

# Weather Hub

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# The Idea

Control the climate system through Home Assistant

Monitor Weather

Manage multiple properties, all concentrated in one place

Easily done with Weather Hub.



Track Weather



Get Notified on  
Extreme  
Weather  
Conditions



Activate Home  
Assistant  
Automations  
Remotely



Set Activity  
Hours for Air  
Conditioning



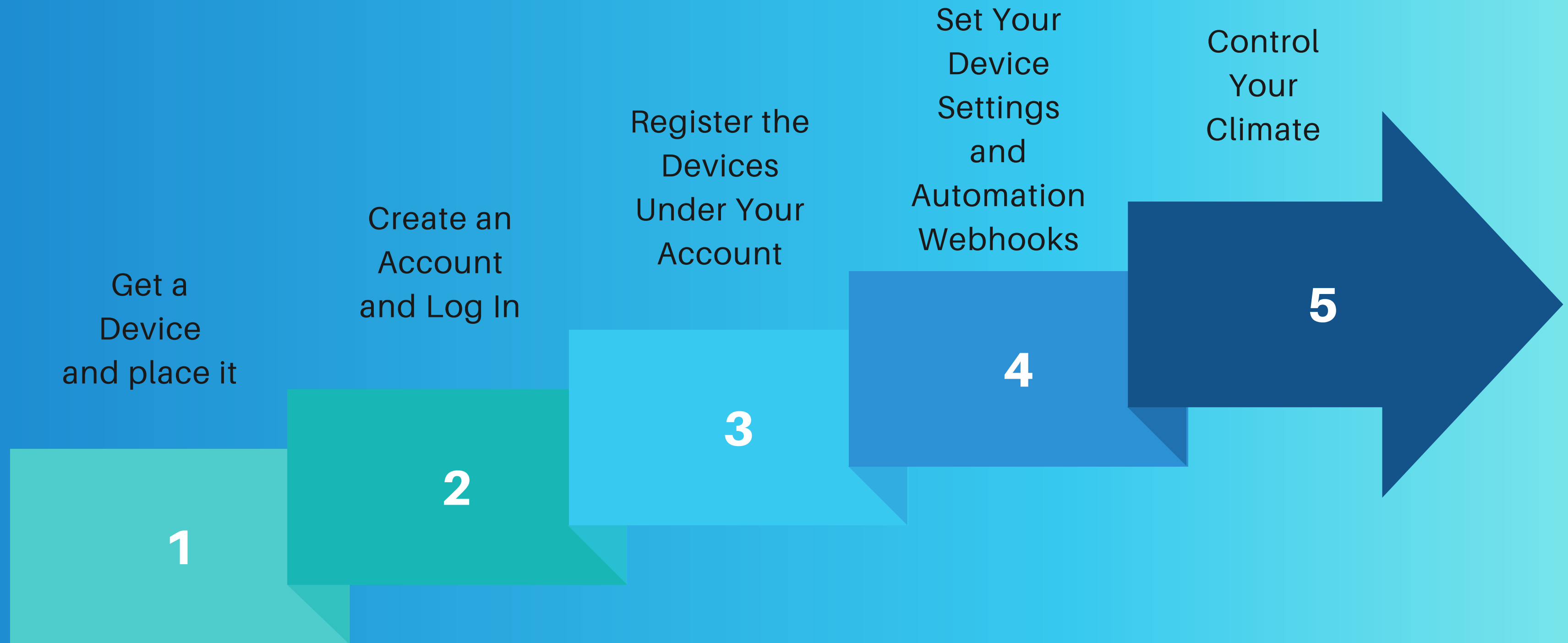
Save energy!

# FEATURES

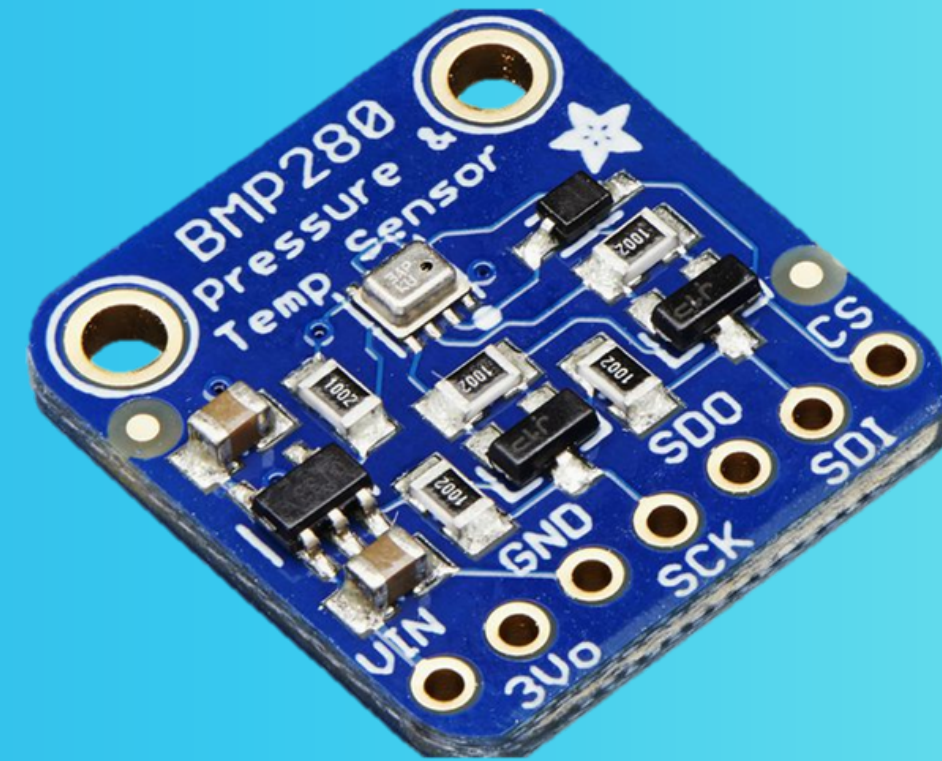
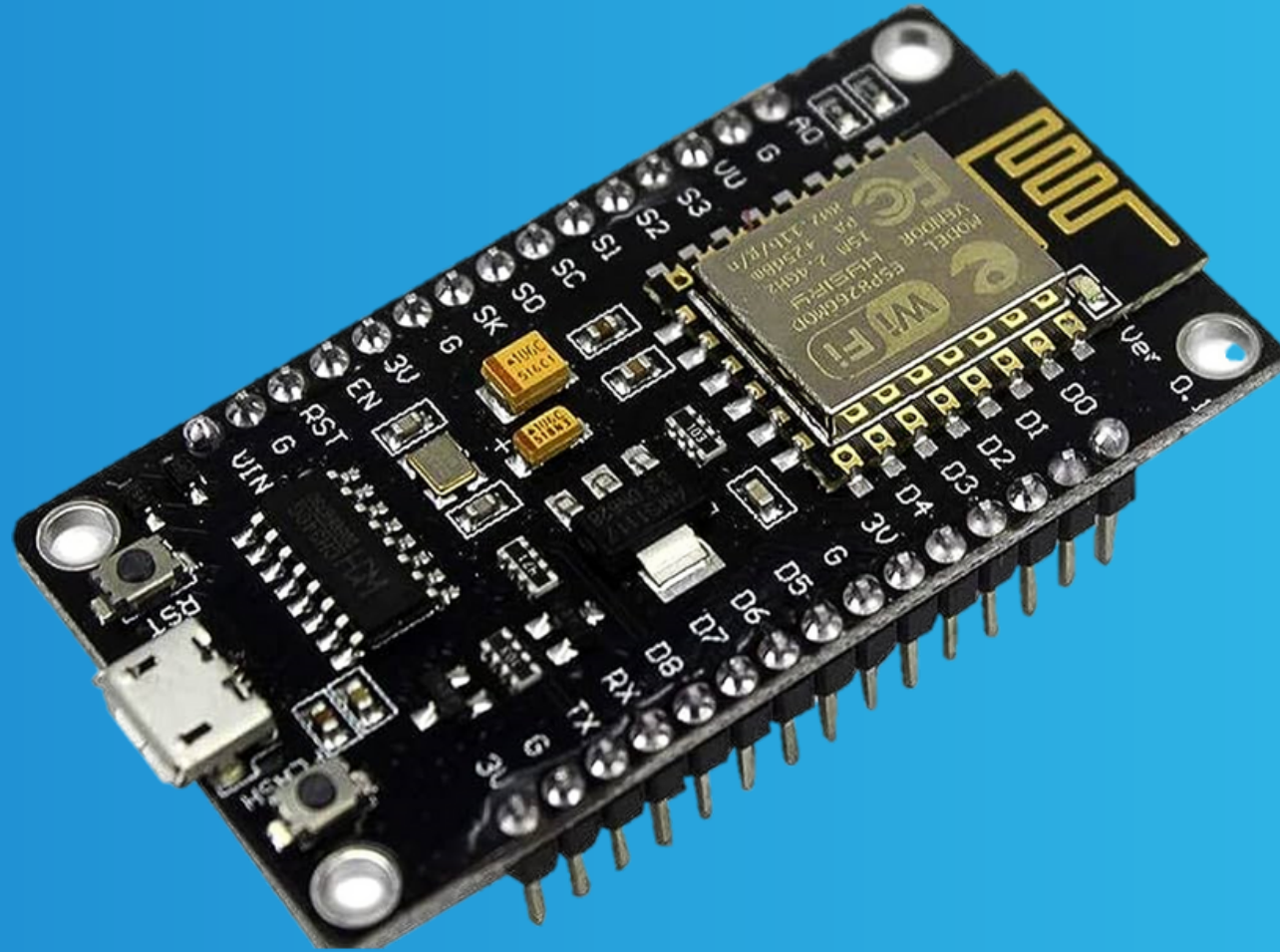
What Can Weather Hub do ?

# HOW IT WORKS

The User's Experience



# The Device



- ESP8266 Board (With WiFi Antenna).
- BMP280 Temperature and Air Pressure measure.



# Cloud Services Used

## Azure IoT Hub

- For managing cloud to device messages.



## Azure signalR Service

- For syncing the information received on the app with the information stored on the cloud. Received immediate notification on extreme conditions measured by the device.



## Azure Storage : Data Tables

- For storing data.





# Cloud Services Used

## Azure Functions

- HTTP Trigger
  - For activating most of the functions
- Event Grid Trigger
  - For activating an automation through another function.
- Timer Trigger
  - For supporting the automatically managed AC activity hours.





# Cloud Services Used

## Event Grid

- An Event Grid topic to activate an azure function.



## Azure Maps

- Getting coordinates for given address, and getting current weather conditions at said coordinates.

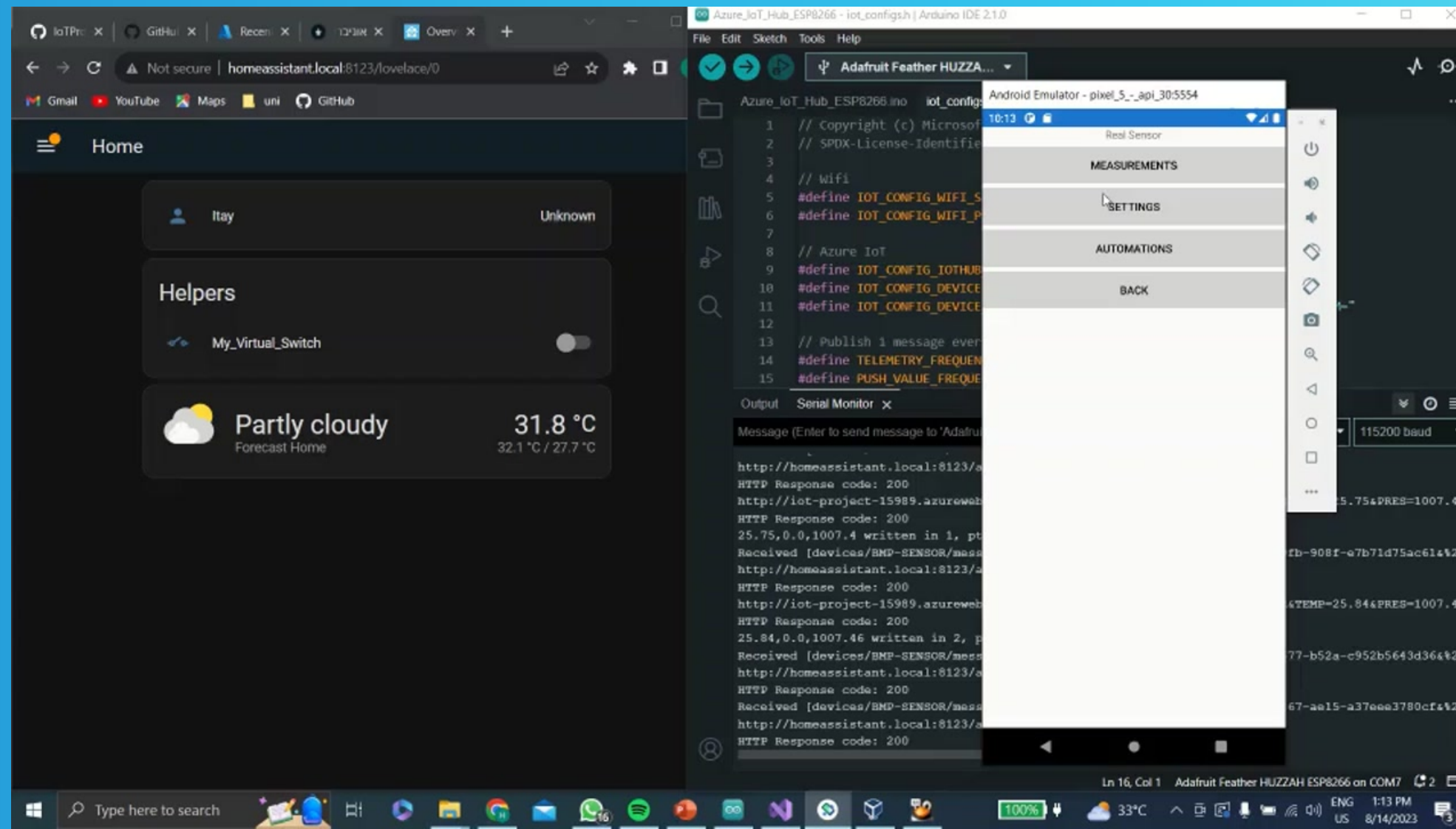




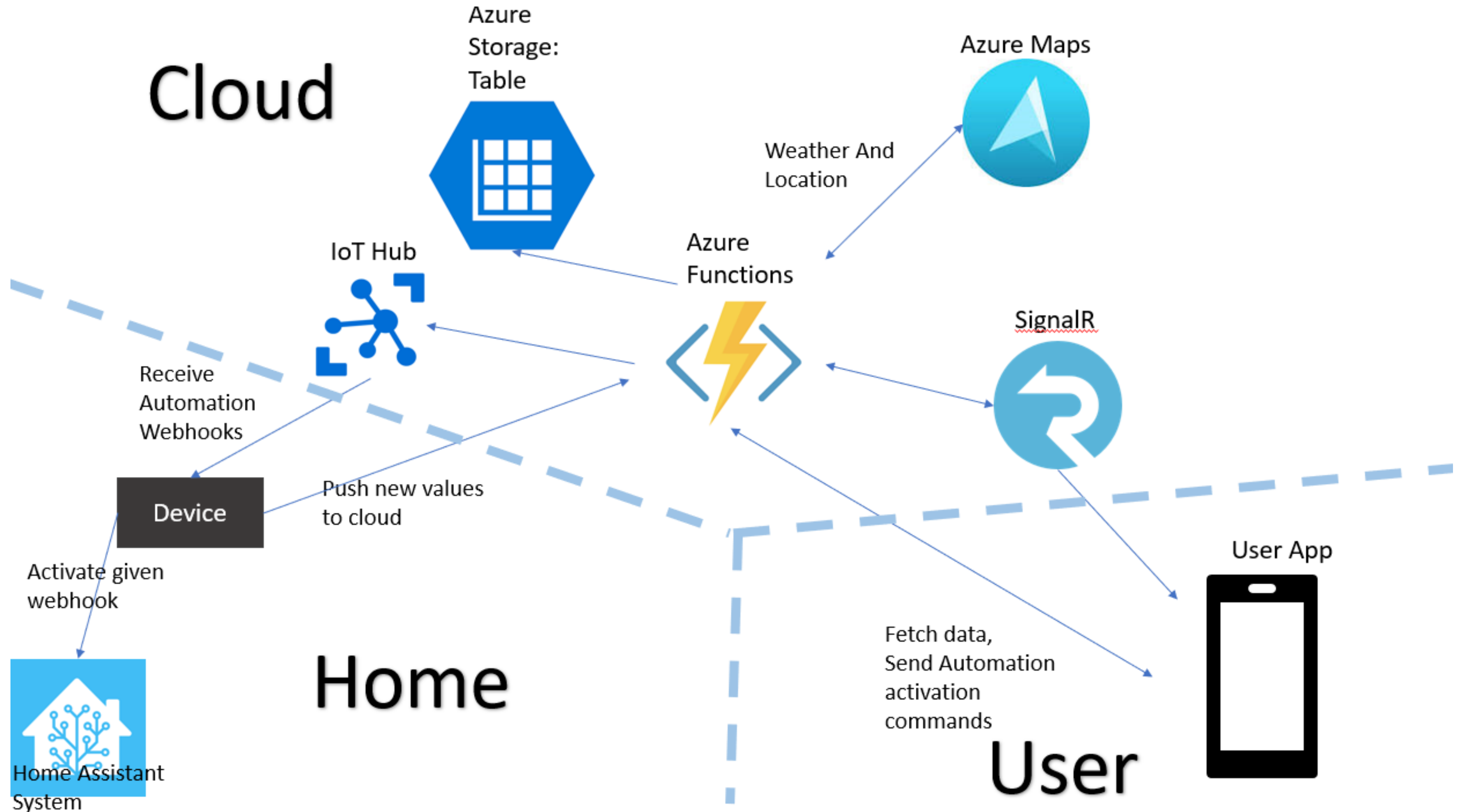
# Managing Climate

Managing your property climate is done through communicating with a home assistant system.

Home Assistant features a service which runs automations through an HTTP request on your local WiFi Network (Webhook triggered automations)



# Architecture



# Setting Activity Hours

The screenshot displays a desktop environment with three main windows:

- Android Emulator (pixel\_5\_api\_30.5554):** Shows a mobile app interface with a 'LOG OUT' button, a green 'Add' button, and a 'Sensors' section. The sensors listed are 'Stone', 'Airbnb 1', 'Real Sensor', and 'Private Condo'.
- Web Dashboard:** Displays a temperature reading of 32.1 °C and a status of 'Unknown'.
- Arduino IDE (Azure\_IoT\_Hub\_ESP8266 - iot\_configs.h):** Shows the configuration file for the ESP8266 module. The code includes comments and defines for WiFi, Azure IoT, and telemetry frequency.

**Arduino IDE Code (iot\_configs.h):**

```
1 // Copyright (c) Microsoft Corporation. All rights reserved.  
2 // SPDX-License-Identifier: MIT  
3  
4 // Wifi  
5 #define IOT_CONFIG_WIFI_SSID "benny-decco"  
6 #define IOT_CONFIG_WIFI_PASSWORD "18861968"  
7  
8 // Azure IoT  
9 #define IOT_CONFIG_IOTHUB_FQDN "IoT-Project-15989-hub.azure-devices.net"  
10 #define IOT_CONFIG_DEVICE_ID "BMP-SENSOR"  
11 #define IOT_CONFIG_DEVICE_KEY "3hxHlgR77zEe6nRbJvYoEA6KFJRjqcsDCh14ApKmR2M="  
12  
13 // Publish 1 message every 2 seconds  
14 #define TELEMETRY_FREQUENCY_MILLISECS 2000  
15 #define PUSH_VALUE_FREQUENCY (10 * 60 * 1000)
```

**Serial Monitor Output:**

```
connected with benny-decco, channel 8  
dhcp client start...  
....ip:192.168.68.108,mask:255.255.255.0,gw:192.168.68.1  
.Wifi connected, IP address: 192.168.68.108  
Setting time using NTPdone!  
Current time: Mon Aug 14 05:35:50 2023  
Client ID: BMP-SENSOR  
Username: IoT-Project-15989-hub.azure-devices.net/BMP-SENSOR/?api-version=2020-09-30&Device  
MQTT connecting ... connected.  
pm open,type:2 0  
http://iot-project-15989.azurewebsites.net/api/push_values?User=BMP-SENSOR&TEMP=25.71&PRES  
HTTP Response code: 200  
25.71,0.0,1007.38 written in 8, ptr is 9  
http://iot-project-15989.azurewebsites.net/api/push_values?User=BMP-SENSOR&TEMP=25.46&PRES  
HTTP Response code: 200  
25.46,0.0,1007.33 written in 9, ptr is 0
```

# Automatic Climate Managing

The image displays a multi-window desktop environment used for IoT development and monitoring.

- Home Assistant Web Interface:** The left window shows the Home Assistant dashboard at `homeassistant.local:8123/lovelace/0`. It features a 'Home' header, a user profile for 'Itay' with an 'Unknown' status, a 'Helpers' section with a 'My\_Virtual\_Switch' toggle, and a weather card for 'Partly cloudy' showing a temperature of **31.8 °C** and a forecast for 'Home' with a range of **32.1 °C / 27.7 °C**.
- Arduino IDE:** The middle window is the Arduino IDE 2.1.0, editing a sketch named `Azure_IoT_Hub_ESP8266.ino`. The code includes comments for copyright, license, and WiFi configuration, and defines macros for Azure IoT Hub connection and data publishing. The 'Serial Monitor' is open, showing a series of HTTP 200 responses and received messages from the device.
- Android Emulator:** The right window is an Android emulator for a 'pixel\_5' device. It displays a 'Real Sensor' app with a menu containing 'MEASUREMENTS', 'SETTINGS', 'AUTOMATIONS', and 'BACK'. The 'SETTINGS' option is currently selected.

The Windows taskbar at the bottom shows the system clock at 1:15 PM on 8/14/2023, with a battery level of 100% and a temperature of 33°C.

# Notification Demonstration

