Pi in the SCD Cloud

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Internet of Things

Emma's Toaster
@Toasty

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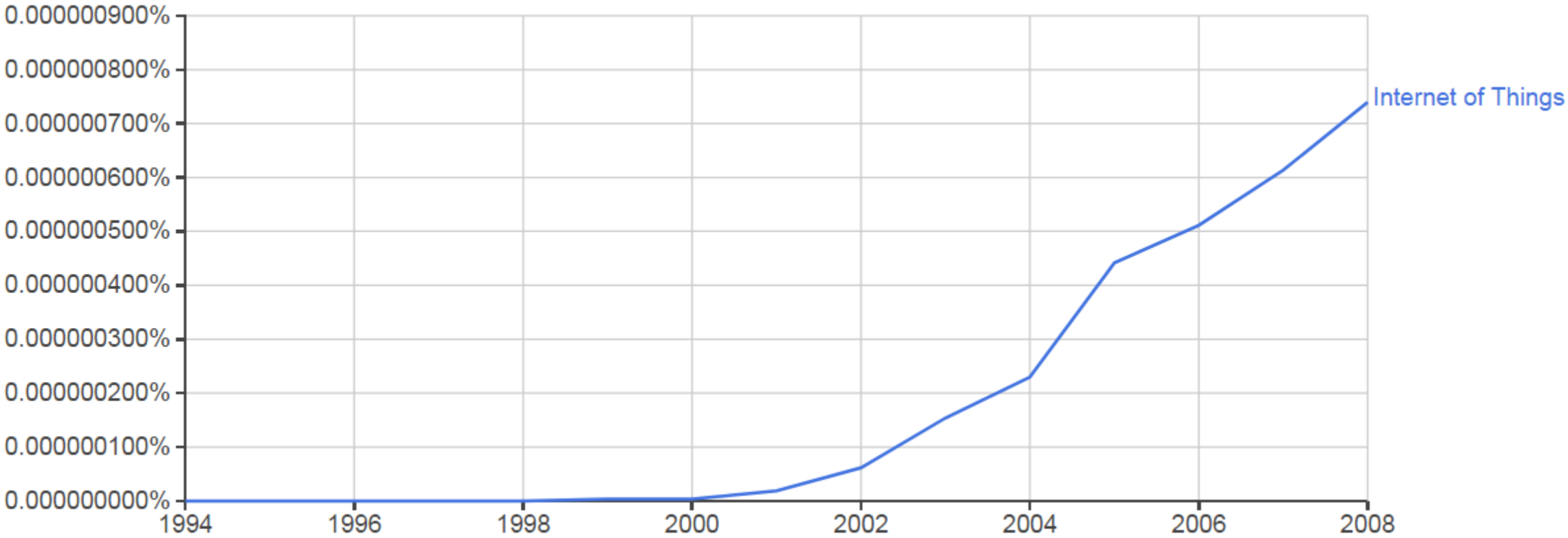
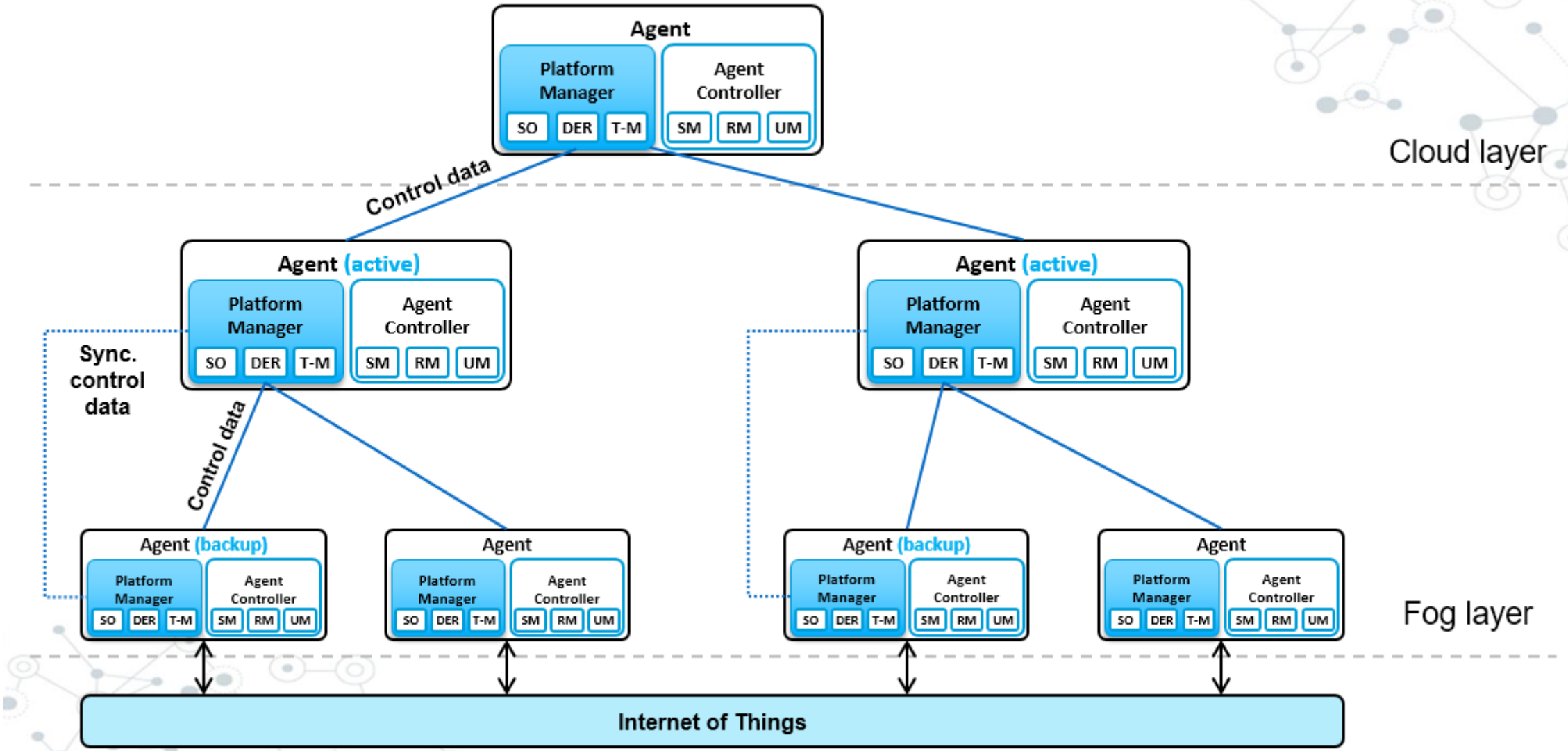
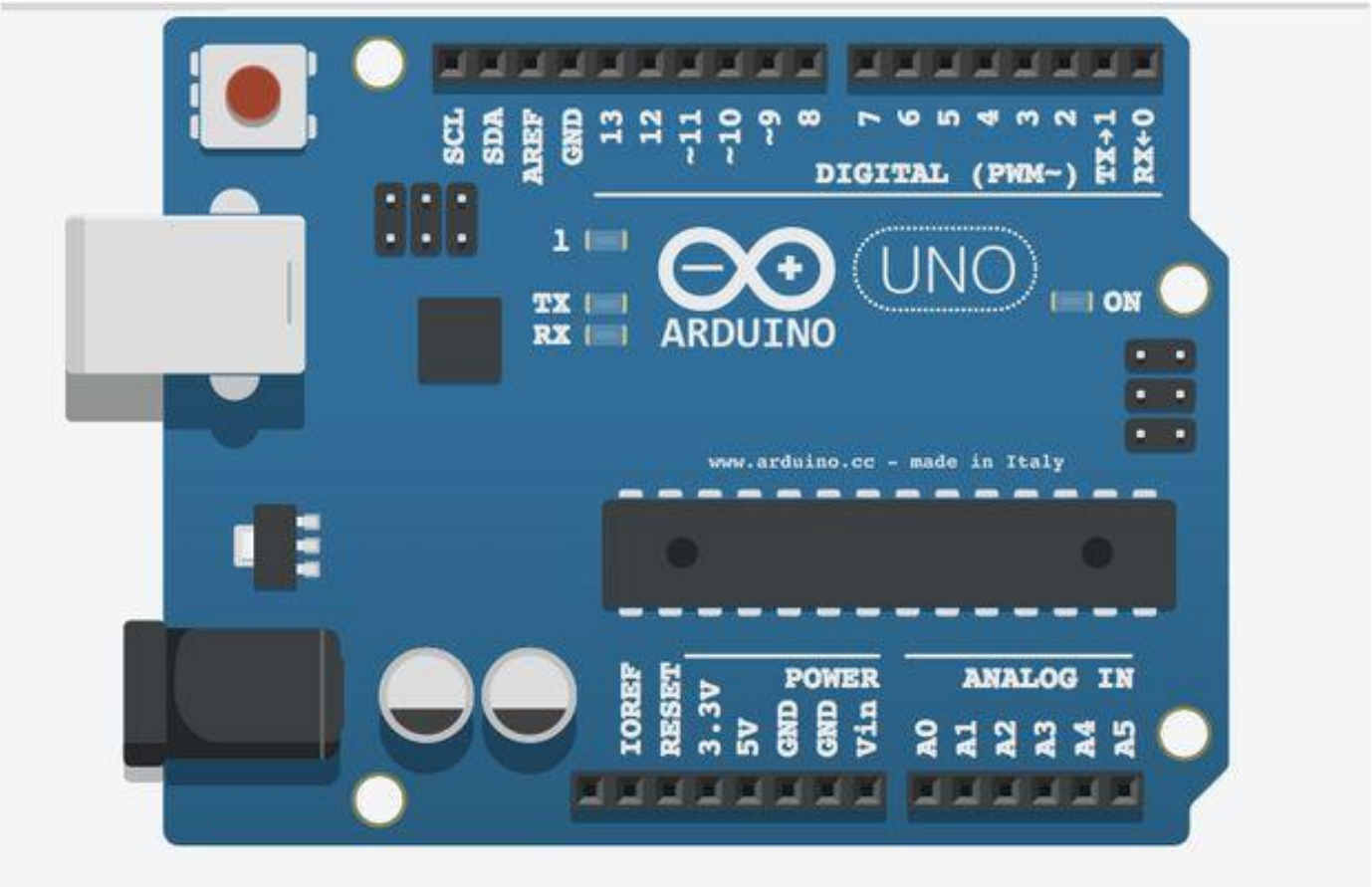


mF2C Architecture

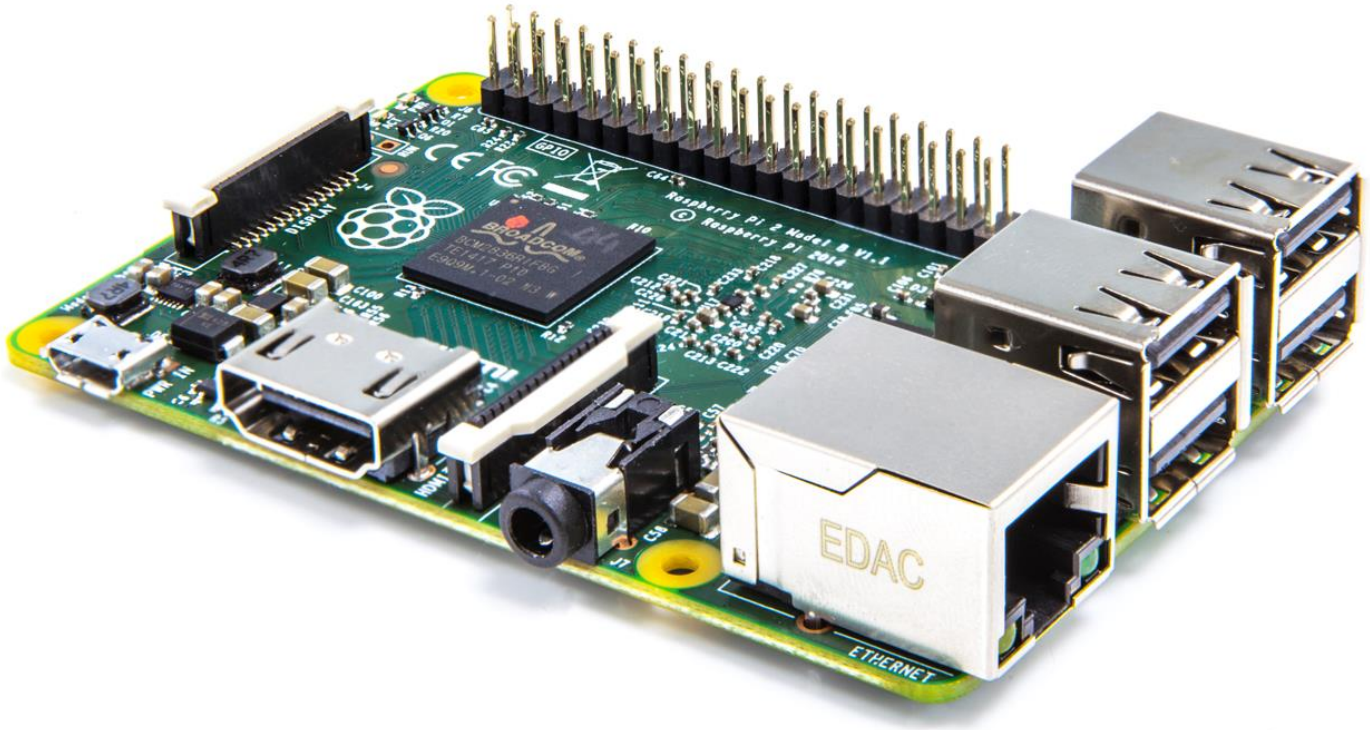


Edge devices: Arduino



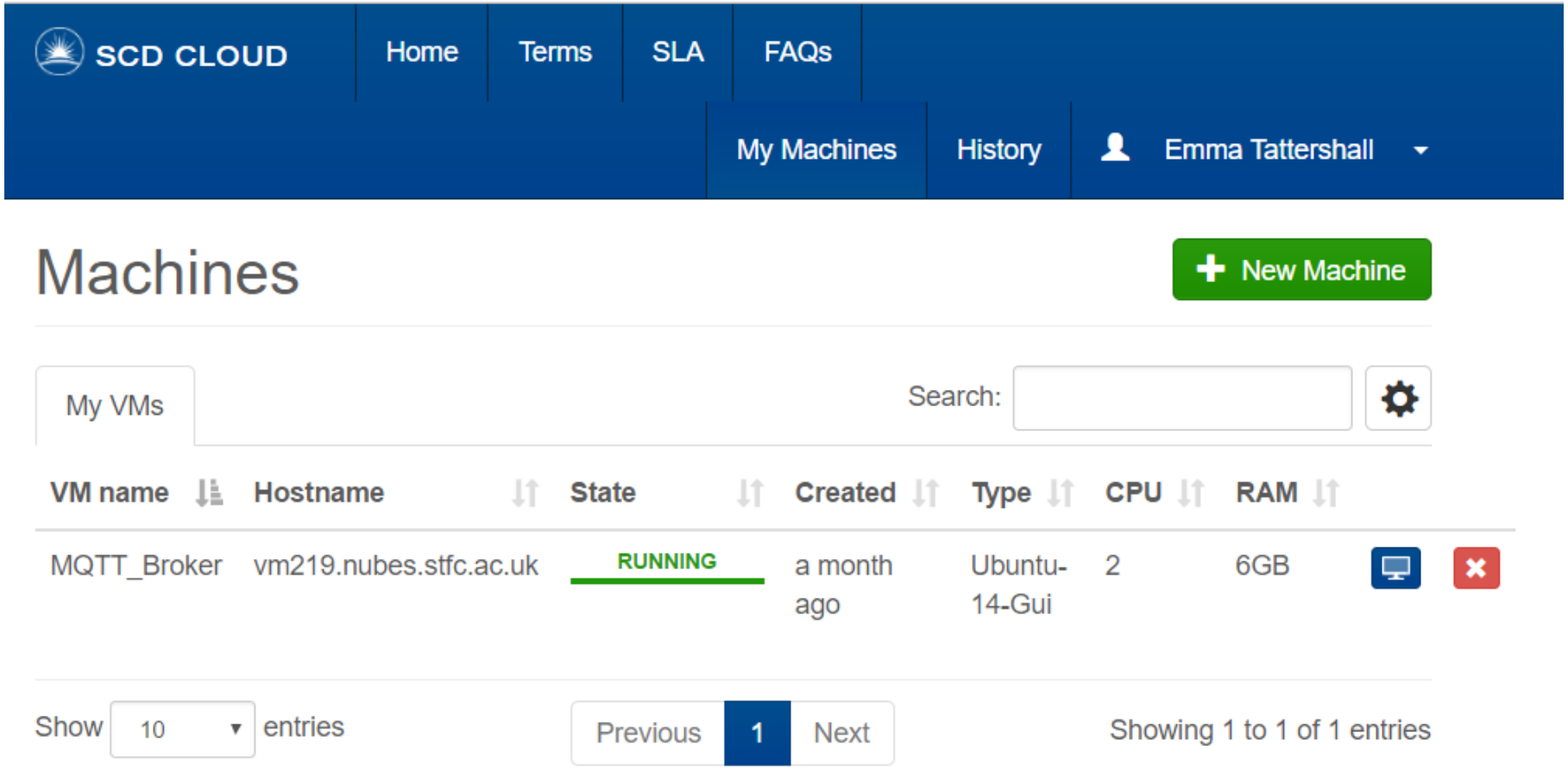
- ~ £20
- No operating system
- 14 digital input/output pins
- 6 analog outputs

Smart Agents: Raspberry Pi



- ~ £40
- 1 GB RAM
- Bluetooth, Wifi & Ethernet built in

The Cloud


SCD CLOUD
Home
Terms
SLA
FAQs
My Machines
History
Emma Tattershall
Machines
New Machine
My VMs
Search:
VM name
Hostname
State
Created
Type
CPU
RAM
MQTT_Broker
vm219.nubes.stfc.ac.uk
RUNNING
a month ago
Ubuntu-14-Gui
2
6GB
Show 10 entries
Previous
1
Next
Showing 1 to 1 of 1 entries

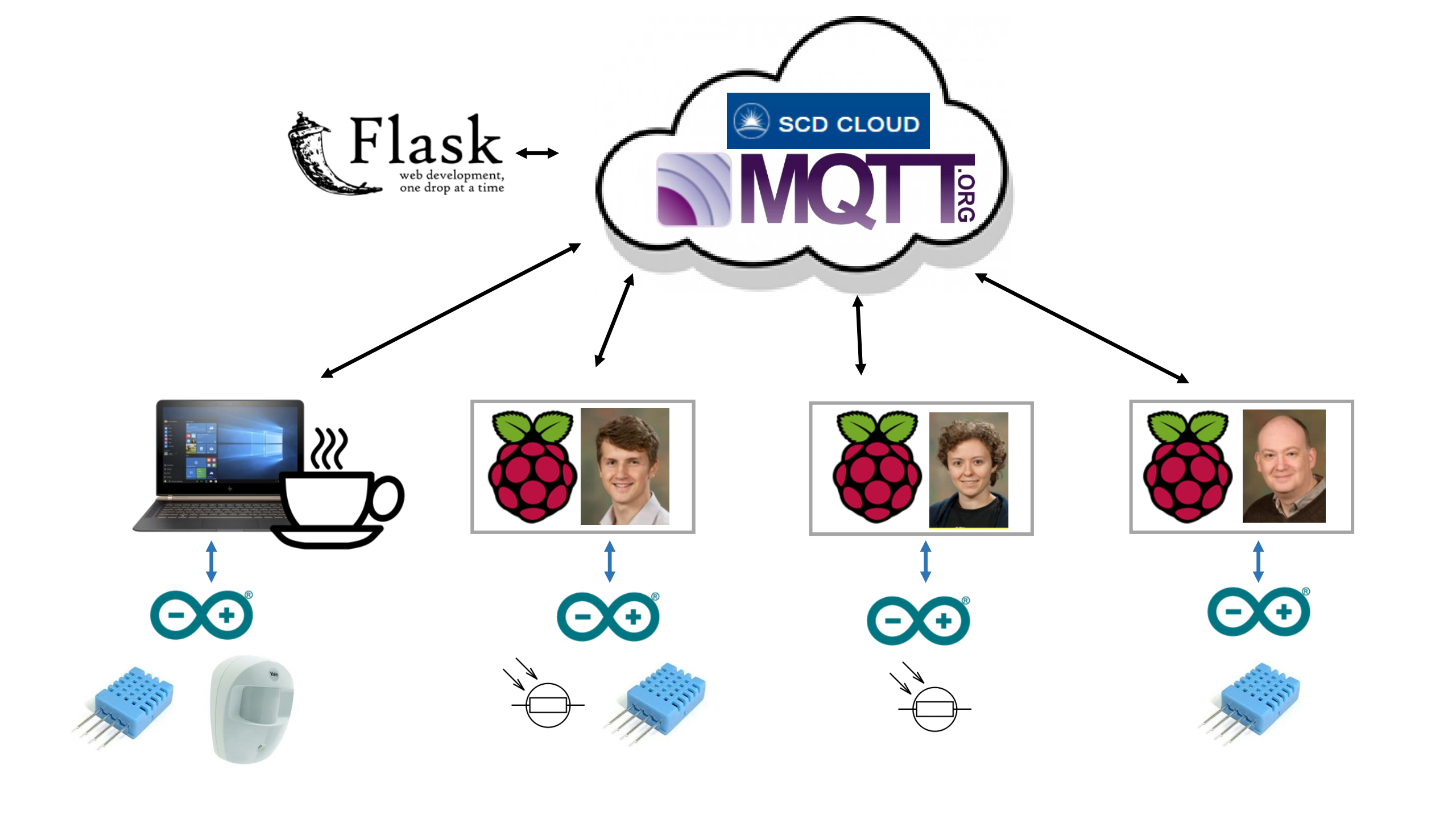
Protocol: MQTT

- Message Queue Telemetry Transport
- Lightweight message protocol designed for internet of things systems

Quality of service levels:

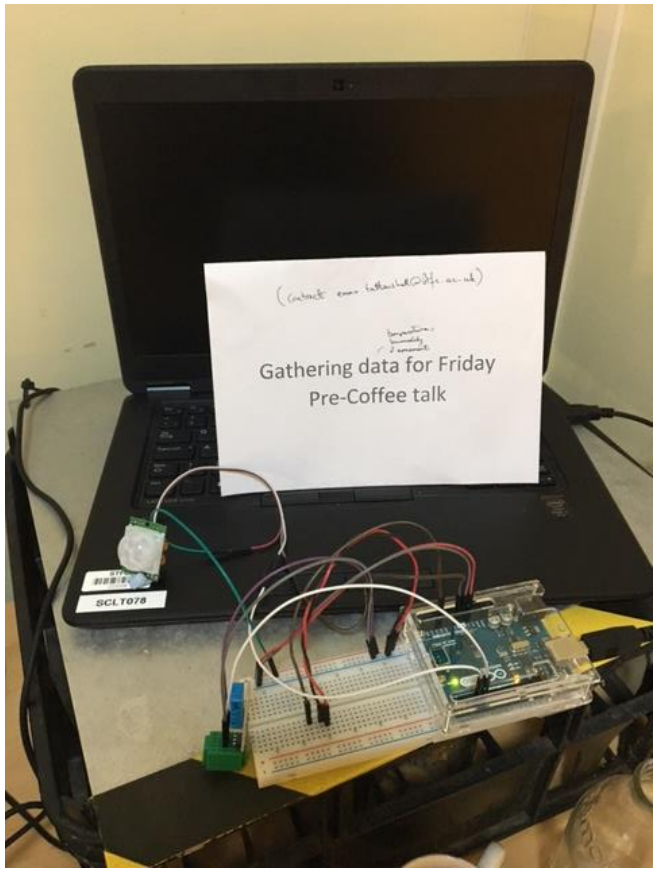
1. At most once
2. At least once
3. Exactly once

- Used by Facebook messenger


Flask
web development,
one drop at a time
SCD CLOUD
MQTT.ORG

The experiment: Sensors

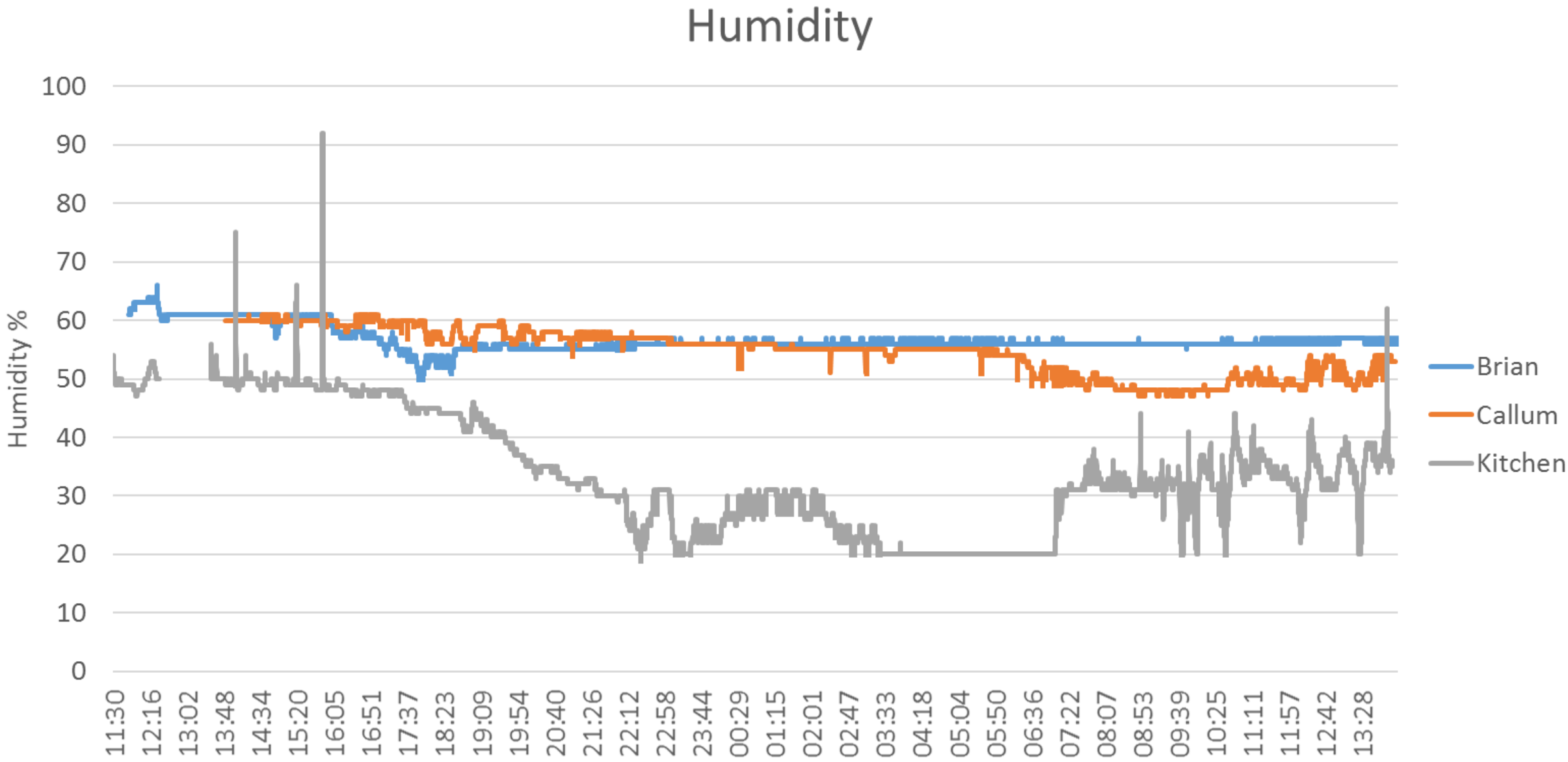
On Emma's desk – light dependent resistor

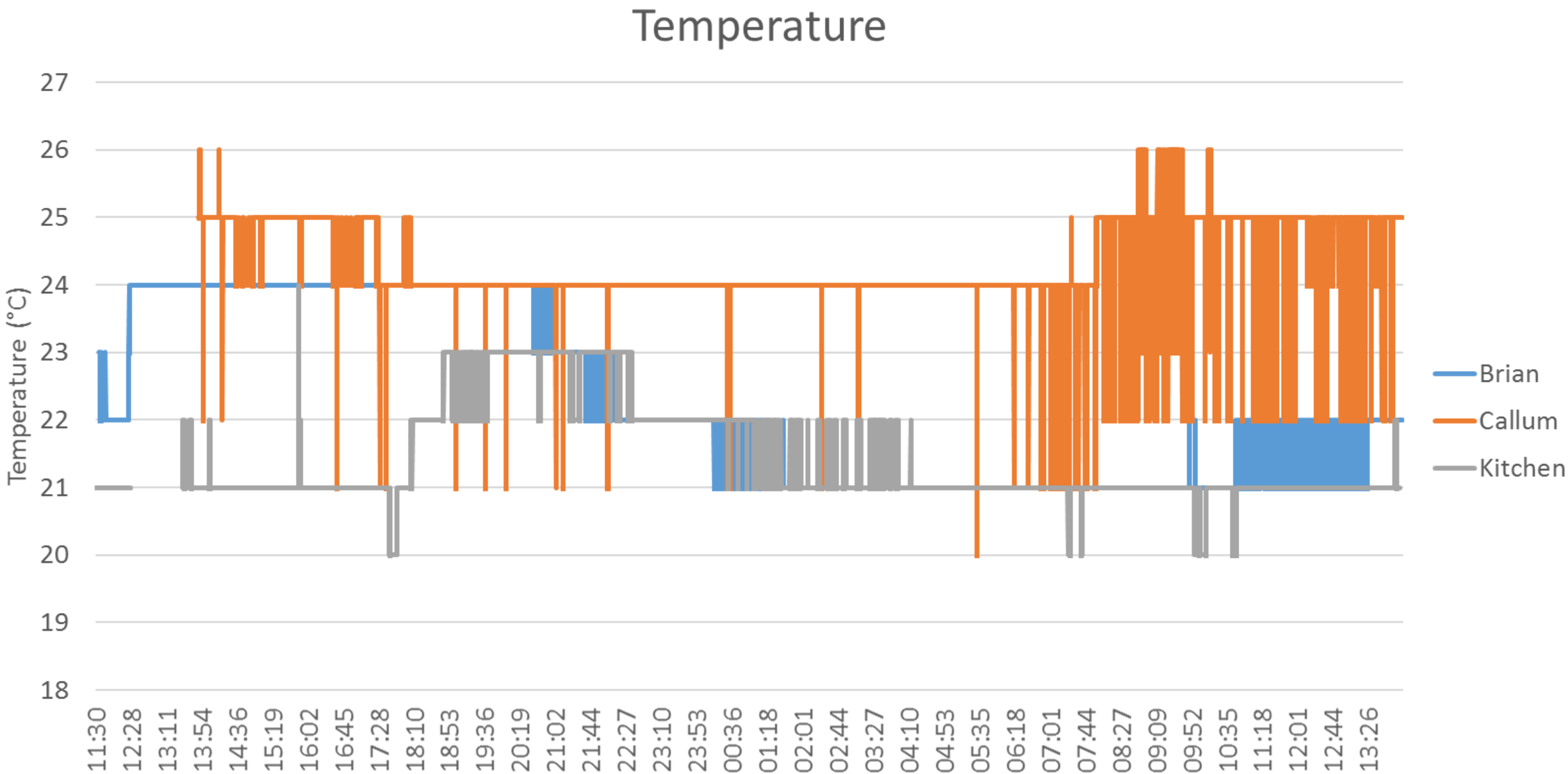


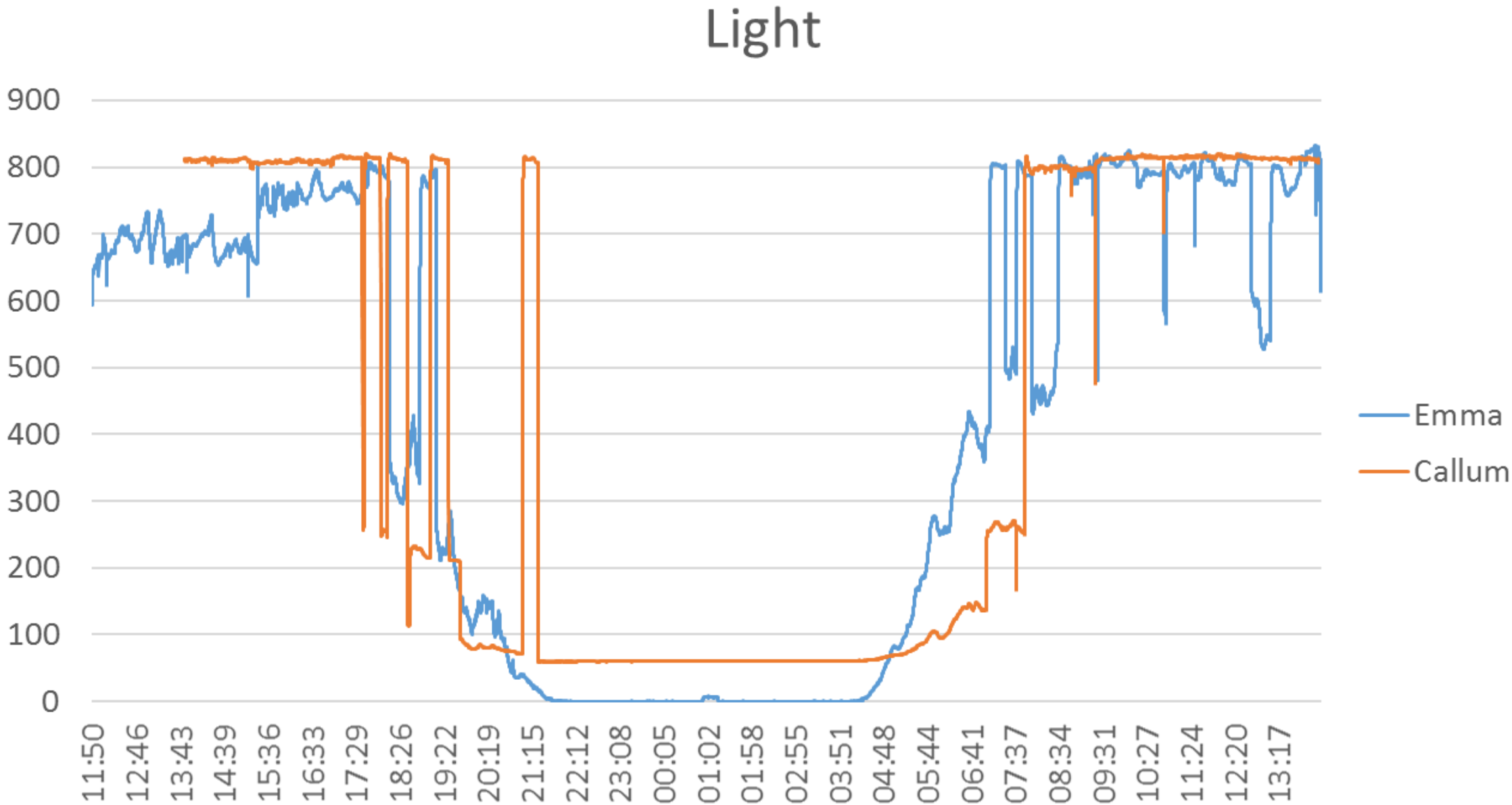
In the coffee room – humidity/temperature sensor and infrared (movement) detector

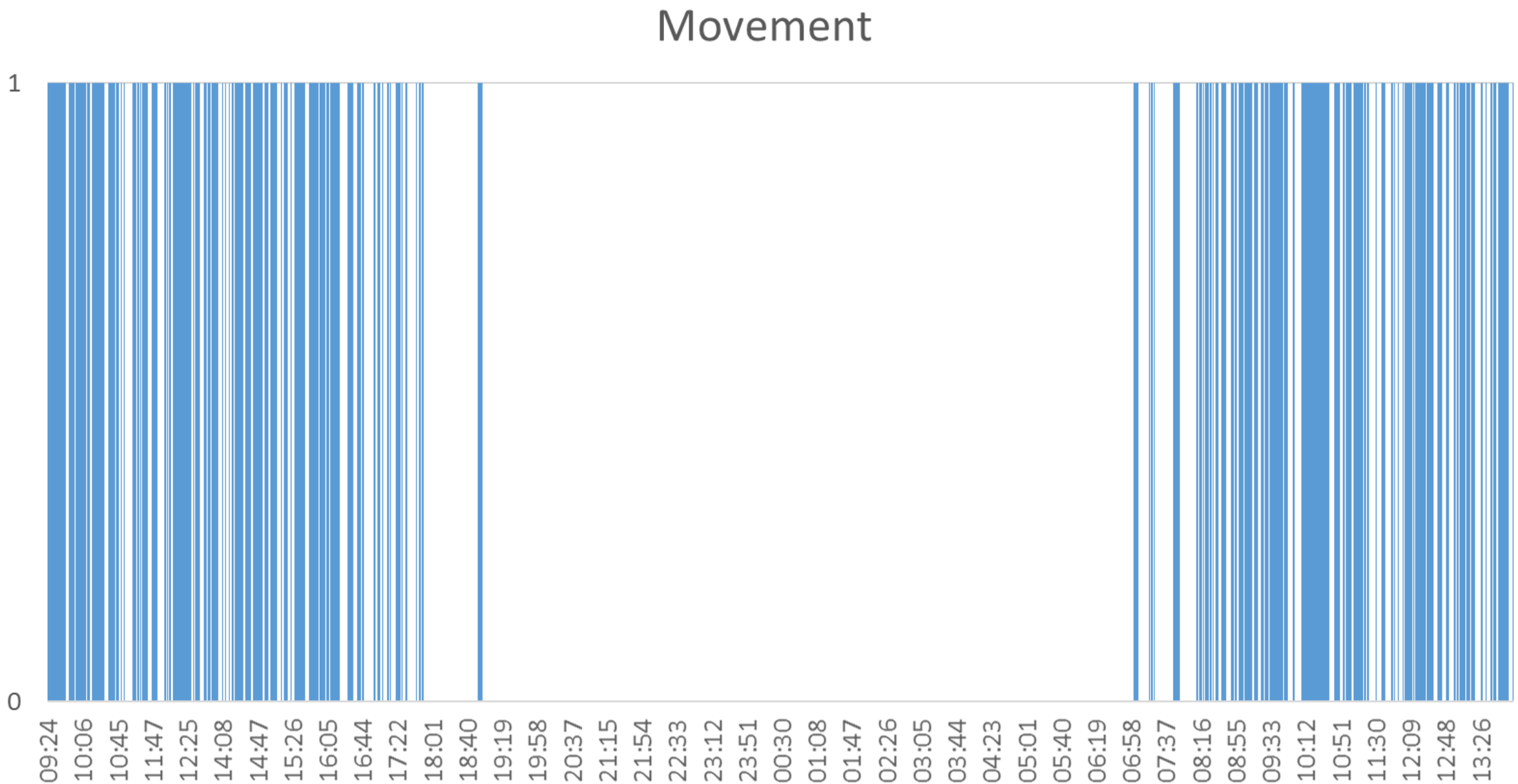
Live website demo

http://vm219.nubes.stfc.ac.uk:5000/


Humidity
Humidity %
100
90
80
70
60
50
40
30
20
10
0
11:30
12:16
13:02
13:48
14:34
15:20
16:05
16:51
17:37
18:23
19:09
19:54
20:40
21:26
22:12
22:58
23:44
00:29
01:15
02:01
02:47
03:33
04:18
05:04
05:50
06:36
07:22
08:07
08:53
09:39
10:25
11:11
11:57
12:42
13:28
Brian
Callum
Kitchen


Temperature
Temperature (°C)
27
26
25
24
23
22
21
20
19
18
11:30
12:28
13:11
13:54
14:36
15:19
16:02
16:45
17:28
18:10
18:53
19:36
20:19
21:02
21:44
22:27
23:10
23:53
00:36
01:18
02:01
02:44
03:27
04:10
04:53
05:35
06:18
07:01
07:44
08:27
09:09
09:52
10:35
11:18
12:01
12:44
13:26
Brian
Callum
Kitchen


Light
900
800
700
600
500
400
300
200
100
0
11:50
12:46
13:43
14:39
15:36
16:33
17:29
18:26
19:22
20:19
21:15
22:12
23:08
00:05
01:02
01:58
02:55
03:51
04:48
05:44
06:41
07:37
08:34
09:31
10:27
11:24
12:20
13:17
Emma
Callum


Movement
1
0
09:24
10:06
10:45
11:47
12:25
14:08
14:47
15:26
16:05
16:44
17:22
18:01
18:40
19:19
19:58
20:37
21:15
21:54
22:33
23:12
23:51
00:30
01:08
01:47
02:26
03:05
03:44
04:23
05:01
05:40
06:19
06:58
07:37
08:16
08:55
09:33
10:12
10:51
11:30
12:09
12:48
13:26

Conclusion: is IoT useful?

- Fun at home (cat flap monitor, plant waterer)
- Investment, research area.
- Security is difficult to get right. Devices have low memory and bandwidth which makes it difficult to store and transmit long cryptographic keys.
- Low power, wide area mobile networks are becoming available for IoT devices.
- Fad, spyware, or key technology of the future?