

GIX IoT Network

Connecting students in unique and innovative ways

What has been accomplished so far

- Local control (only accessible by devices on home Wi-Fi)
 - Using the simple ESPHome flasher we can enable the servo to work right after plugging sensors in.
 - Easily modifiable file to work with the plethora of components and devices on ESPHome
 - (e.g. lightning sensor, bluetooth temp/humidity displays, plant sensors, etc.)

```
# three commands to flash the software
git clone git@github.com:codycodes/gix-mkrfridays-iot.git
./install.sh
./run.sh
```

// Photo by Paweł Czerwiński on Unsplash

terrasse Web Server

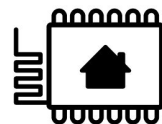
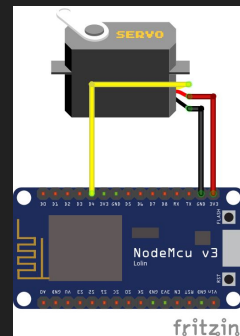
States

Name	State	Actions
Terrasse Wind	0.00 pulses/min	
Terrasse Regen	0.00 pulses/min	
Terrasse Temperatur	46.1 °C	
Terrasse Neustart	OFF	Toggle
Terrasse Status	ON	

See [esphome:lib Web API](#) for REST API documentation

Debug Log

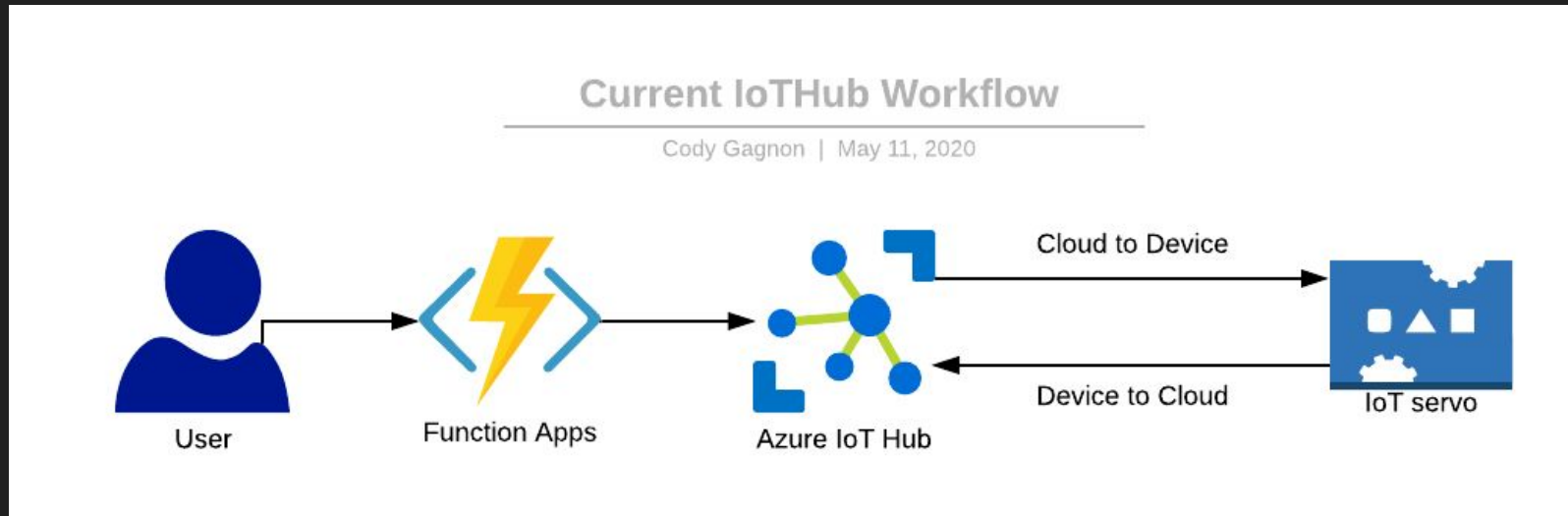
```
[V] (component:iset_linux0133): set_timeout(name="0x0146634074FF72D", timeout=750)
[D] (sensor.pulse_counter_value:125): 0: Retrieved counter (raw=0): 0.00 pulses/min
[V] (sensor.sensorpush_new_value:22): "Terrasse Wind": Received new value 0.000000
[V] (sensor.sensorpush_new_value:28): "Terrasse Wind": Filter 0: aborted chain
[D] (sensor.pulse_counter_value:125): 1: Retrieved counter (raw=0): 0.00 pulses/min
[V] (sensor.sensorpush_new_value:22): "Terrasse Regen": Received new value 0.000000
[V] (sensor.sensorpush_new_value:28): "Terrasse Regen": Filter 0: aborted chain
[D] (sensor.dallasoperator1:127): "Terrasse Temperatur": Got Temperature=44.9°C
[V] (sensor.sensorpush_new_value:22): "Terrasse Temperatur": Received new value 44.937500
[V] (sensor.sensorpush_new_value:28): "Terrasse Temperatur": Filter 0: aborted chain
```



ESPHome

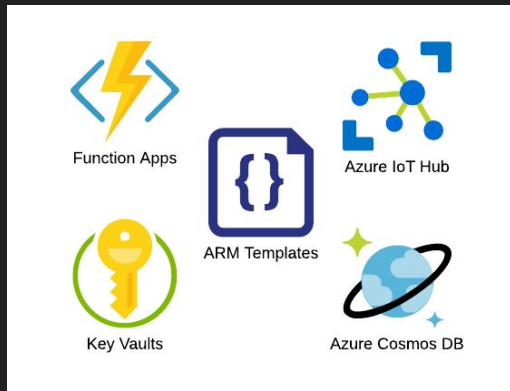
What has been accomplished so far (cont'd)

- Cloud via Azure IoT Hub
 - Steps to get Arduino flashed which are partially documented but can be fully documented!
 - Depending on time, potentially fully automated.
 - Setup of other Arduino sensors/devices possible, but no data “streaming”
 - Max 8,000 messages a day on our network



High Level: Our cloud technologies

- IoT Hub allows our devices an interface to connect to/from Azure from anywhere with an Internet connection
- Function apps are “serverless code” which allows us to write only the code users interact with without having to manage the server
 - No need to worry about things like downtime
 - It's cheap af
- Key Vaults allow us to store secrets for our code in a secured configuration so they don't accidentally get exposed
- Cosmos DB allows us to store the “state” of our users so we can make decisions based on devices
 - E.g. don't allow a device to get spammed



Estimated costs

- IoT Hub - Free Tier up to 8,000 messages/month
- Key Vault
 - Depending on number of operations, but .03 cents per 10,000 operations
- Function Apps
 - Free for a million 30 second runs a month
- Cosmos DB
 - Now has a free tier - Applies a \$24/month discount making it free for 5GB storage and 400 RU/s <https://bit.ly/3dFplcV>
- Total cost: about \$1 or less/month if stay within generous limits
 - If the Cosmos DB cost is fully discounted for free tier, then only Key Vault -> \$ 0.03/month
 - <https://bit.ly/2YTM54w>



Where can we go? Some ideas...

- Teams
 - Create a bot which can notify people via IoT
 - Use Teams as a secondary interface to chat in when you say hi
- Voice
 - Use Alexa to say “hi” to a random or specific cohort member
- Automation
 - IFTTT allows many services/devices to trigger IoT
 - if there's a new disease outbreak from the WHO, then squawk the Porg.



IFTTT

Next Steps

-  MKRSPC needs an Azure account to host this infrastructure
-  More CRW working on different functions for this project:
 - Access control
 - Ensuring students aren't spammed and pricing limits aren't breached
 - General
 - IaC, or Infrastructure as Code
 - Deployable for our cohort and future cohorts
 - Open-source efforts
 - Innovation
 - New ways to connect and interact
 - Sensors
 - Devices
 - Integrations
 - Platforms
 - Interfaces