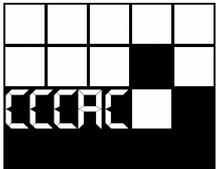


HTCPCP

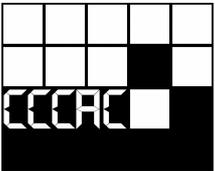
IoT done right for fun and no profit

Bader Zaidan <bader@zaidan.pw>



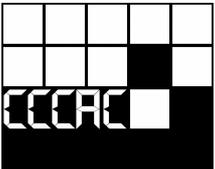
Me IRL

- Bader Zaidan
- 4. Semester Electrical Engineering B.Sc.
- Evil capitalist



Goals

- GNU{/,+}Linux{/,+}Python{/,+}*BSD{/,+}.....
- Hidden home miniserver and automation on a budget
- Networking, protocols, etc.
- Crontab has no snooze button
- IoT done right
- Why not?



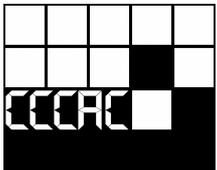
Competition



\$330

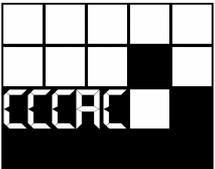


\$74



HTCPCP

- coffee: URI scheme (read as http:)
- POST, GET, PROPFIND, as well as BREW, WHEN...
- 406, 418 Errors
-



HTCPCP

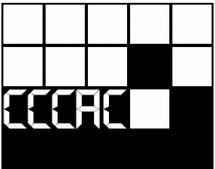
```
Accept-Additions = "Accept-Additions" ":"  
                  #( addition-range [ accept-params ] )
```

```
addition-type = ( "*" | milk-type | syrup-type | sweetener-type |  
                 | spice-type | alcohol-type ) *( ";" parameter )
```

```
milk-type = ( "Cream" | "Half-and-half" | "Whole-milk" |  
             | "Part-Skim" | "Skim" | "Non-Dairy" )
```

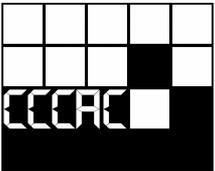
```
syrup-type = ( "Vanilla" | "Almond" | "Raspberry" |  
             | "Chocolate" )
```

```
alcohol-type = ( "Whisky" | "Rum" | "Kahlua" | "Aquavit" )
```



XHTCPCP(S)

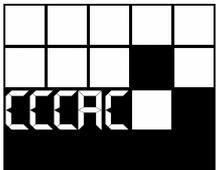
- coffee(s): (backwards compatible)
- SSL/TLS/*
- Authentication, ie. coffee(s)://username:password@location.tld/
- More headers and commands for maximum hipsterdom
- HEAD instead of PROPFIND+XML
- JSON!!1one
- Cookies



XHTPCP(S)

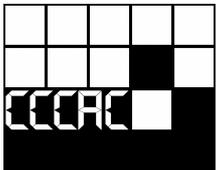
```
Accept-Additions = "Accept-Additions" ":"  
                  #( addition-range [ accept-params ] )
```

```
addition-type = ( "*" .....  
                 | bean-type  
                 | roast-type  
                 | grind-size  
                 | grind-mass  
                 | brew-temperature  
                 | brew-time  
                 | water-volume  
                 ) *( ";" parameter )
```

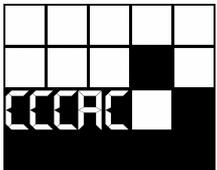
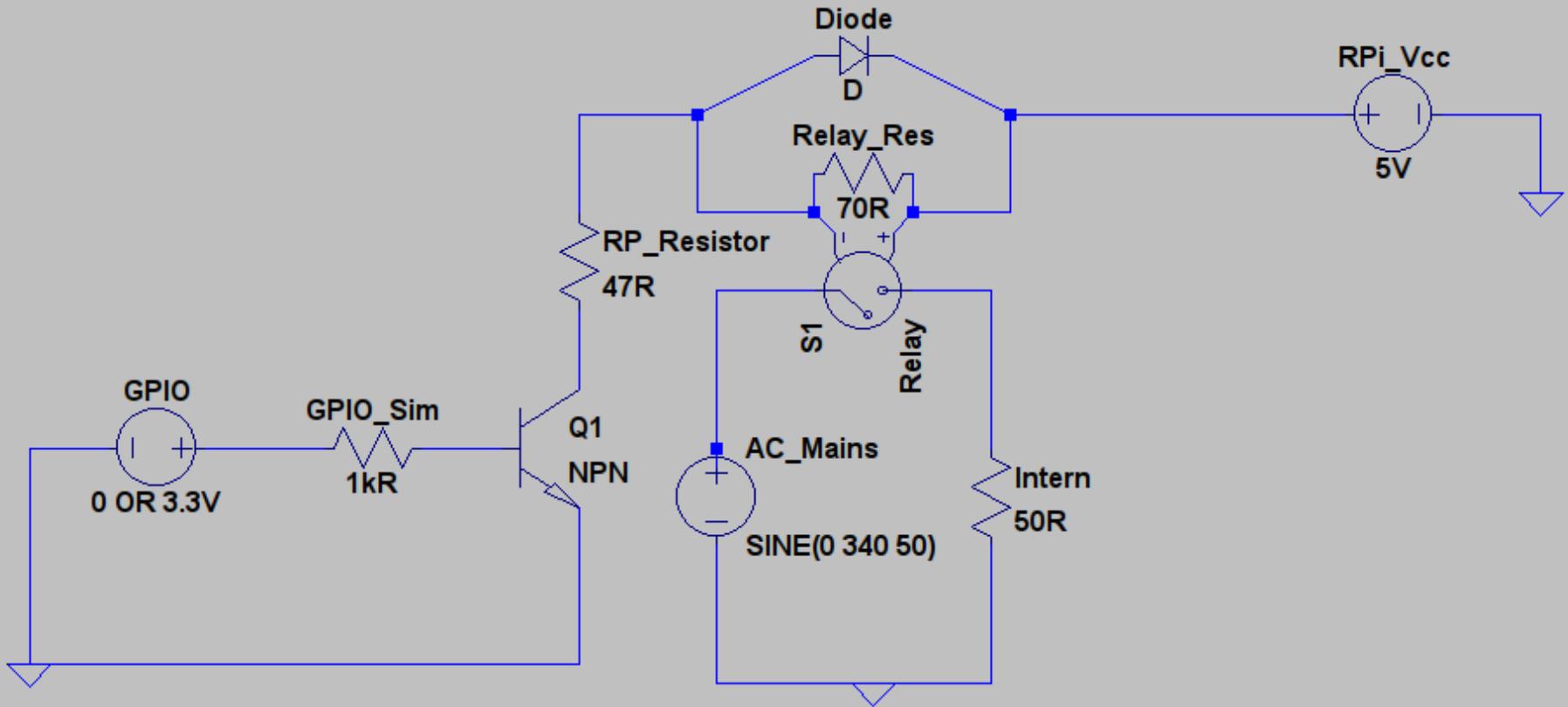


covfefemat

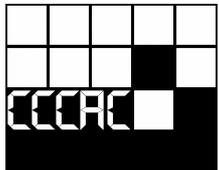
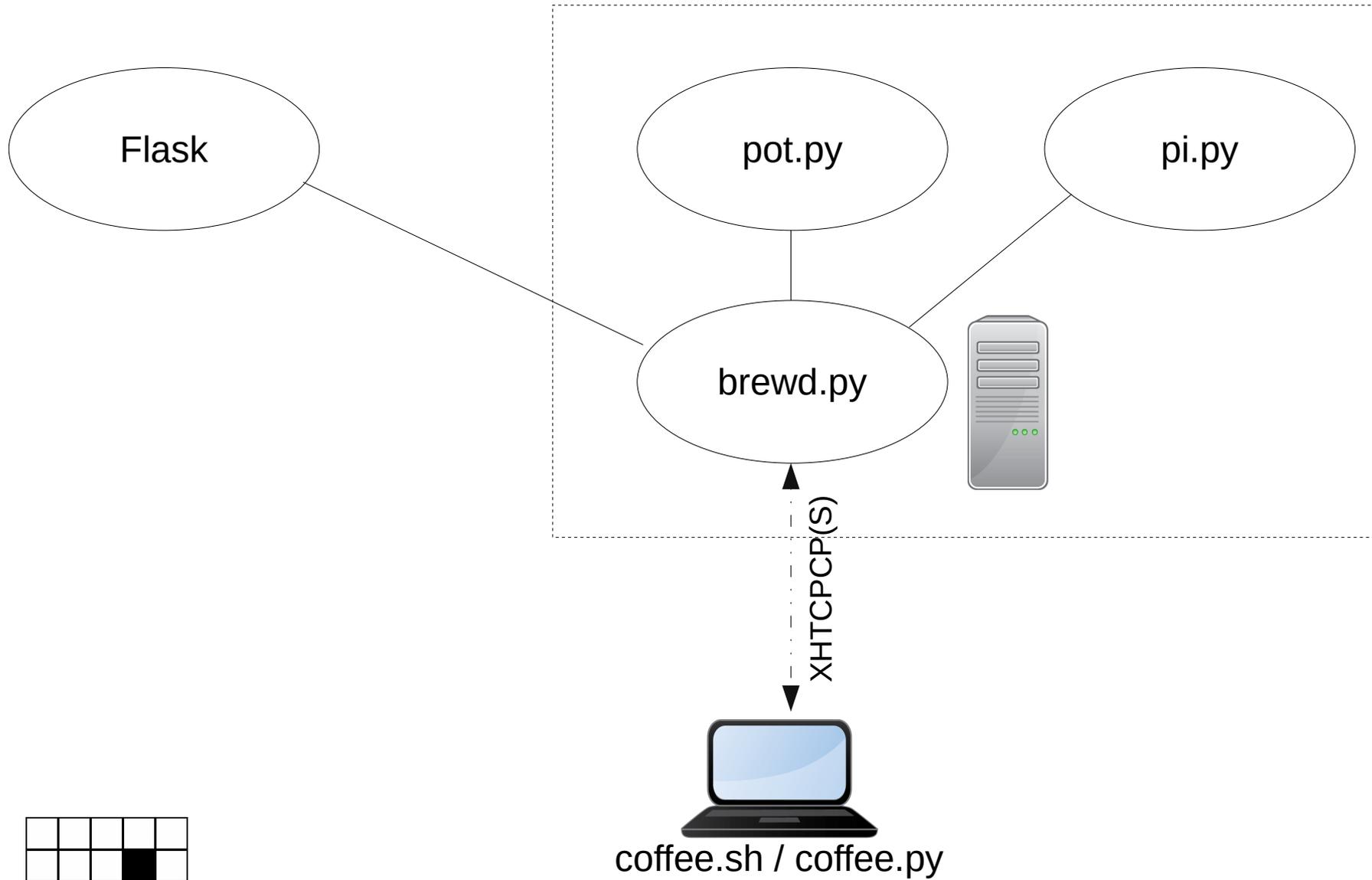
- Raspberry Pi Model 2 & Python3
 - `brewd+coffee.sh`
- Melita 1010-02 Filter Coffee Machine
 - Timed BÄR 3600 Switch, replaced with relay circuit
 - Same heating element for water and pot
- Parts cost €35 (inc. VAT) new, almost as much as hipster beans
- <https://github.com/badersz/covfefemat>



covfefemat



covfefemat



Theory

Fick's law of diffusion

$$s = kT / \eta A / x (C - c) \theta$$

s = quantity of diffusing solute from solid particle

k = constant, depending on molecular factors

T = absolute temperature

η = viscosity of the liquid, $f(T)$

A = layer cross-section around the particle

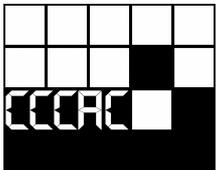
x = layer depth

C = solute concentration in the solid

c = solute concentration in the liquid

Θ = contact time

*Barbanti & Nicoli 1996



Theory

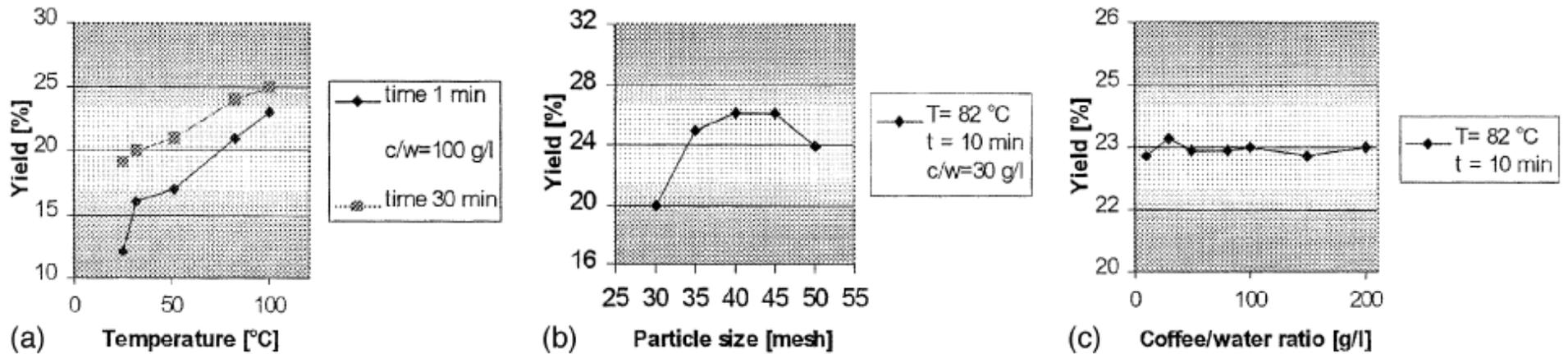
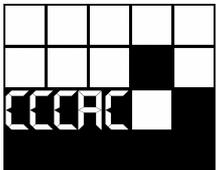


Fig. 7.1 Extraction yield as a function of the main brewing variables: (a) temperature, (b) grinding, (c) brewing formula (constant blend).



Theory

Table 7.3 Brew concentration and extraction yield by different brewing methods (after Peters, 1991).

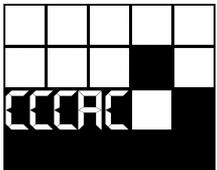
Brewing method ¹	Total solids in brew (g/l)	Extraction yield (%)
Boiled	13.0	26.9
Percolator	10.9	25.5
Filter	13.0	30.4
<i>Napoletana</i>	26.9	29.6
Plunger	14.2	23.9
<i>Moka</i>	41.1	31.9
<i>Espresso</i>	52.5	24.2

¹ Coffee/water ratio and brewing temperature according to method, constant blend.

Table 7.4 Insoluble solid content (fines) in different brewing methods (after Peters, 1991).

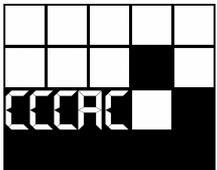
Brewing method	Fines in brew (g/l)	Fines/total solids ratio (%)
Boiled	2.04	15.7
Percolator	0.22	2.0
Filter	0.07	0.5
<i>Napoletana</i>	1.71	6.3
Plunger	1.06	7.5
<i>Moka</i>	1.10	2.7

Chapter 7, Coffee: Recent Developments, M. Petracco
DOI:10.1002/9780470690499



Practice V60/Filter

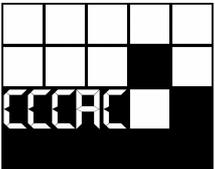
- @t+0s Presaturate with 2x coffee mass in water (blooming process)
- @t+30s Add 25% water into mass
- Pulse to maintain temperature and water amount
- @t+160s End extraction
- Pre-heat & pre-rinse, presaturate (15 sec)
- 100g/m², 20µm filament filter paper
- 86-94°C, dependent on roast (lighter==hotter)
- 21g : 360g or 30g:500g coffee:water



coffee.sh

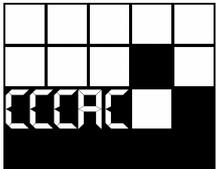
```
bader@antaeus:~$ curl -i -H "Content-Type: application/json" -X BREW -d  
'{"bean-type": "GAIA"}' http://localhost:5000/pot
```

```
HTTP/1.0 200 OK Brew in Progress  
Content-Type: text/html; charset=utf-8  
Server: covfefemat/0.01 Python/3.5.3  
ETag: "d41d8cd98f00b204e9800998ecf8427e"  
Content-Length: 0  
Date: Wed, 30 May 2018 09:41:34 GMT
```



TODO

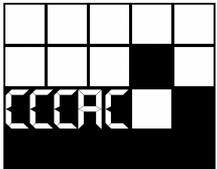
- Fully automate process (grind, brew, etc)
- Temperature and flow control
- Implementation of SSL/TLS/*
- More



Conclusion

I have too much time on my hands

∪_(ツ)_∪



Cheers

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Github: @BaderSZ

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