On the edge of the real world.
An introduction.

Bruno Verachten, Worldline
On the edge of the real world. An introduction.

bruno.verachten@worldline.com  
@poddingue
WORLDLINE PRESENTS

MR WHAT IF TOUR

2020

FROM HOME AND ON ZOOM!

SEPTEMBER 22
12:15PM

ONLINE

bruno.verachten@worldline.com

@poddingle
On the edge of the real world.
An introduction.

bruno.verachten@worldline.com

@poddingue
Definitions: IoT

IoT STANDS FOR

Internet of Things
Definitions: IoT
Definitions: IoT
Definitions: IoT
Definitions: IoT
mytoaster

Social Networking for your Toaster, The Internet of Things (#iot) powered by @ThingSpeak, created by @scharler

Pittsburgh, PA  nothans.com/social-network...  Joined December 2008

99 Following  2,436 Followers

Not followed by anyone you're following
Definitions:

IoT
Definitions:

IoT
Definitions: IoT
Definitions: IoT
Definitions:

IoT
Definitions:

IoT
Definitions:

IoT
EDGE COMPUTING

Definitions
Definitions

**Edge Computing**
- Image Data In
- Image data processed
- Action

**Cloud Computing**
- Image Data In
- Image data processed
- Control Commands Returned
- Action

Image Uploaded to Cloud
“It’s time to think local and migrate intelligence from the cloud to embedded devices at the edge.” says Chris Shore, Director of Embedded Solutions at Arm.

#EW19
Definitions

Centralized

Decentralized

Distributed
The IoT Zombie Apocalypse
The IoT Zombie Apocalypse
YOU'RE CHEAP.
SB... What?
SBC STANDS FOR Single Board Computer
How to mine bitcoin with your Raspberry Pi

By Raka Mahesa - October 12, 2017 - 12:00 am

3387 views | 0 comments
A modern brewery controller

The BrewPi Spark 3 is a temperature controller that can control your beer or wine fermentation with 0.1°C precision. It sends data to a Raspberry Pi to show a control panel with graphs in your browser. And all our software is open source!
Awaken your home

Open source home automation that puts local control and privacy first. Powered by a worldwide community of tinkerers and DIY enthusiasts. Perfect to run on a Raspberry Pi or a local server.

GET STARTED    VIEW DEMO    BROWSE CODE ON GITHUB
What is the AirPi?

The AirPi is an air quality and weather surveillance station made with a Raspberry Pi computer. This project aims to facilitate access to localised meteorological surveillance for the masses.

Build Your Own
Maak een 3D Selfie!

3D Selfie

3D model wordt bewerkt voor prijzen
3D houten 3D model wordt geboord en schilderwerk
SB... What?

SBC STANDS FOR

Single Board Computer
SB... What?

YOU'RE CHEAP.
GPIO STANDS FOR
General purpose input output
SB... What?
Choose your fruit in the basket
Choose your fruit in the basket
Choose your fruit in the basket.
Choose your fruit in the basket.
Choose your fruit in the basket.
Choose your fruit in the basket
Choose your fruit in the basket
Choose your fruit in the basket
Choose your fruit in the basket
Choose your fruit in the basket
Choose your fruit in the basket
HackerBoards.com is pleased to host...

The Single Board Computer Database

There are currently 303 boards in our database. Click here to begin your search:

>>> Search Board-DB <<<

Note: We welcome board submissions from SBC enthusiasts of all stripes, including students, hackers, and professional developers, as well as board manufacturer reps. Please help us continue to grow this valuable resource.

DEVOOPS PRO EUROPE 2019
HackerBoards.com is pleased to host...

**The Single Board Computer Database**

There are currently **303 boards** in our database. Click here to begin your search:

>>> Search Board-DB <<<

**Note:** We welcome board submissions from SBC enthusiasts of all stripes, including students, hackers, and professional developers, as well as board manufacturer reps. Please help us continue to grow this valuable resource.
Choose your fruit in the basket

OTG STANDS FOR

On The Go

@poddingue
Choose your fruit in the basket

Raspberry Pi PoE HAT

The Raspberry Pi PoE HAT powers a Raspberry Pi 3 Model B+ via an Ethernet cable. Power-sourcing equipment is required on the Ethernet network.

BUY NOW

or Buy for Business
PI CAP

€30.00 ex VAT

Choose your fruit in the basket
The 96Boards Sensors Mezzanine adapter makes it simple and easy to connect sensors and devices to any 96Boards-compatible base board. With it you can connect your favourite Grove modules and Arduino compatible shields and interface to software running on the 96Boards baseboard. It provides everything you need to start experimenting and prototyping on the 96Boards platform.

On the board you will find sockets for 18 Grove modules, an Arduino-compatible shield socket, and two SPI headers. It also includes an ATMega328 microcontroller which can be programmed from the Arduino IDE and will run most Arduino UNO sketches unchanged. The shield connector and half of the Grove sockets are controlled by the microcontroller, while the remaining Grove sockets are controlled directly by the baseboard. This makes it a flexible prototyping platform which supports both direct control of devices from application software, and offload to a real-time kernel.
Choose your fruit in the basket
Choose your fruit in the basket
2

SBCS as servers

@poddingue

Bruno Verachten
How to setup Raspberry Pi Lighttpd

by Gus  Dec 4, 2017  Updated Aug 19, 2018  Beginner, Servers

Installing LIGHTTPD on the Raspberry Pi

In this project, we will be exploring how to set up a Lighttpd Web Server on your Raspberry Pi. Lighttpd like NGINX is a fast and memory efficient alternative to Apache that is designed to have a relatively low memory footprint and a small CPU load, both of which are perfect qualities for the Raspberry Pi. One of the largest users of Lighttpd is the Wikimedia Foundation.
Setting up an SQL database on the Raspberry Pi
New server: Orange Pi Zero

I took some time to set up my own server and create my own website, to show the results of my projects, as a kind of portfolio of my work. I'll be uploading various projects, from small repairs to fully developed products.

The server itself is an Orange Pi Zero board, a tiny little embedded board about half the size of a credit card with a 1.2 ghz quad core ARM chip, 512 MB DDR3 memory, and most importantly for my application, a network port. It has some other features that I won't be using at this moment. It's similar to another form of a “Pi” type embedded board, but lacking an HDMI video output (which I would have used for the projects on my website).
ODROID BOARD / EXYNOS5 OCTA

ODROID-HC2 : Home Cloud Two

$54.00

For Bank transfer

<table>
<thead>
<tr>
<th>TIER</th>
<th>DISCOUNT RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 ~ 29</td>
<td>5%</td>
</tr>
<tr>
<td>30 ~ 59</td>
<td>6%</td>
</tr>
<tr>
<td>60 ~ and more</td>
<td>7%</td>
</tr>
</tbody>
</table>

credit card with a 1.2 ghz quad core ARM chip, 512 MB DDR3 memory, and most importantly for my application, a network port. It has some other features that I won’t be using at this moment. It is similar to another form of a “Pi” type embedded board, but has an HDMI video output (which I...
How to Turn a Raspberry Pi into an Always-On BitBox
RetroOrangePi
Make the Ultimate Gaming and Media Center on Orange Pi Zero
Works on Arm is committed to accelerating the Arm architecture in the datacenter.

Arm and Packet have partnered to make powerful Armv8 bare metal infrastructure — including latest generation Ampere and Marvell systems — available to the open source software ecosystem. What will you build, test or optimize on Arm?

**Ampere**

Ampere's vision is to set the new standard for cloud and edge servers and reset expectations for high performance and a better total cost of ownership. Their eMAG system is designed with cloud workloads in mind, with 32 Armv8 cores at 3.3 GHz in a single socket configuration.

**Arm**

ARM designs the technology that lies at the heart of advanced digital products, from wireless, networking and consumer entertainment solutions to imaging, automotive, security and storage devices.

**Marvell®**

The Marvell® ThunderX® and ThunderX2® product families are comprised of best-in-class 64-bit Armv8 data center and cloud processors that enable servers and appliances optimized for compute, storage, network and secure compute workloads in the cloud.

**Packet**

Packet, an Equinix company, is the go-to cloud partner for today's leading developers, empowering SaaS companies and Fortune 100's alike to make infrastructure their competitive advantage with automated bare metal that can be deployed anywhere. They have offered powerful Arm-based configurations since 2016.
Who wants to play?
Who wants to play?
GPIO STANDS FOR

General purpose input output
GPIO STANDS FOR General purpose input output
I let's move from left to right
Raspberry Pi Alexa: Build your own Amazon Echo

by Gus  Aug 8, 2017   Updated Aug 16, 2018
Beginner, IoT, Media
Containerization
Containerization
Containerization
Containerization

Bruno Verachten
Containerization
Containerization

Bruno Verachten

@poddingue
Containerization

Bruno Verachten

@poddingle
Containerization

@poddingue

Bruno Verachten
Containerization

@poddingue

Bruno Verachten
ARMed with Docker by Hypriot - Chromium

by Hypriot
Docker Pirates ARMed with explosive stuff
Build SD card image for Raspberry Pi 3 64bit

- 225 commits
- 2 branches
- 133 releases
- 8 contributors

Branch: master

Dockerfile
Upgrade to kernel 4.14.37 optimized for Docker (kernel build 20180429...)

10 months ago

.Dockerignore
Ignore .tar.gz.sha256 files

2 years ago

.gitignore
Ignore .tar.gz.sha256 files

2 years ago

.travis.yml
Use external Travis build script

2 years ago

builder
Upgrade to kernel 4.14.37 optimized for Docker (kernel build 20180429...)

10 months ago

Latest commit b9b4381 on 29 Apr 2019
Containerization

armbian

Bruno Verachten

@poddingue
How to run Docker?

Preinstallation requirements:

- Armbian 5.1 or newer with Kernel 3.10 or higher
- Debian Jessie (might work elsewhere with some modifications)
- root access

Execute this as root:

```
curl https://get.docker.com | sh
```

Test if Docker works correctly:

```
docker run -d -p 80:80 hyriot/rpi-busybox-httpd
```

... and point the browser of any device in the same network to http://<IP OF YOUR DEVICE>/

More info in this forum topic

How to set wireless access point?
UPDATE: RASPBERRY PI DOCKERCON CHALLENGE

By Victor Coisne  September 15, 2015

dockercon, DockerCon 2015, DockerCon Europe, hackathon, hacks, hypriot, raspberry pi

In the DockerCon closing keynote Dieter Reuter from Hypriot presented a demo running 500 Docker containers on a Raspberry Pi 2 device. Convinced that this number of containers could be at least doubled, Dieter then challenged the Docker community to beat his personal record. As of now, the current record stands at 2334 web servers running in containers on a single Raspberry Pi 2.

You can see the original demo here:
 ARM your continuous integration system with fruits! 🍑

The goal of this howto is to show you how to add your own ARM Gitlab runner to your Gitlab instance Runners herd.
hypriot/rpi-nano-httpd

By hypriot • Updated 4 years ago

Raspberry Pi nano sized HTTP server

Overview
Tags

rpi-nano-httpd

A nano sized web server packed into a Docker Nano Container

Docker Pull Command

docker pull hypriot/rpi-nano-httpd
Raspberry Pi compatible Docker base image with MySQL.
It is based on the official Mysql Docker Image ported to the ARM based Raspberry Pi.

What is MySQL?
Wordpress for Docker for Raspberry PI (ARM architecture)
ebspace/armhf-phpmyadmin
By ebspace • Updated 2 years ago

phpMyAdmin docker image for ARM armhf architecture

openstf/stf-armv7l
By openstf • Updated 7 months ago

An automated nightly build of the openstf/stf image for armv7l
Containerization
Containerization
Combining best of both worlds
Combining best of both worlds
Combining best of both worlds
Combining best of both worlds
Combining best of both worlds @poddingue
Combining best of both worlds

Yes, you can control the GPIO through Docker.

@poddingue
Yes, you can control the GPIO through Docker.
Plugging everything together

@poddingue

Bruno Verachten
Plugging everything together
Wiring Pi

GPIO Interface library for the Raspberry Pi

About

WiringPi is a PIN based GPIO access library written in C for the BCM2835, BCM2836 and
acencini/rpi-python-serial-wiringpi

By acencini • Updated 3 years ago

Serial/WiringPi-Enabled Python/C Container for use with Hypriot

Overview

Tags

rpi-python-serial-wiringpi

Hello Raspberry Pi docker-loving hardware hackers!

This image supports full GPIO and serial access, for use with Python (wiringpi2, pyserial) and C (libwiringpi).

Docker Pull Command

docker pull acencini/rpi-python-serial-wiringpi
Plugging everything together
Plugging everything together

/dev/ttyAMA0
Plugging everything together

/dev/ttyAMA0
/dev/mem

@poddingue
Plugging everything together

docker run --device /dev/ttyAMA0:/dev/ttyAMA0 --device /dev/mem:/dev/mem --privileged -ti acencini/rpi-python-serial-wiringpi /bin/bash
Plugging everything together

docker run --device /dev/ttyAMA0:/dev/ttyAMA0 --device /dev/mem:/dev/mem --privileged -ti acencini/rpi-python-serial-wiringpi /bin/bash
Plugging everything together
#Guide: which camera to choose for the Raspberry Pi 3 or Pi Zero W

10 October 2017  7457  1 comment
Plugging everything together
Plugging everything together, even the camera!
Plugging everything together, even the camera!
Plugging everything together, even the camera!

Access Camera from Docker Container

Fri Jan 12, 2018 7:40 pm

Hey Folks,

I'm working up an open source sample for Microsoft's new IoT Edge platform w/ Raspberry Pi to do computer vision etc on the actual raspberry pi without any cloud comms (aside from firmware updates
Plugging everything together, even the camera!

**MotionEye**

Docker image based on Raspbian system and MotionEye project.

Go to [https://github.com/ccrisan/motioneye](https://github.com/ccrisan/motioneye) to learn more.
Plugging everything together, even the camera!

docker run --device=/dev/vcsm --device=/dev/vchiq ...
Plugging everything together, even the camera!
Approaching the edge
Install TensorFlow

TensorFlow is tested and supported on the following 64-bit systems:

- Ubuntu 16.04 or later
- macOS 10.12.6 (Sierra) or later (no GPU support)
- Windows 7 or later
- Raspbian 9.0 or later

Download a package

Install TensorFlow with Python's `pip` package manager.

```bash
# Current release for CPU-only
$ pip install tensorflow

# Nightly build for CPU-only (unstable)
$ pip install tf-nightly

# GPU package for CUDA-enabled GPU cards
$ pip install tensorflow-gpu
```
Uses the raspberry pi's gpio pins to control a lava-lamp based build status indicator.
FASCINATING
Containerization
Approaching the edge/power
Approaching the edge/power

POE STANDS FOR

Power Over Ethernet
Approaching the edge
Questions and answers about powering the Orange Pi Zero using the "Power over Ethernet" option.

The aim is to answer community questions about Power Over Ethernet options (both official 802.3af/at and unofficial "PoE" solutions) and to improve the wiki page with these answers:
https://www.orangepi.org/forum/kernel/better-power-over-ethernet-support-possible
Raspberry Pi’s PoE HAT ships for $20, tosses in a free fan
Aug 25, 2018 — by Eric Brown — 13185 views

Raspberry Pi Trading has launched a $20 Power-over-Etherernet HAT board for the Raspberry Pi 3 Model B+ that delivers up to 15W and ships with a small fan.

The Power-over-Ethernet HAT that was promised with the release of the Raspberry Pi 3 Model B+ SBC has arrived. The $20, 802.3af-compliant “Raspberry Pi PoE HAT” allows delivery of up to 15W over the RPi 3 B+’s USB-based GbE port without reducing the port’s up to 300Mbps bandwidth.
Approaching the edge /power
Approaching the edge/power
Approaching the edge/power
12W Folding Solar Charger

Dual USB Output

With Build-in Voltage Regulator

SHINING

Usine Directe 12 W Double USB 5 V Sortie Panneau Solaire Mobile Téléphone Chargeur Batterie Chargeur, Portable Pliable Solaire Chargeur de Téléphone Portable

12W Folding Solar Charger

Dual USB Output

With Build-in Voltage Regulator

SHINING
Approaching the edge / power
Approaching the edge/power

Bruno Verachten

@poddingue
Approaching the edge/network

LoRa STANDS FOR

Long Range

Bruno Verachten

@poddingue
Approaching the edge / network

LoRa STANDS FOR Long Range
Connexion LoRa

Gateway

End-device

Connexion IP

Application server
REAL-TIME DATA VISUALIZATION OF A LoRa NETWORK USING PYTHON
Approaching the edge/network
Approaching the edge/network
Approaching the edge/network
Approaching the edge/network
A LoRaWAN "The Things Network" Gateway for Windows IoT Core

Build your own LoRaWAN "The Things Network" packet-forwarding gateway on Windows 10 IoT Core in native .NET code.

Easy  Full instructions provided  3 hours  10,862
IoT LoRa Gateway HAT for Raspberry Pi (868MHz/915MHz)

LoRa (Long Range) is the smart, long-range, wireless transmission technology that is enabling the future of IoT (Internet of Things).

Our IoT LoRa Gateway HAT allows you to create an inexpensive LoRa gateway, compatible with The Things Network, in conjunction with a Raspberry Pi or other single board computers. The HAT allows you to set up your IoT LoRa gateway in minutes rather than hours for a third of the price of traditional gateways.

More Info

- Nebra IP67 Case - LoRa Gateway HAT Mounting and Raspberry Pi Expansion Board £38.99 (ex VAT £34.96)
- Nebra IP67 Waterproof/Weatherproof Enclosure £53.99 (ex VAT £44.99)
Approaching the edge/network

EDGE COMPUTING
Approaching the edge/network
Approaching the edge/network
**What’s Orange Pi 4G-IOT?**

It’s an open-source single-board computer. It can run Android 6.0 image. It uses the ARM Cortex-A53 SoC, and has Integrated 1GB DDR3 SDRAM.
YOU'RE CHEAP.
First Click: This $1 chip will connect your things to the city for free

February 17th, 2016

By Thomas Ricker on February 17, 2016 07:30 am  
@Trixy
LoRaWAN gate sensors help detect / prevent theft of livestock, it doesn’t need a mobile signal or subscription. @ColegGlynllifon already showcasing LoRaWAN #agtech @FarmingCo @royalwelshshow @ArloesiGwyrr

bbc.co.uk/news/uk-englan...

Peter Gwyn Williams @petergwyn
3:01pm - 10 Mar 2019
Approaching the edge/network
On the Edge. Now what?
Machine Learning
Google AI on Raspberry Pi: Now you get official TensorFlow support

Google's TensorFlow team makes it a whole lot easier to get AI up and running on a Raspberry Pi.

By Liam Tung | August 6, 2018 -- 12:51 GMT (13:51 BST) | Topic: Innovation

Recommended Content:
Downloads: ADP RUN Payroll vs. Top Alternatives—Competitive Report
Find out which ADP RUN software alternative you should consider. This report highlights the strengths and weaknesses of the top payroll systems, including ADP RUN, Dayforce, Gusto, and Workday. This competitive report is a valuable tool for businesses looking for ways to improve their payroll processes. Download Now
Data Science Docker Stack

This set of Docker images were developed to provide a fast and reproducible way to play, develop and learn with Tensorflow under Python environment, from minimal installation to a complete one including JupyterLab computational environment and OpenCV (Open Source Computer Vision Library). Use or build images for amd64 or arm32v7 architectures without hassle, the whole set is Multi-Arch designed. Get latest versions and switch between them while keep clean your system.

Features Chart
How to easily Detect Objects with Deep Learning on Raspberry Pi

The real world poses challenges like having limited data and having tiny hardware like Mobile Phones and Raspberry Pis which can’t run complex Deep Learning models. This post demonstrates how you can do object detection using a Raspberry Pi. Like cars on a road, oranges in a fridge, signatures in a document and teslas in space.

Bruno Verachten

@poddingue
Rockchip RK3399 has passed #AI chip evaluation by the Artificial Intelligence Industry Alliance (AIIA)! The development board based on Rockchip RK3399, showed superior performance in a number of indicators, which were at the leading level in the industry.

In the case of less precision loss, the speed of int8 is significantly higher than that of fp32 under CPU with Tengine framework.

In the case of less precision loss, the speed of int8 is significantly higher than that of fp32 under CPU with Tengine framework.

SiPEED MAIX-1 without WiFi

Raspberry Pi 40-Pin

UART Mode Switch

A0

D16

LCD

PWM/D12

PWR

USB-C

LED1

Reset

LED2

Boot

CP2102

I2C

UART

@poddingue

Camera
New CMSIS-NN Neural Network Kernels Boost Efficiency in Microcontrollers by $\sim 5x$

Lower Power, High performance, Integrated NPU, Easy to develop

- Equipped with one powerful neural network process unit (NPU), it supports mainstream platforms at the market, such as caffe, tensorflow and Mxnet.
- Supports 8-bit and 16-bit computing, it can deliver up to 3.0TOPs and 150% performance improvement compared to similar NPU Soc design.

Tops STANDS FOR

Tera Operations Per Second

Lower Power, High performance, Integrated NPU, Easy to develop

- Equipped with one powerful neural network process unit (NPU), it supports mainstream platforms at the market, such as caffe, tensorflow and Mxnet.
- Supports 8-bit and 16-bit computing, it can deliver up to 3.0TOPs and 150% performance improvement compared to similar NPU Soc design.

Develop Tool for AI

Model Training
- Python: Train / Test
  - Train Dataset
  - Test Dataset
  - ONNX
  - TensorFlow
  - Caffe
  - DarkNet

Convert
- TF Train & Quantization*
  - Quantize
  - Graph Optimize
- RKNN Model
  - Plugins
  - Model Converte
  - Custom Layer

Debug / Deploy
- Desktop
  - Simulation Library
  - Simulation Runtime
- RKNN/TFLite
  - Application
  - RK3399Pro Deploy Runtime

@poddingue

Bruno Verachten
On the Edge.

Now what? Machine Learning
On the Edge. Machine Learning with Google
On the Edge. Machine Learning with Google
On the Edge. Machine Learning with Google

Bruno Verachten

@poddingue
Who’s Afraid of Machine Learning?
Part 1: What do they all talk about?!?
Intro to ML (for mobile developers.)

Britt Barak
Sep 11, 2018 · 5 min read
FATTPANTS IS KIDDING HIMSELF IF HE THINKS HE’S EATING LESS THAN 2000 CALORIES A DAY!

HE SPENT A FORTUNE ON US SMARTBULBS AND HE ONLY USES THE “WHITE LIGHT” SETTING! *SIGH*

DUMMYS NEEDS TO TEST ME NOW AND THEN, OR AT LEAST CHECK MY APP!

AT LEAST YOU GET USED! I NEVER DO! ALL HE EATS IS TAKE-OUT!

DON’T BOTHER HIM! THE PREVIOUS SMOKE DETECTOR, HE BEAT TO DEATH WITH A BROOM HANDLE!!

DID YOU SEE WHAT TIME HE GOT IN LAST NIGHT? SCANDALOUS!

HEY GUYS! THE HOUSE SMARTMETER IS TELLING EVERYONE THAT SACREDY CAT STILL USES A NIGHT LIGHT! HA HA!

I REFUSE TO PICK UP THIS FRENCH FRY. LAZYPONES CAN DO IT HIMSELF!

What your Internet of Things is saying about you...
Thanks

For more information please contact:
@poddingue
bruno.verachten@worldline.com
or go to https://discord.gg/ZT6FMQE