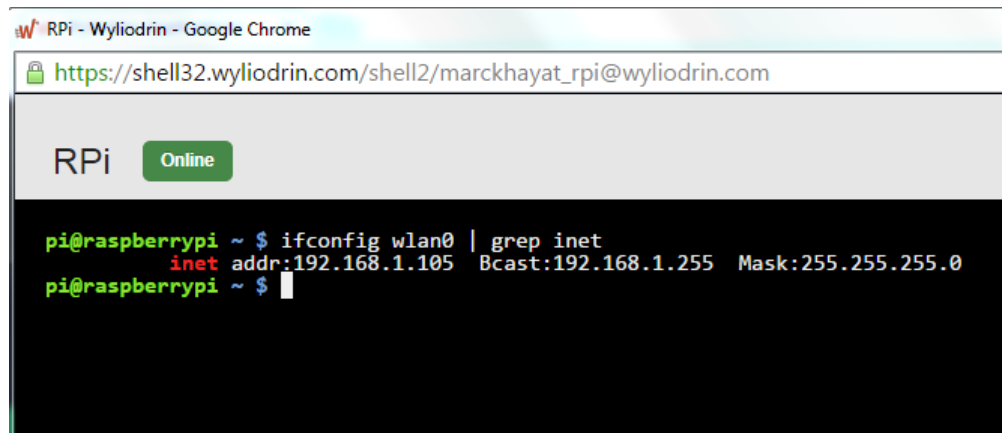
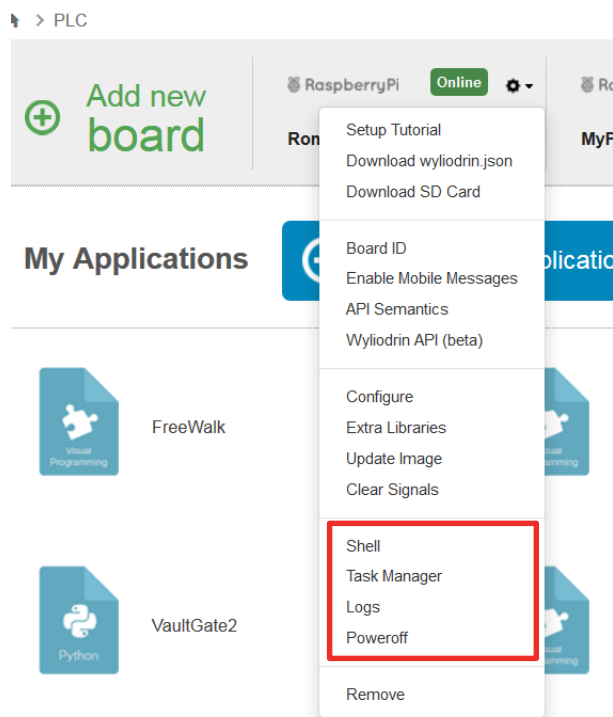
- 2 Power the RPi using MicroUSB cable



- 3 After 2 minutes device should show Online on Cloud



# Connect to shell (optional)



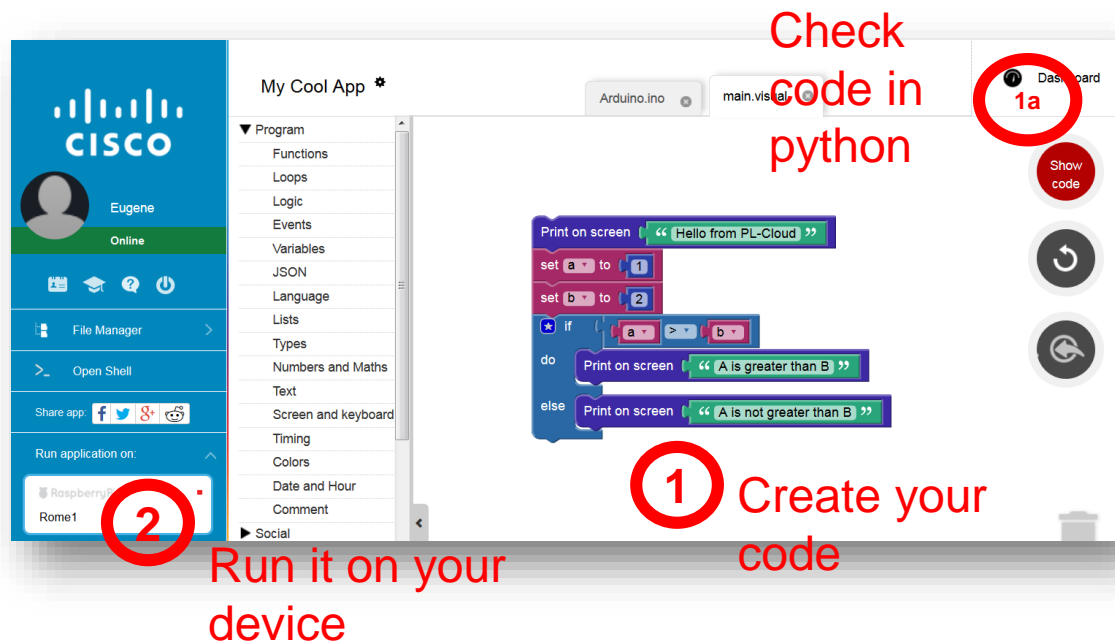
- This step is optional, it's just to verify you can access your board's CLI from the cloud.

# Add new project



The screenshot displays the Cisco Networking Academy user interface. At the top, the Cisco logo and 'Cisco Networking Academy' text are visible, along with a navigation bar containing 'My NetAcad', 'Inbox 10', 'Settings', 'Logout', and 'Help'. Below this is a secondary navigation bar with 'Courses', 'Grades', and 'Calendar'. The main content area is titled 'PLC' and includes a sidebar with links like 'Home', 'Prototyping Lab Cloud', 'Modules', 'Grades', 'Assignments', 'Quizzes', 'Conferences', 'Discussions', 'People', 'Announcements', 'Pages', 'Syllabus', 'Outcomes', 'Files', and 'Settings'. The main content area features a 'Add new board' button with a green plus icon, followed by two Raspberry Pi status cards labeled 'Rome1' and 'MyPi', both showing 'Offline' status. Below these is a red-bordered box containing the 'My Applications' section, which includes a blue button with a white plus icon and the text 'Create new application'. At the bottom, there are three application cards: 'FreeWalk' (Visual Programming), 'DoorLock1' (Visual Programming), and 'VaultGate1' (Python), each with a 'Settings' gear icon.

# How to run your app



- You need to flash the Arduino only the first time you launch your application



# Step 2:

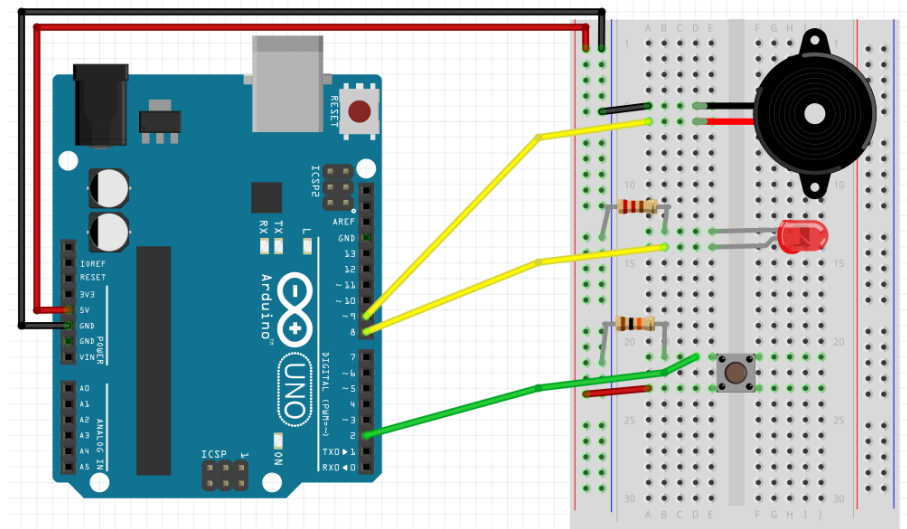
## Creating a project

Select Project A or Project B

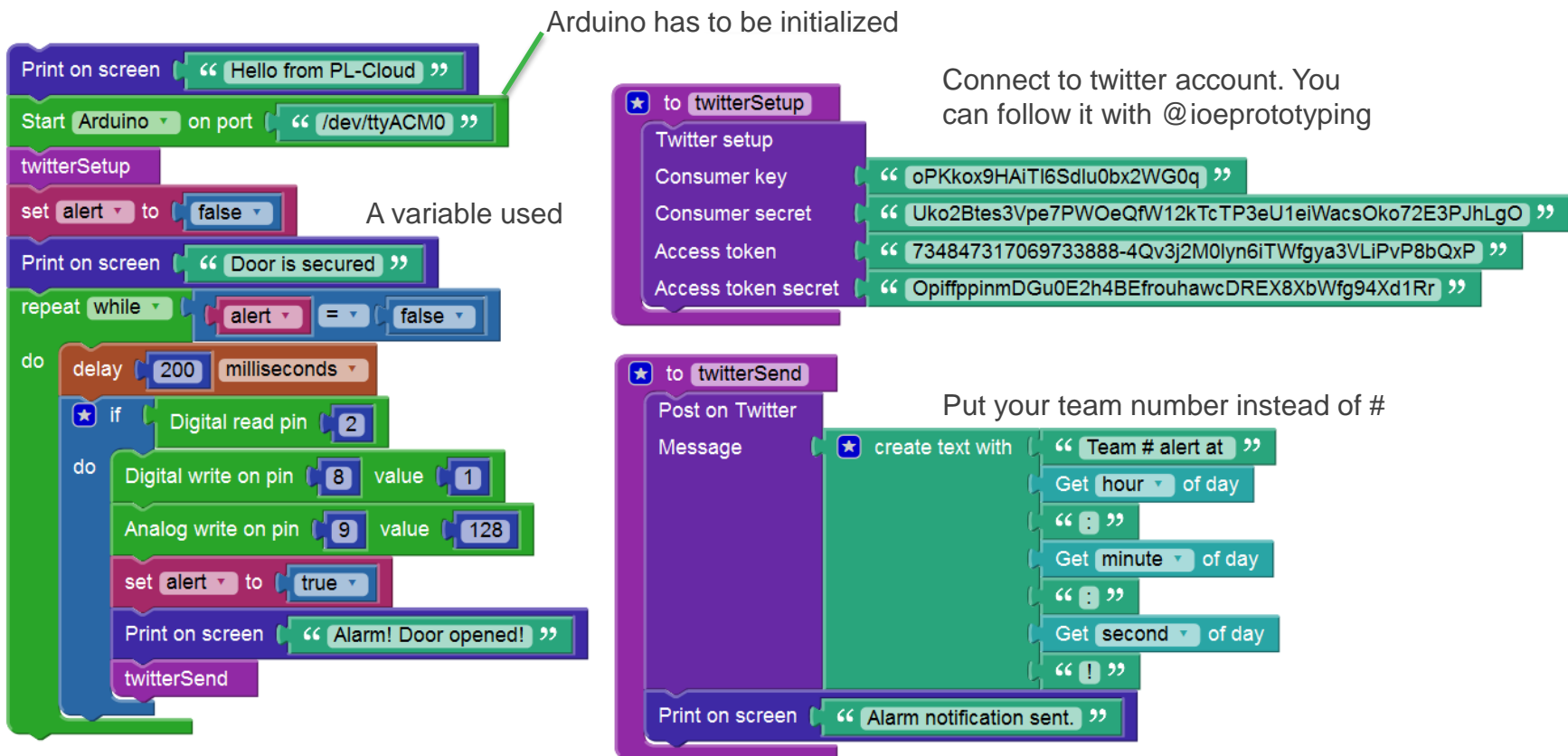


# Project A – Door monitoring

- Monitor door using a simulation push-button
- If door is closed: nothing happens
- If door is opened:
  - Turn alarm light on
  - Sound annoying buzzer alarm
  - Send twitter notification



# Project A – Code

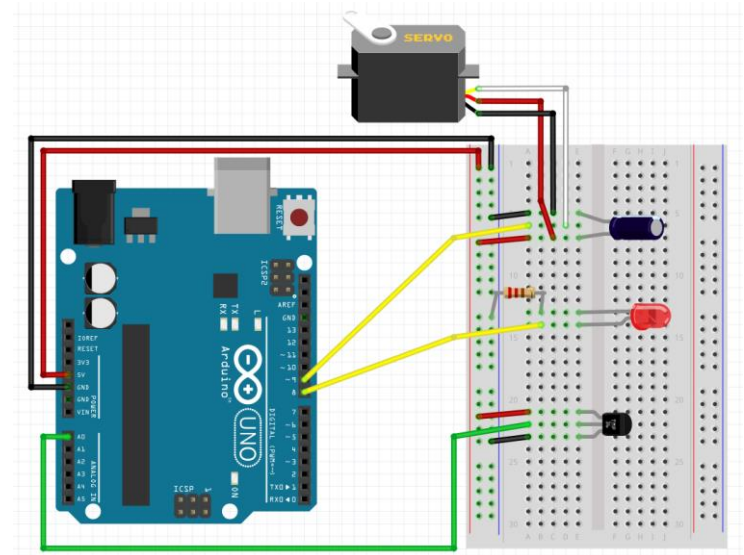


- Try to build your project without twitter notifications and verify it is working. You can add twitter feature then.

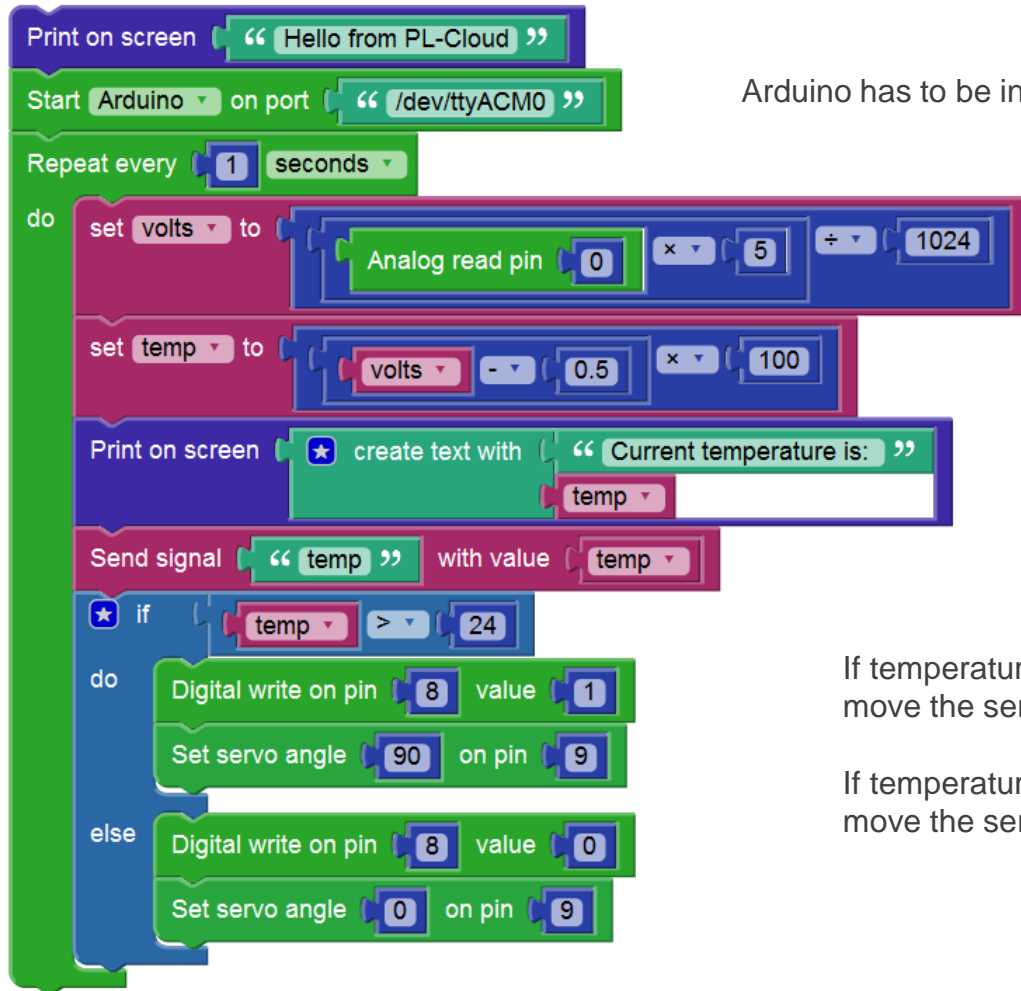


# Project B – Smart Greenhouse

- Monitor temperature using sensor
- If temperature is below 24 ° C:
  - LED is green
- If temperature goes above 24 ° C:
  - Turn LED red
  - Articulate servo to open air vent
- Let the farmer monitor temperature online and with mobile phone



# Project B – Code



Arduino has to be initialized

Sensor reading to ° C:  
Voltage at pin in Volts  
= (reading from pin) \* (5/1024)  
Centigrade temperature  
= [(voltage in V) – 0.5] \* 100

If temperature is too high, turn on the light,  
move the servo 90 degrees

If temperature is normal, turn off the light,  
move the servo to initial position

Let's go!



Danke.



Cisco Networking Academy  
Mind Wide Open

# Cloud Prototyping Platform



- Publicly available
- Free account:
  - 1 board
  - 3 application
- [www.wyliodrin.com](http://www.wyliodrin.com)

