STUDENT:
ALEKSA MITROVČAN

MENTOR:
IVAN MEZEI

REALIZACIJA IOT SISTEMA NA BAZI ESP32, INFLUXDB I GRAFANA PLATFORME

CONTENT

INTERNET OF THINGS

ESP32

SENSORS

INFLUXDB

GRAFANA

ALERTS

INTERNET OF THINGS

Internet of Things Uses By Industry

HOME
- Smart Temperature Control
- Optimized Energy Use

INDUSTRIAL
- Machine-to-Machine Communication
- Quality Control

AUTOMOTIVE
- Vehicle Auto-Diagnosis
- Optimized Traffic Flow
- Smart Parking

AGRICULTURE
- Offspring Care
- Crop Management
- Soil Analysis

MILITARY
- Situational Awareness
- Threat Analysis

MEDICAL
- Optimized Patient Care
- Wearable Fitness Devices
- Quality Data Reporting

ENVIRONMENTAL
- Forest Fire Detection
- Species Tracking
- Weather Prediction

RETAIL
- Theft Protection
- Inventory Control
- Focused Marketing

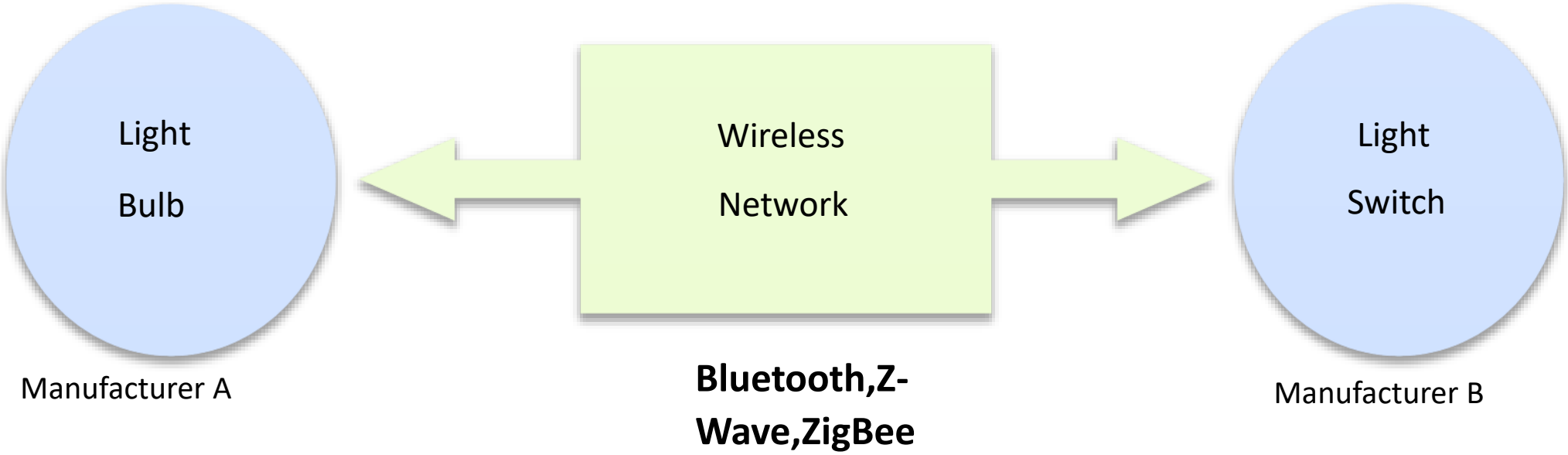
1982.

1989.

1991.

COMMUNICATION MODELS

Device-To-Device communication



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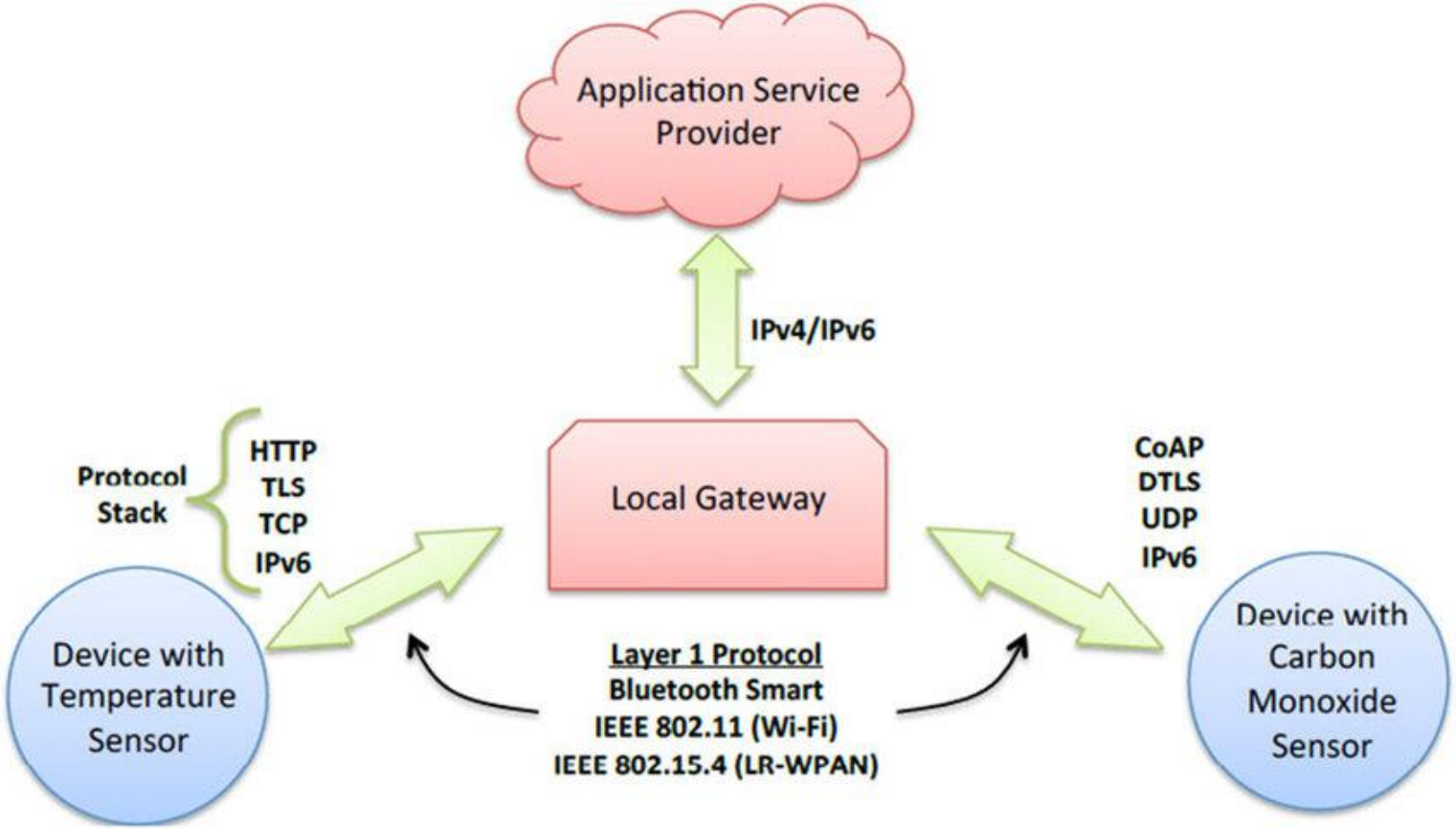
COMMUNICATION MODELS

Device-To-Cloud communication

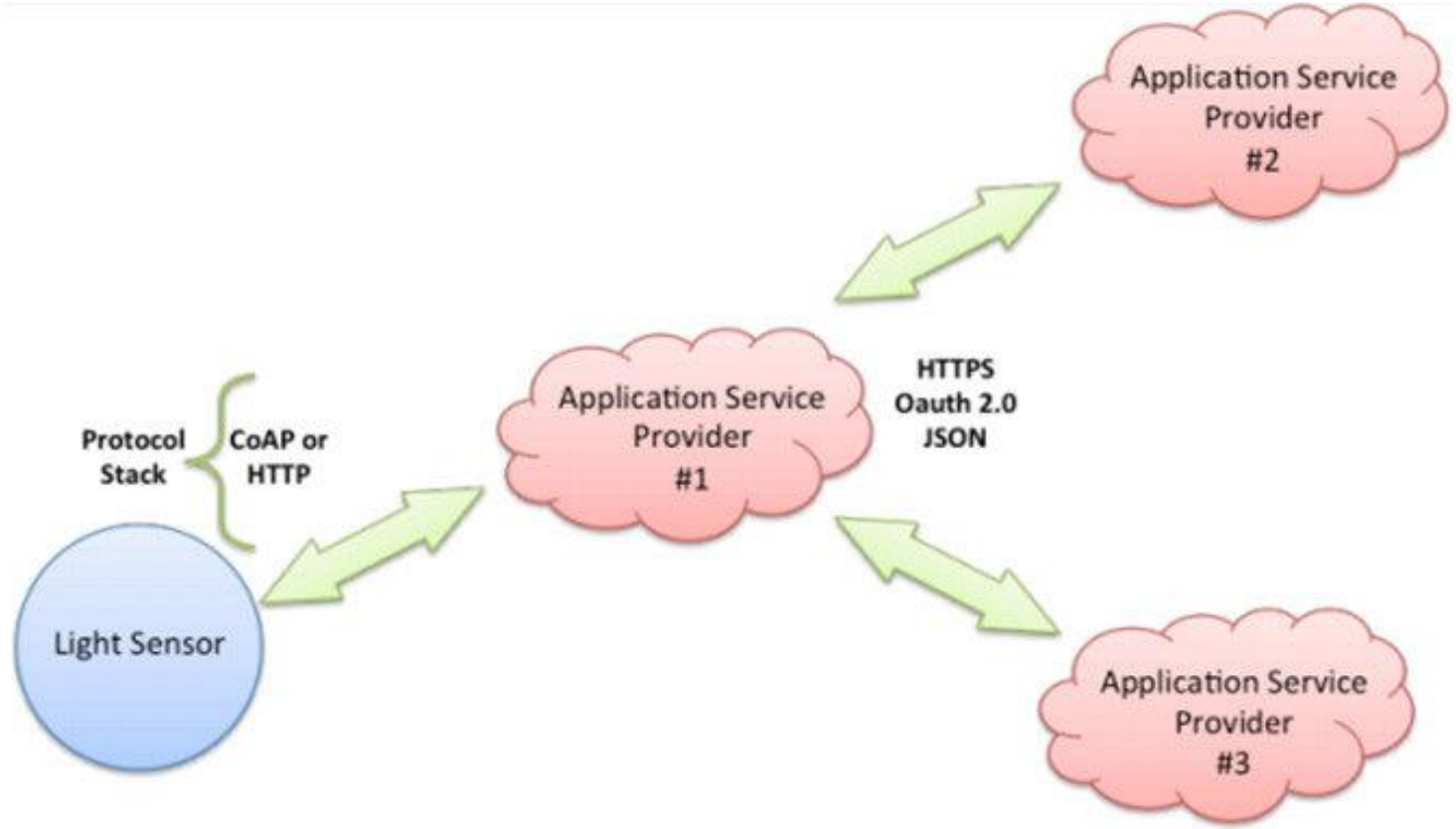
COMMUNICATION MODELS

Device-To-Gateway communication

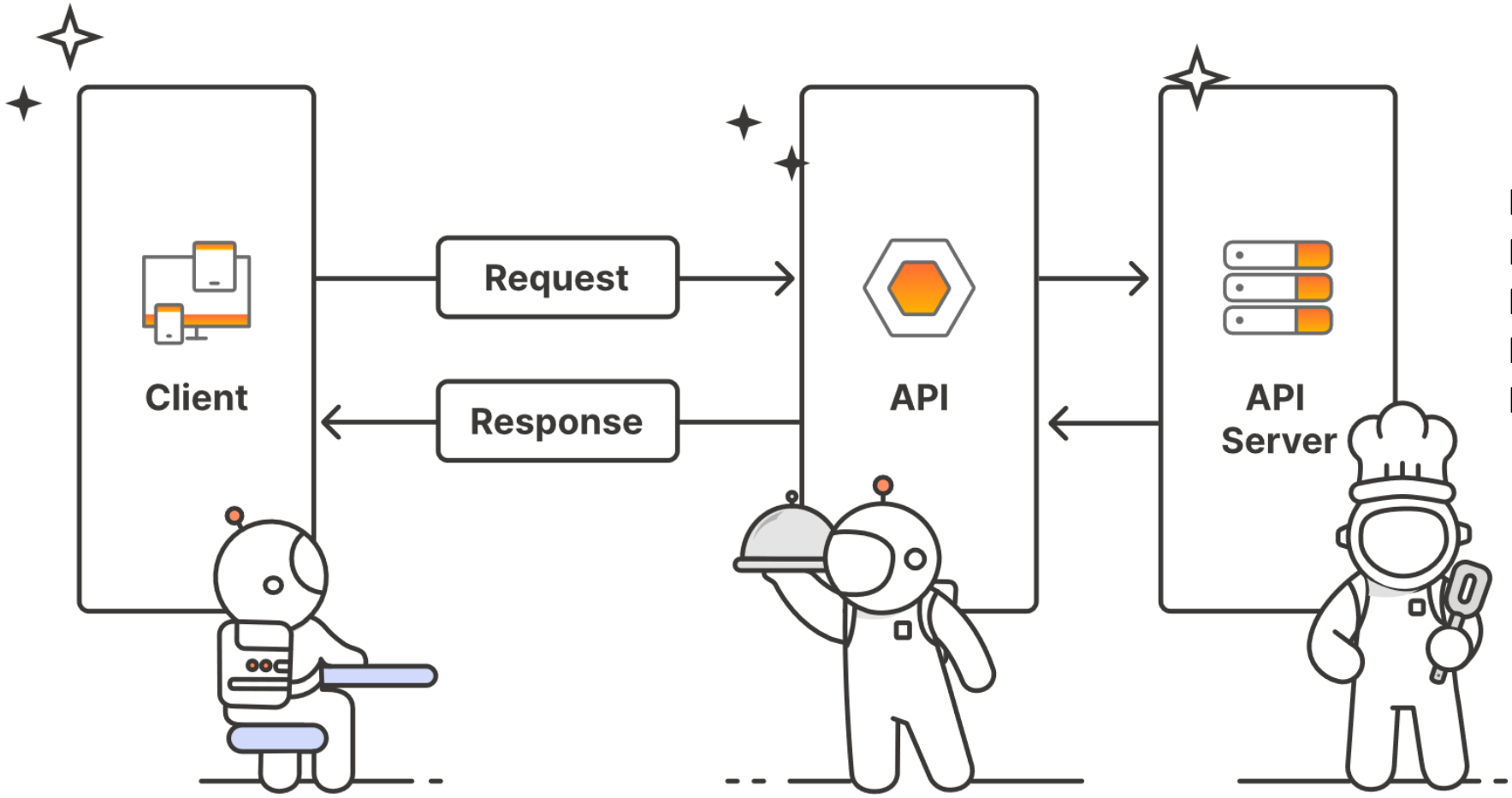


COMMUNICATION MODELS

Back-End-Data-Sharing model

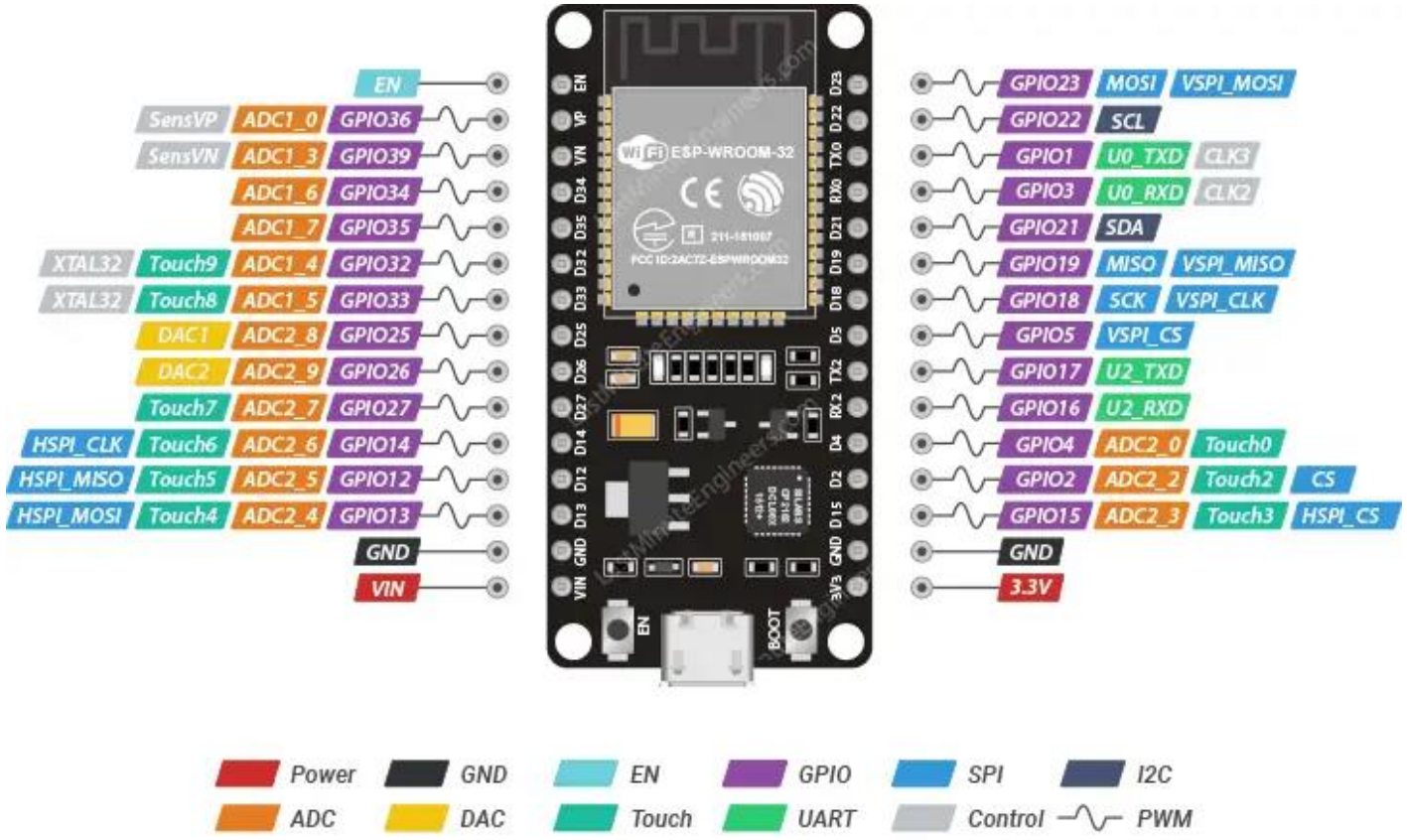


API'S



Endpoint
Method
Parameters
Request headers
Request body

ESP32 MICROCONTROLLER



- Dual-Core 32-bitni MCU + 448 KB ROM + 520 KB SRAM + 4MB FLASH
- WiFi modul
- Bluetooth modul
- Kriptografski akcelerator
- RTC modul
- Periferijski moduli

Consumption with radio on

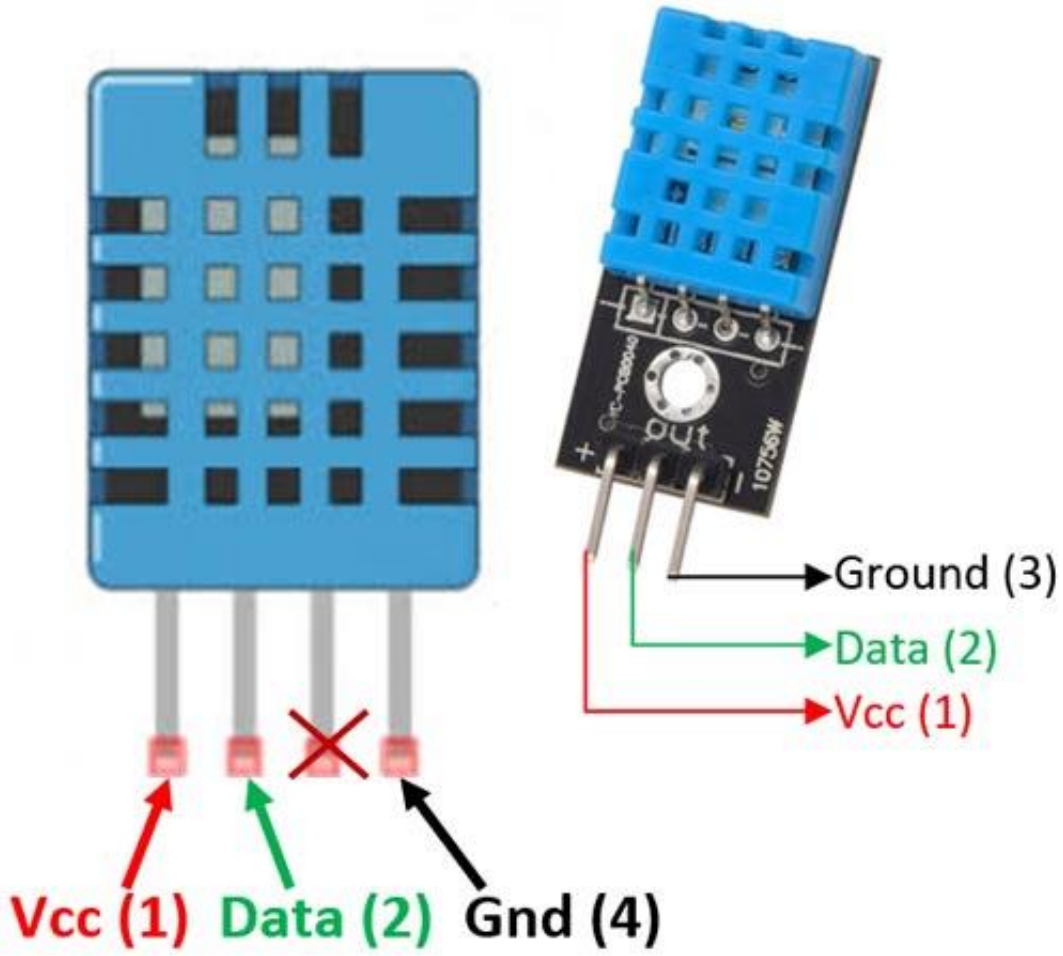
Mode	Consumption
Transmit 802.11b	240 mA
Transmit 802.11g	190 mA
Transmit 802.11n	180 mA
Receive WiFi	100 mA
Transmit BT	130 mA
Receive BT	100 mA

Consumption in sleep modes

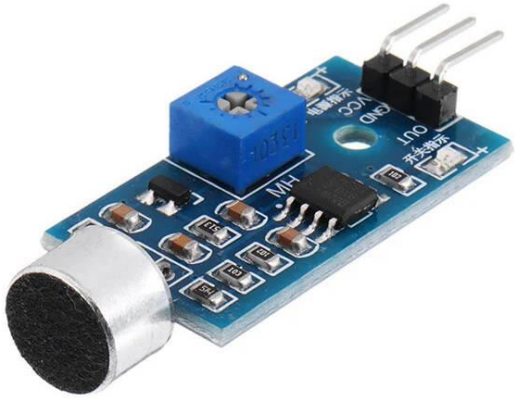
Mode	Consumption
Light-Sleep	800 uA
Deep-Sleep with ULP	160 uA
Deep-Sleep without ULP	10uA
Hibernation	5uA
Power off	1uA

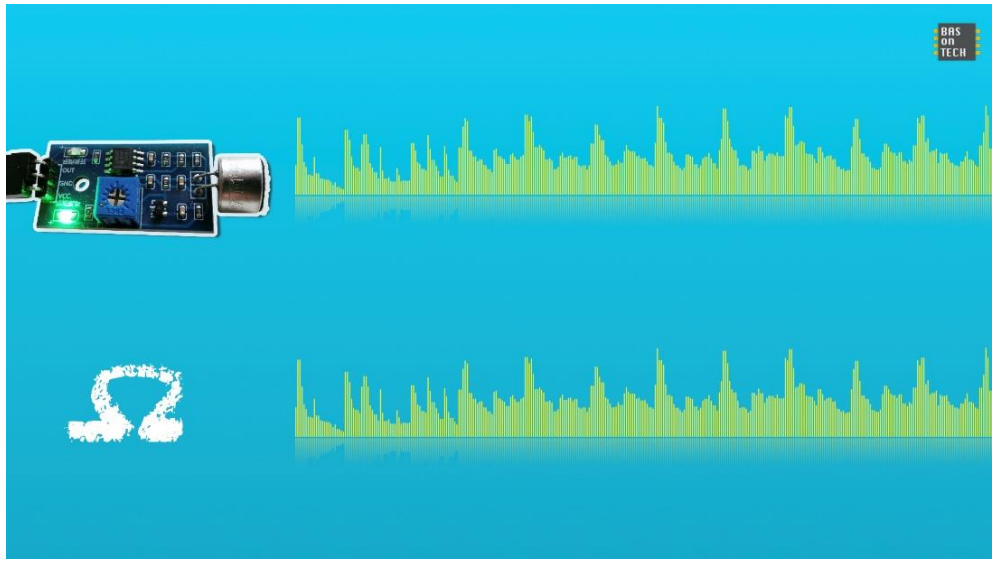
SENSORS

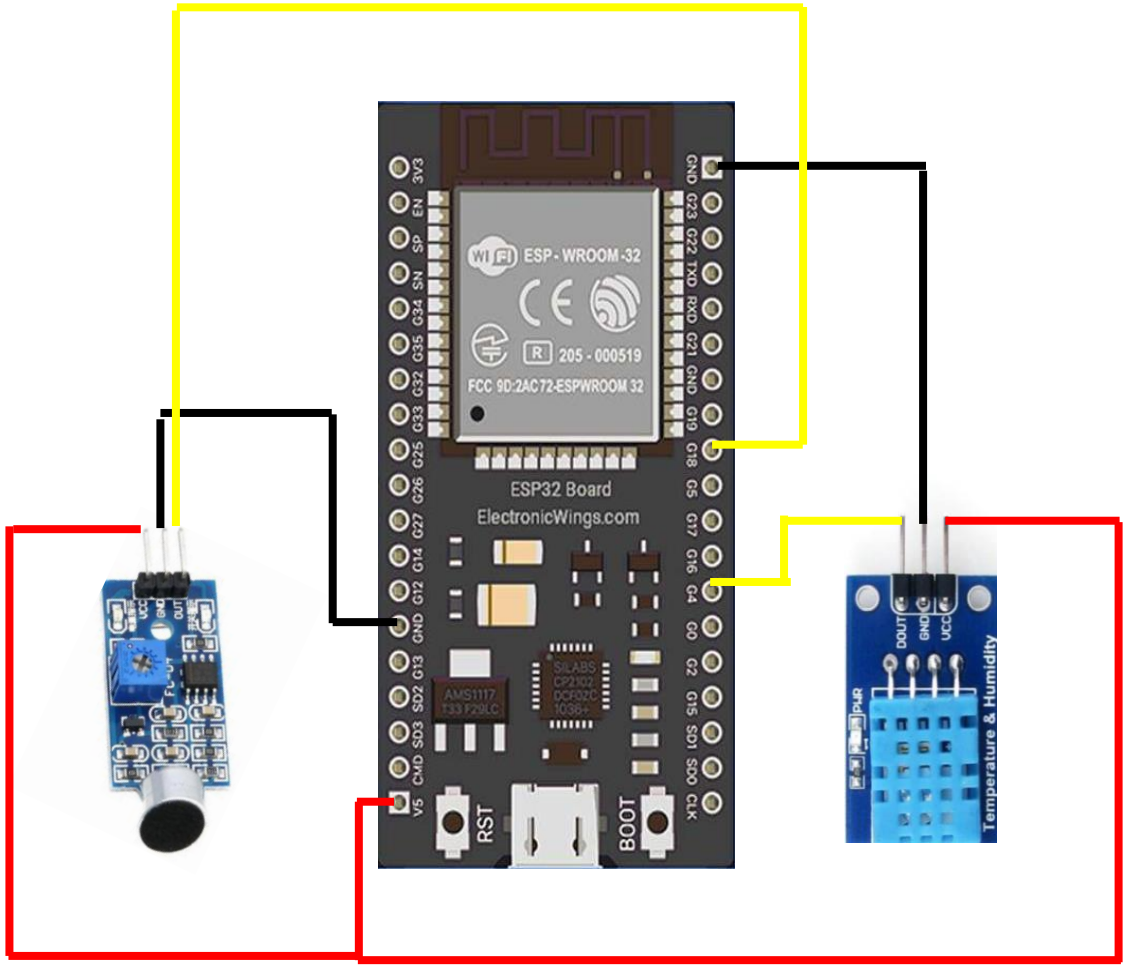
DHT11 TEMPERATURE AND HUMIDITY SENSOR

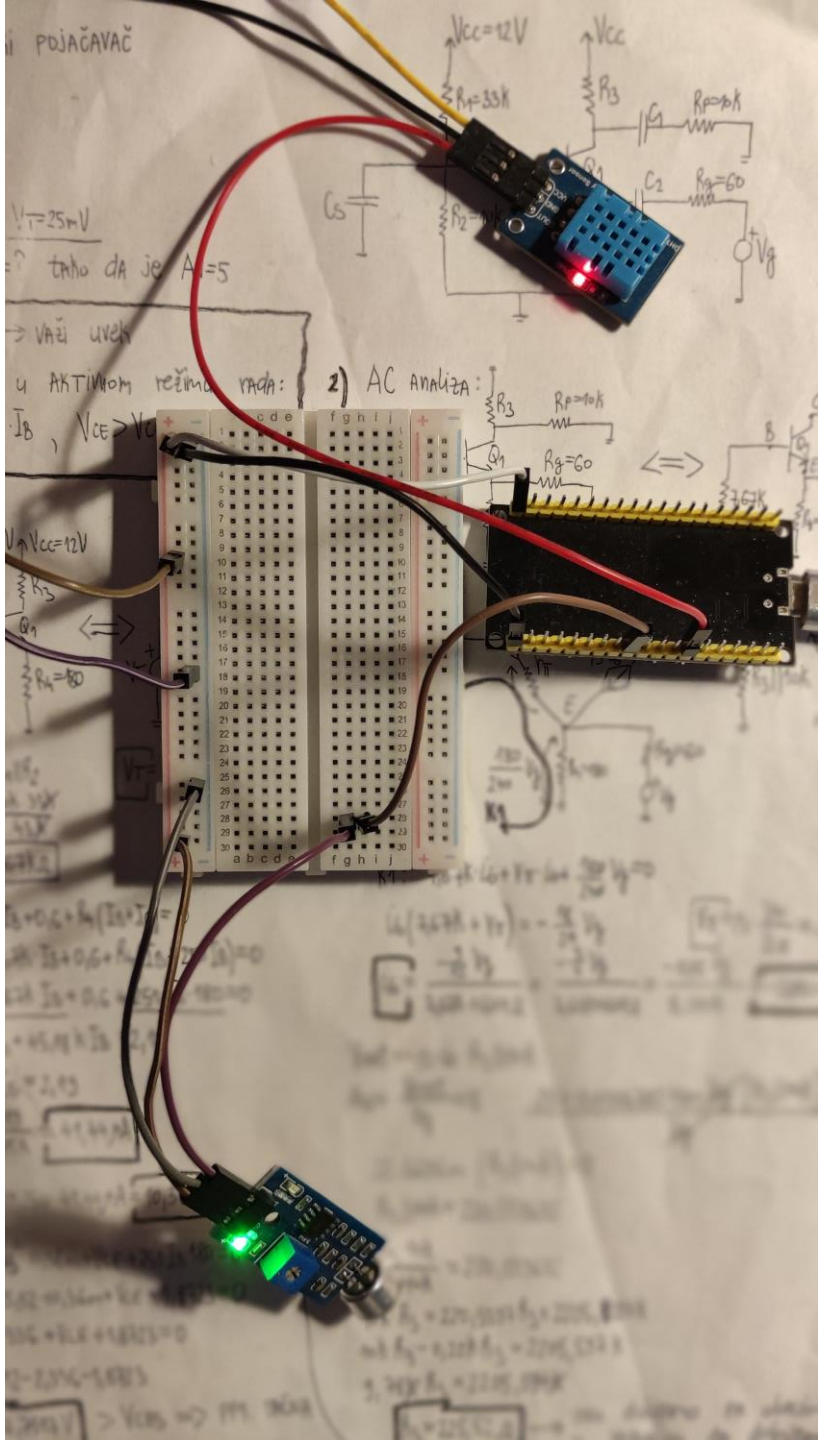


SOUND SENSOR CZN-15E

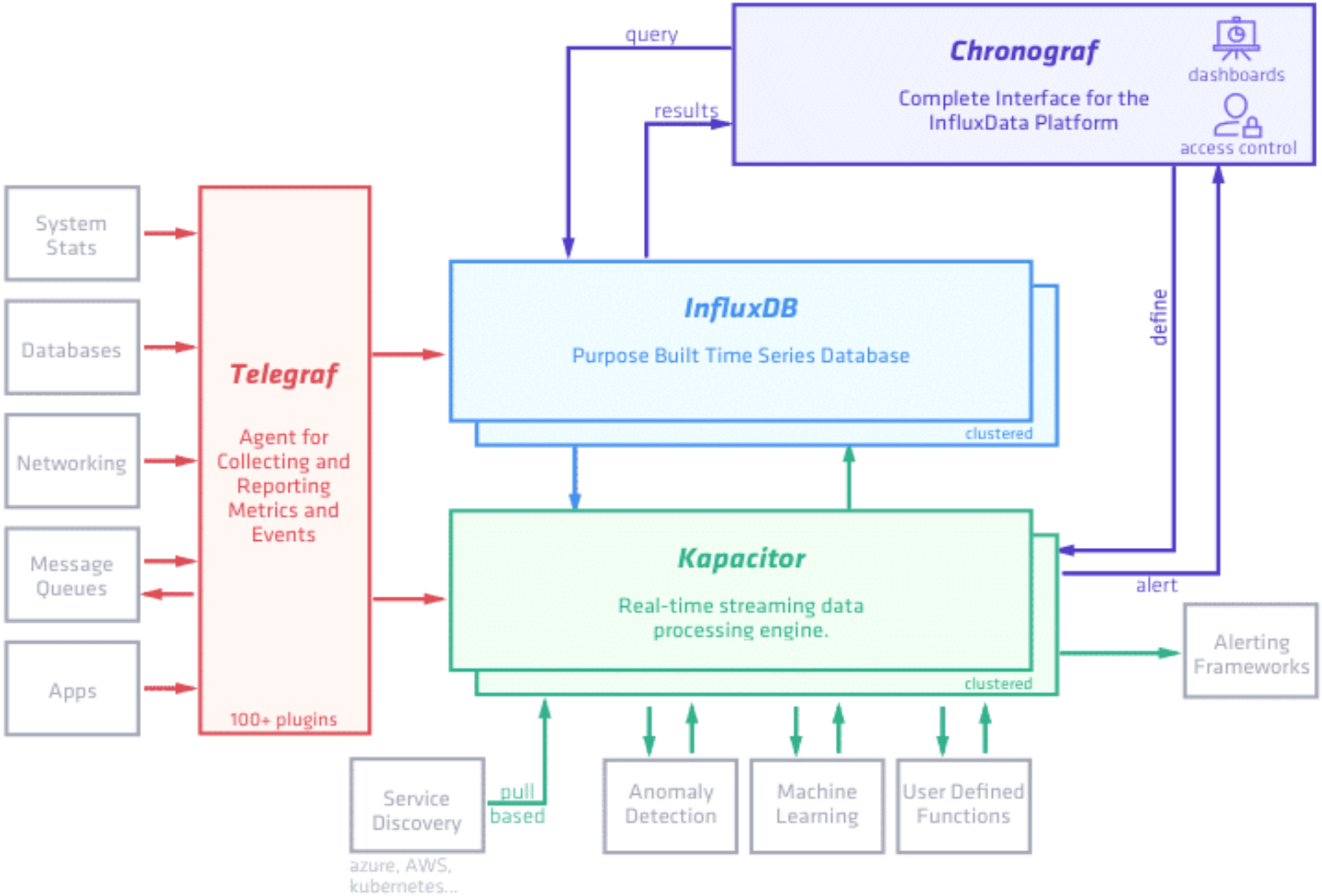


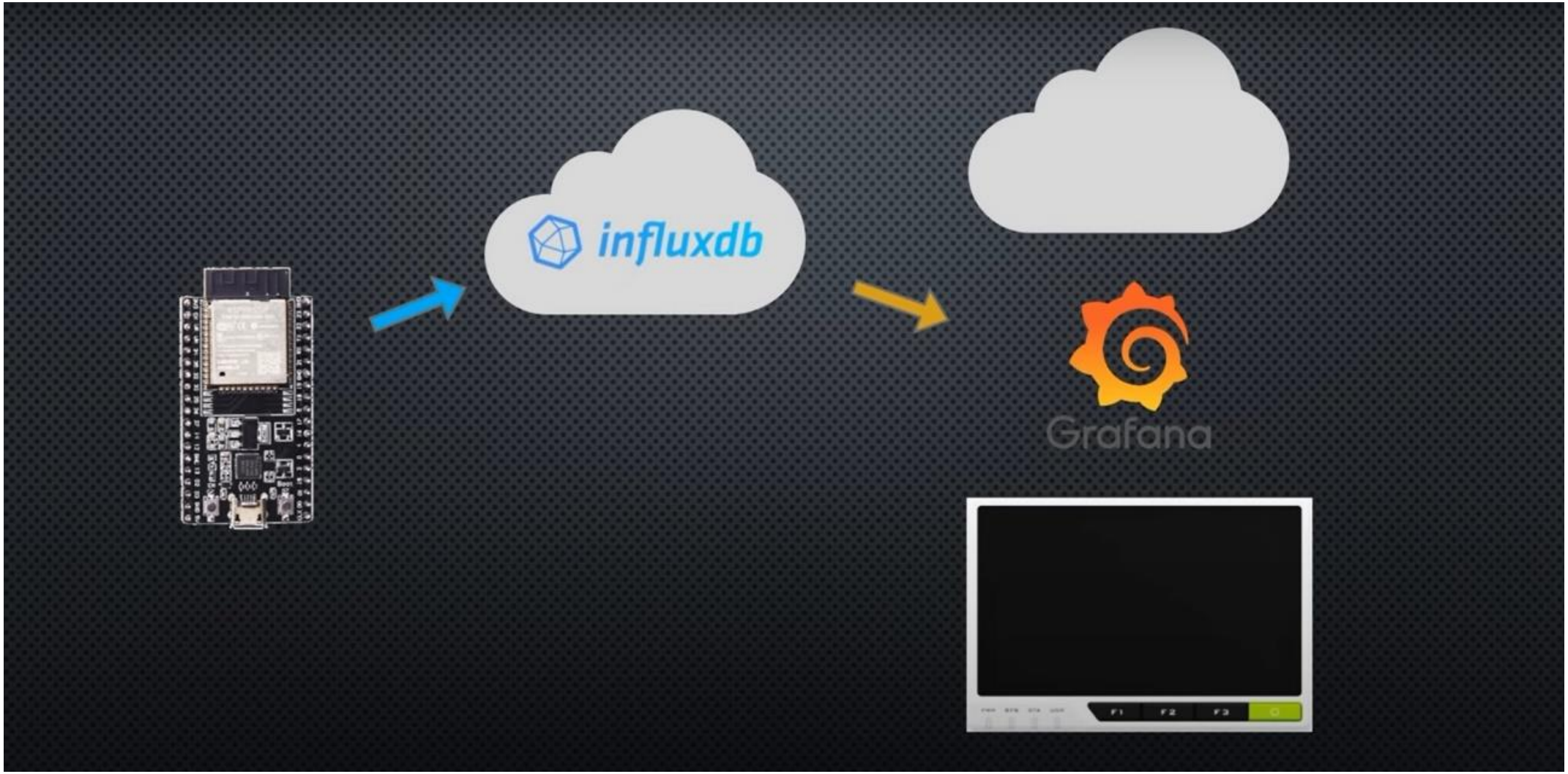



ESP - WROOM -32
205 - 000519
FCC 9D:2AC72-ESPWROOM 32
ESP32 Board
ElectronicWings.com
RST
BOOT
DOUT
GND
VCC
Temperature & Humidity

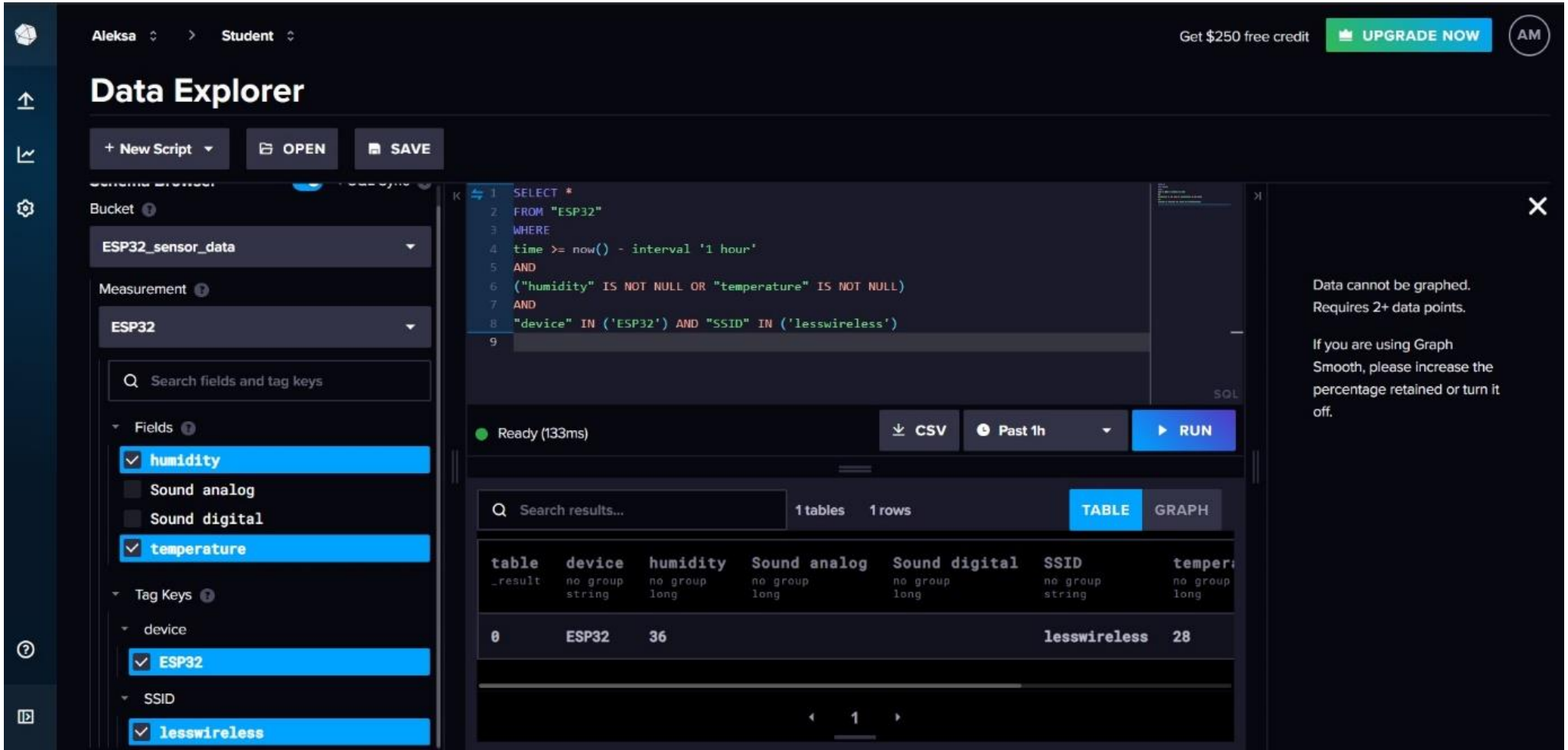

POJAČAVAČ
AC ANALIZA:

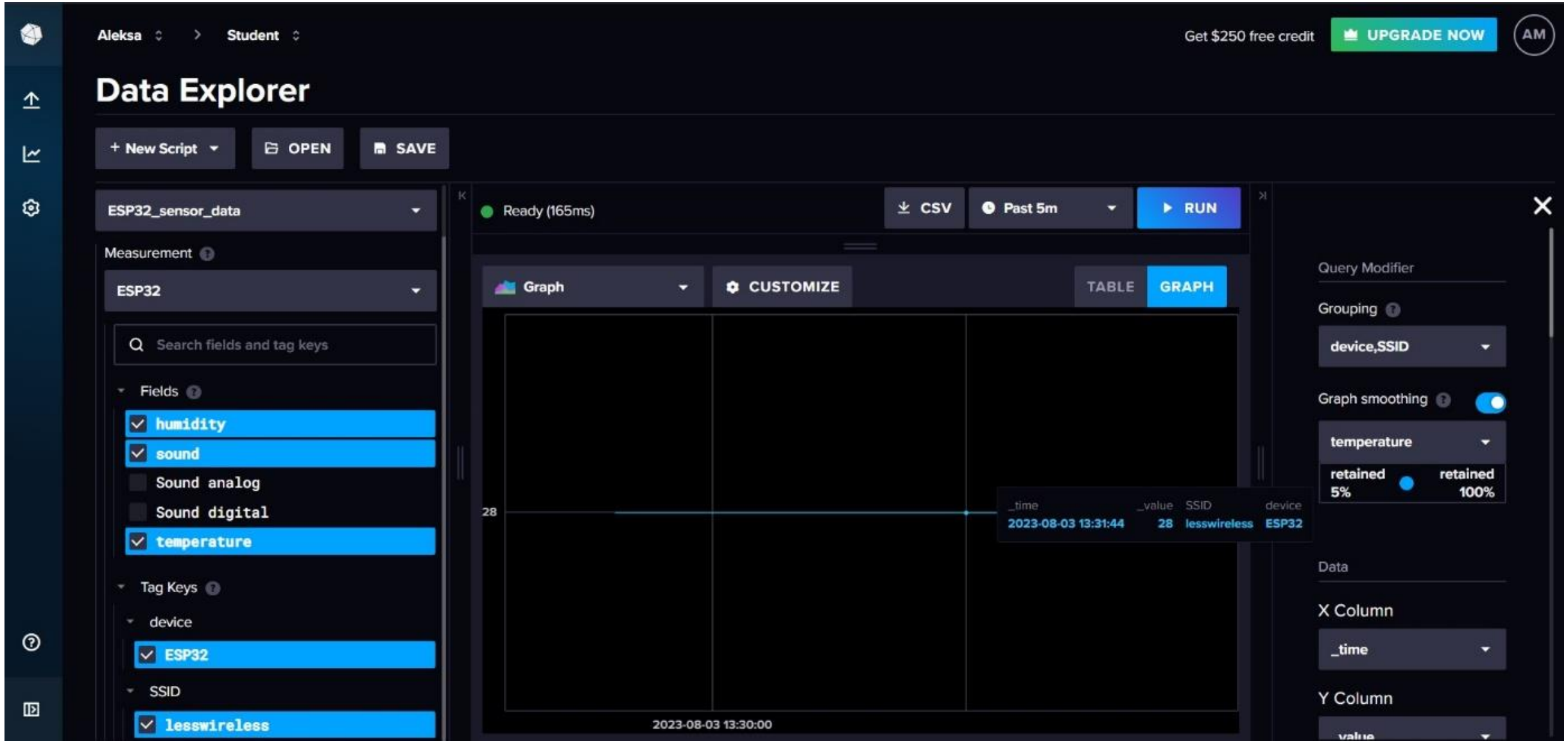
INFLUXDB

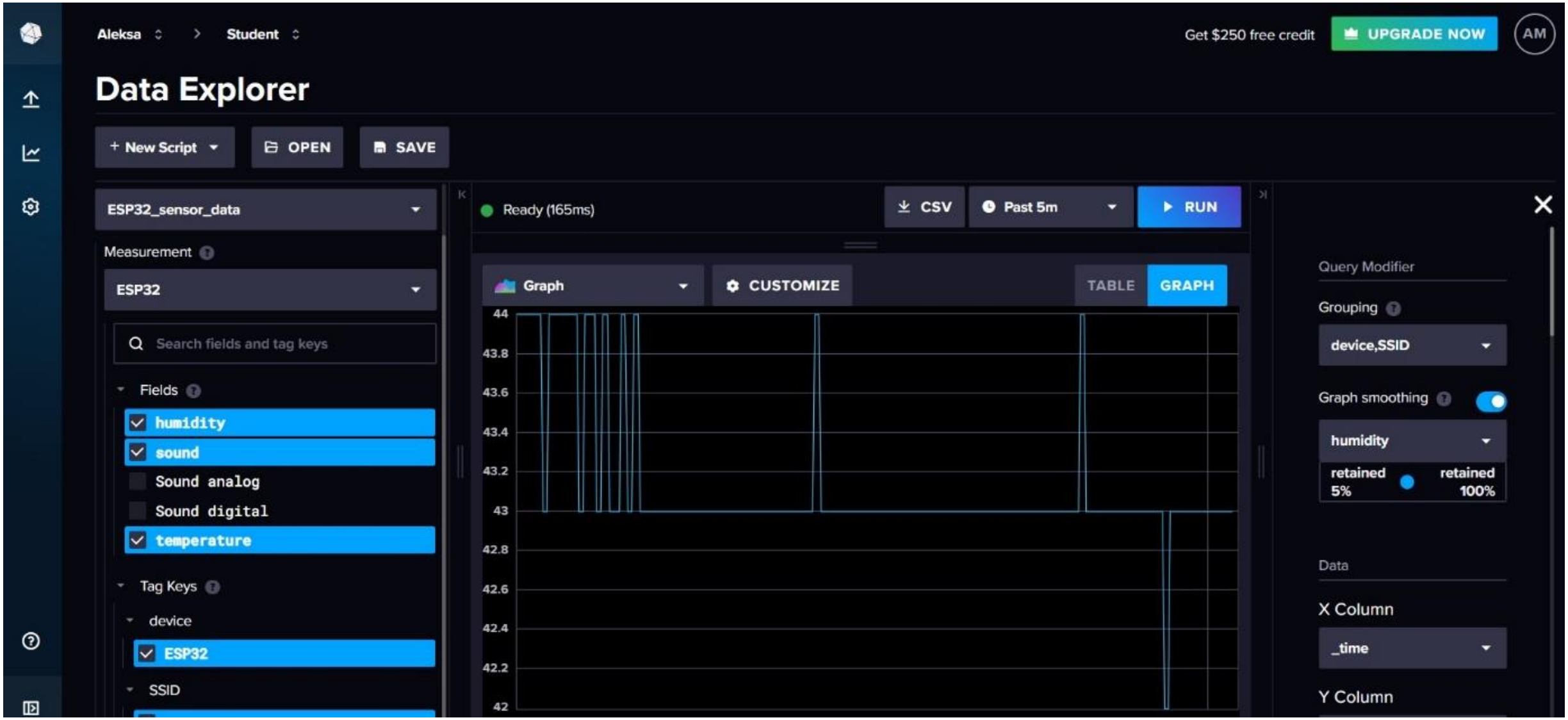

Chronograf
Complete Interface for the InfluxData Platform
dashboards
access control
query
results
define
alert
System Stats
Databases
Networking
Message Queues
Apps
Telegraf
Agent for Collecting and Reporting Metrics and Events
100+ plugins
InfluxDB
Purpose Built Time Series Database
clustered
Kapacitor
Real-time streaming data processing engine.
clustered
Alerting Frameworks
Service Discovery
azure, AWS, kubernetes...
pull based
Anomaly Detection
Machine Learning
User Defined Functions


influxdb
Grafana

```
#define WIFI_SSID "lesswireless"
#define WIFI_PASSWORD "**********"
#define INFLUXDB_URL "https://eu-central-1-1.aws.cloud2.influxdata.com"
#define INFLUXDB_TOKEN
"4U6dWd2BYjiHeYf1WGqQ1vUcYLuJVkSzUQVG9e5JVcbBfrHcpwfhlkevrEAEIMncJfYfdU-
NJ0mrupXsL2RYtg=="
#define INFLUXDB_ORG "91b1603cf9d889a5"
#define INFLUXDB_BUCKET "ESP32_sensor_data"
#define TZ_INFO "CET-1CEST,M3.5.0,M10.5.0/3"
```




Aleksa
Student
Get $250 free credit
UPGRADE NOW
AM
Data Explorer
+ New Script
OPEN
SAVE
ESP32_sensor_data
Measurement
ESP32
Search fields and tag keys
Fields
humidity
sound
Sound analog
Sound digital
temperature
Tag Keys
device
ESP32
SSID
lesswireless
Ready (165ms)
CSV
Past 5m
RUN
Graph
CUSTOMIZE
TABLE
GRAPH
28
_time
_value
SSID
device
2023-08-03 13:31:44
28
lesswireless
ESP32
2023-08-03 13:30:00
Query Modifier
Grouping
device,SSID
Graph smoothing
temperature
retained 5%
retained 100%
Data
X Column
_time
Y Column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AM
Data Explorer
+ New Script
OPEN
SAVE
ESP32_sensor_data
Measurement
ESP32
Search fields and tag keys
Fields
humidity
sound
Sound analog
Sound digital
temperature
Tag Keys
device
ESP32
SSID
Ready (165ms)
CSV
Past 5m
RUN
Graph
CUSTOMIZE
TABLE
GRAPH
44
43.8
43.6
43.4
43.2
43
42.8
42.6
42.4
42.2
42
Query Modifier
Grouping
device,SSID
Graph smoothing
humidity
retained 5%
retained 100%
Data
X Column
_time
Y Column

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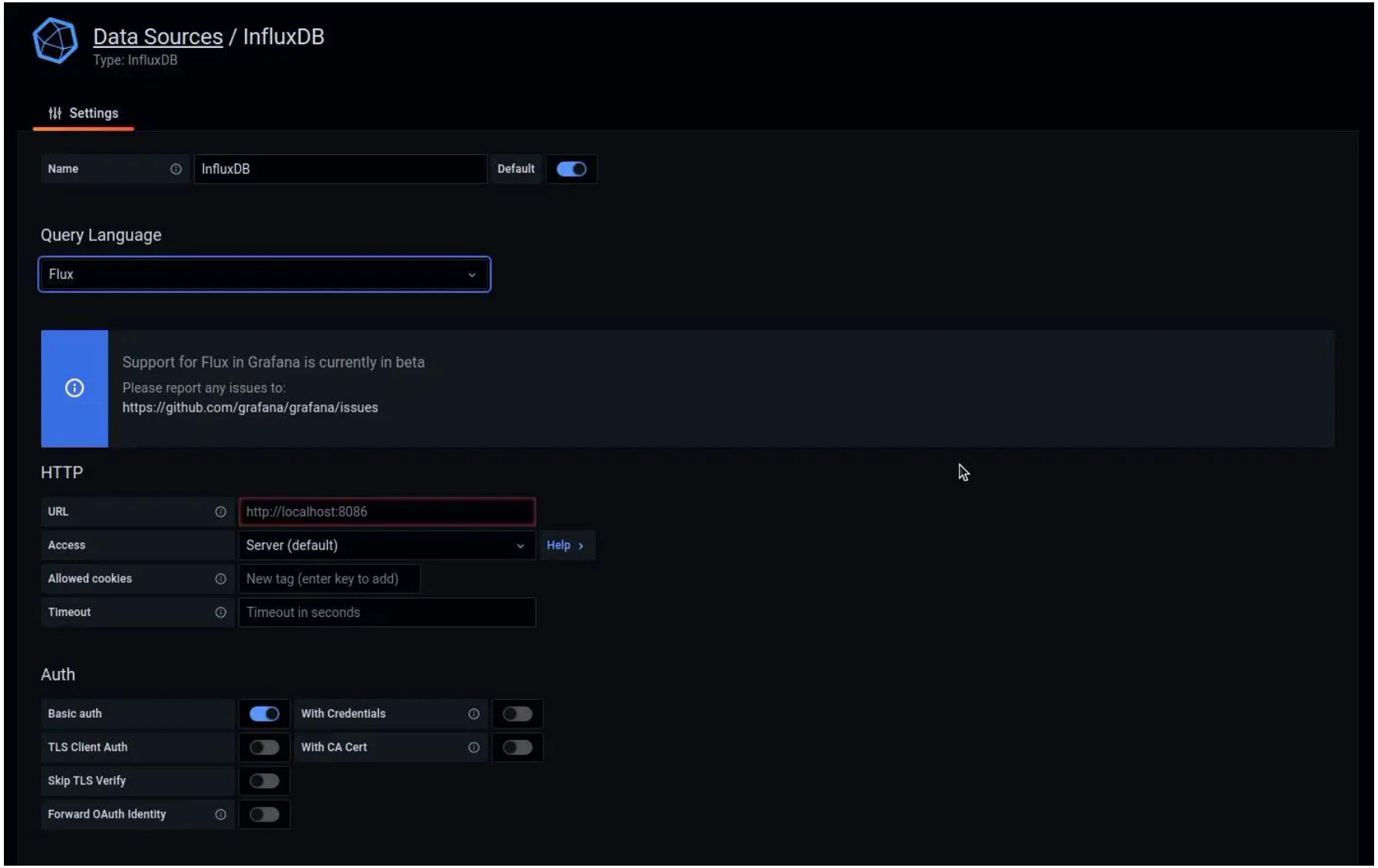
AM
Upgrade N
Data Explorer
+ New Script
OPEN
SAVE
ESP32_sensor_data
Measurement
ESP32
Search fields and tag keys
Fields
humidity
sound
Sound analog
Sound digital
temperature
Tag Keys
device
ESP32
SSID
lesswireless
Ready (96ms)
CSV
Past 1m
RUN
Graph
CUSTOMIZE
TABLE
GRAPH
1
900m
800m
700m
600m
500m
400m
300m
200m
100m
0
2023-08-03 13:30:30
2023-08-03 13:30:45
2023-08-03 13:31:00
2023-08-03 13:31:15
Query Modifier
Grouping
device,SSID
Graph smoothing
sound
retained 5%
retained 100%
Data
X Column
_time
Y Column
value

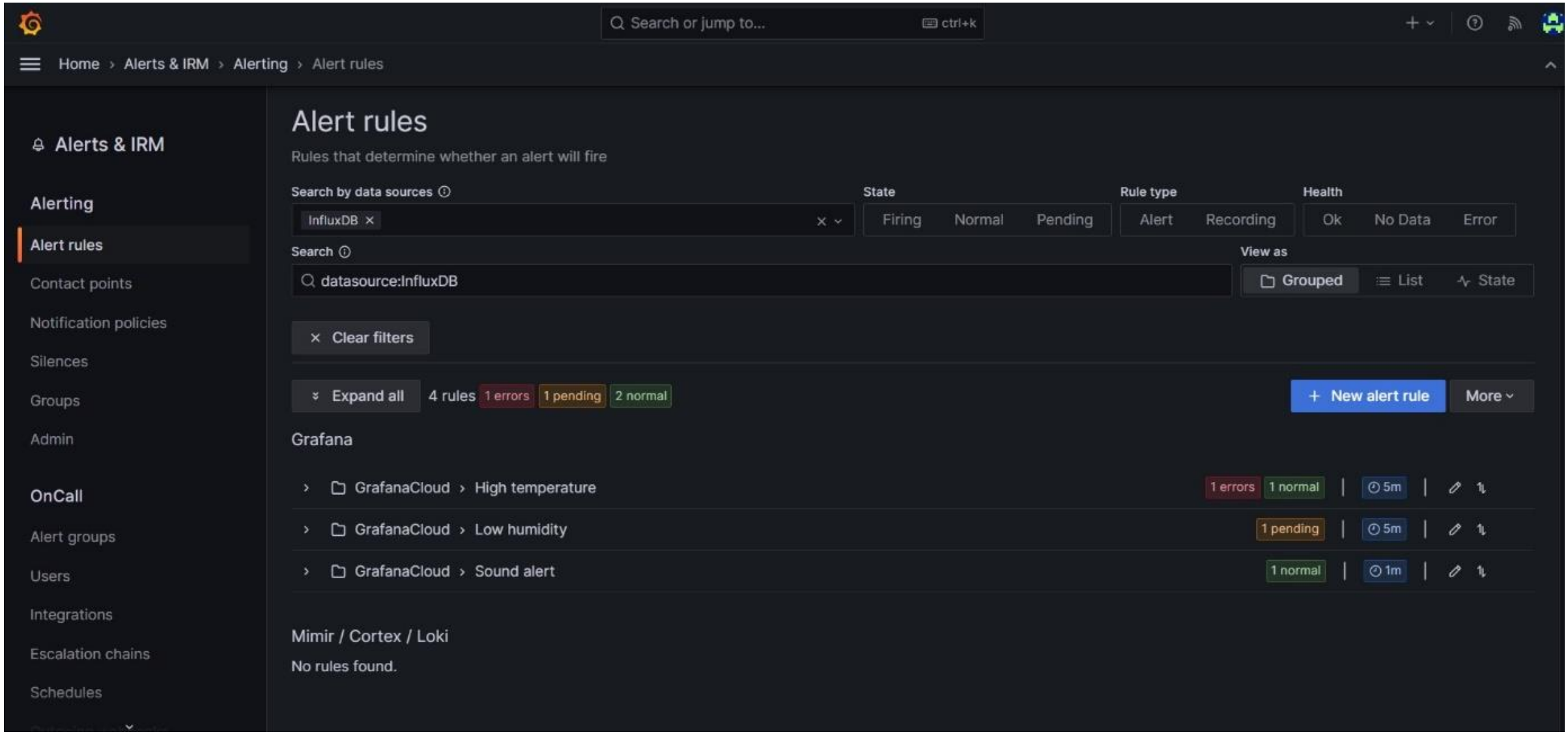
GRAFANA




```
from(bucket: "ESP32_sensor_data")
  |> range(start: -1d)
  |> filter(fn : (r) => r._field == "temperature")
  |> yield(name: "_results")
```

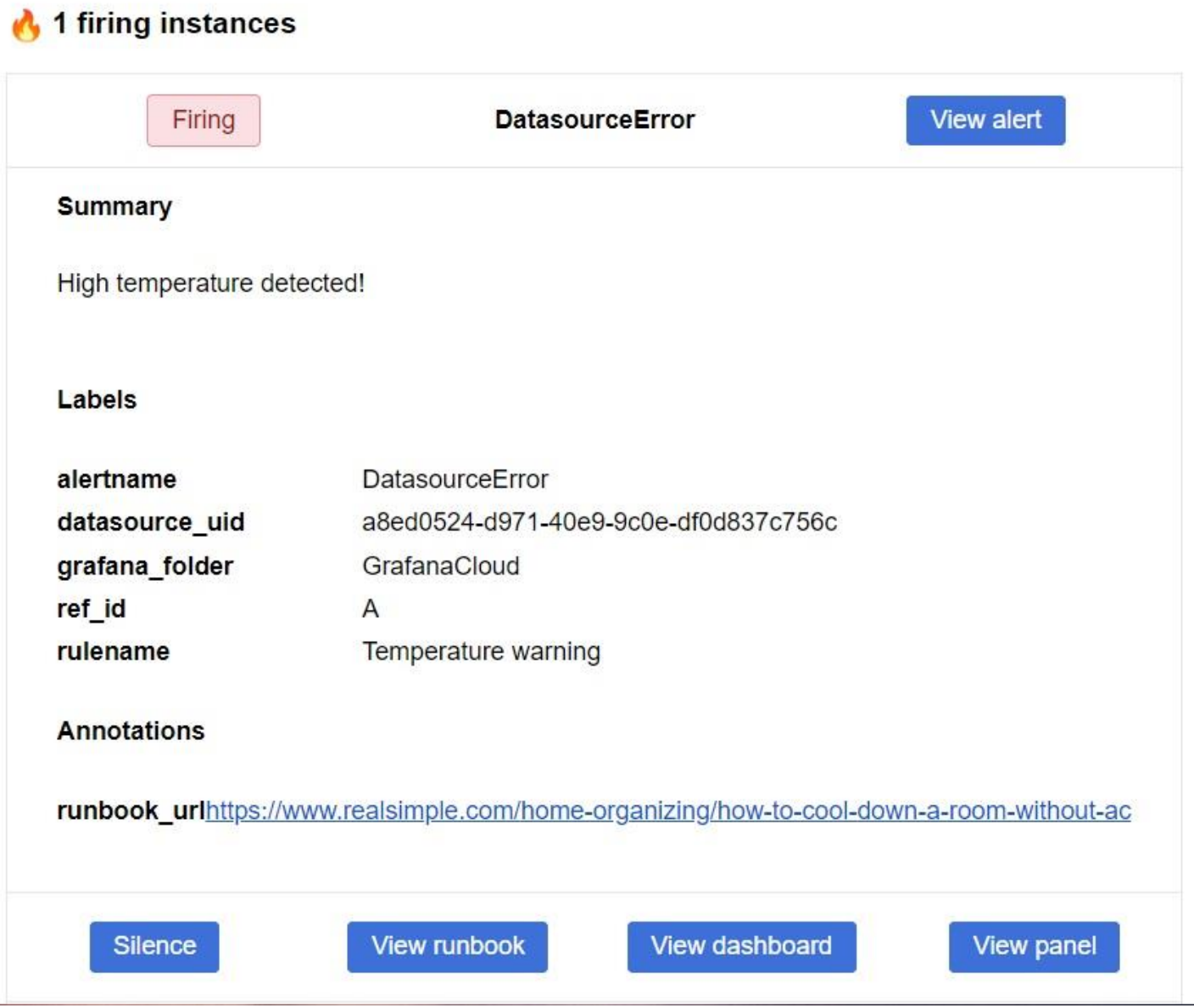
Dashboard with no alarms

ALERTS

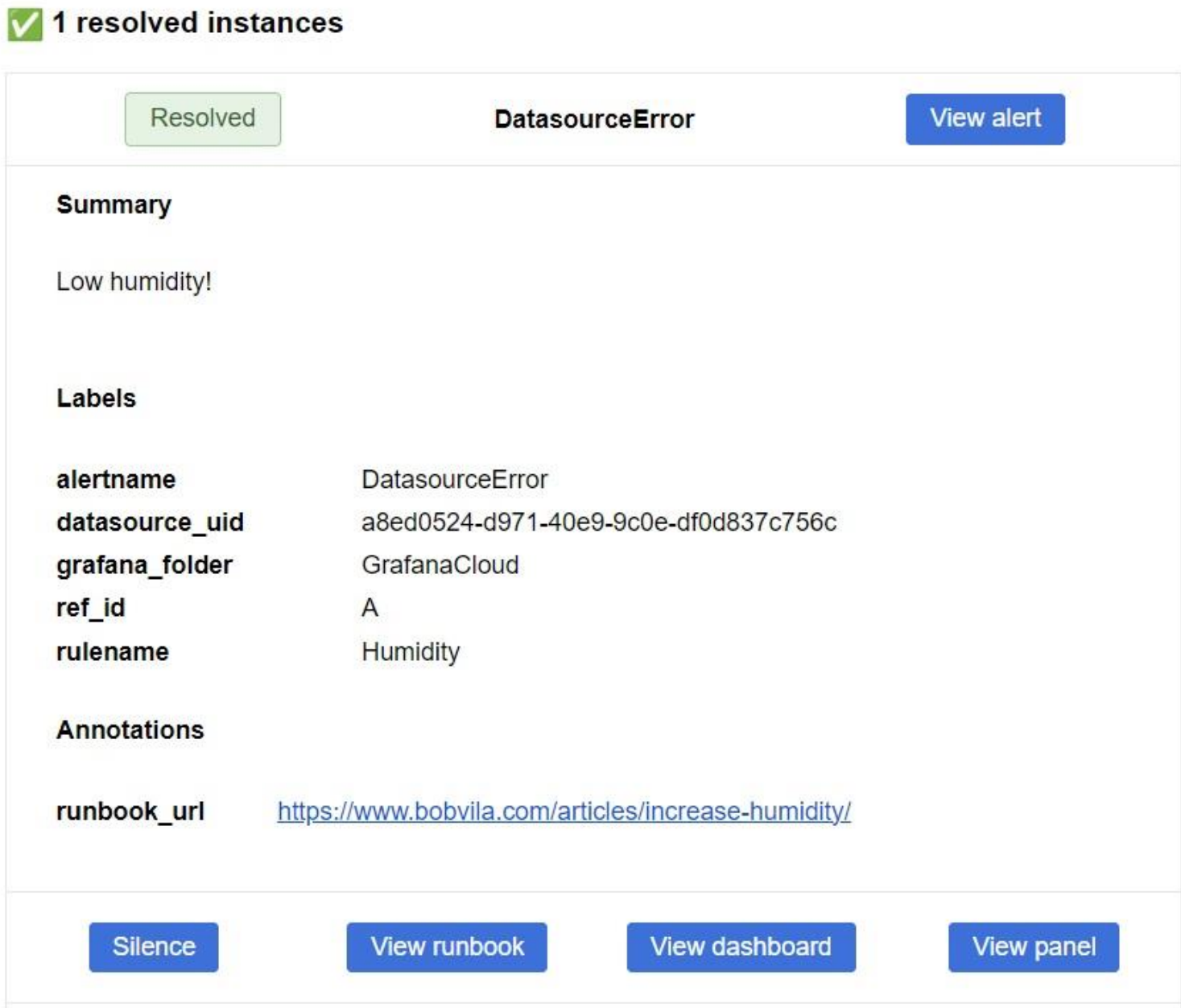

Search or jump to... ctrl+k
Home › Alerts & IRM › Alerting › Alert rules
Alerts & IRM
Alerting
Alert rules
Contact points
Notification policies
Silences
Groups
Admin
OnCall
Alert groups
Users
Integrations
Escalation chains
Schedules
Alert rules
Rules that determine whether an alert will fire
Search by data sources
InfluxDB
State
Firing Normal Pending
Rule type
Alert Recording
Health
Ok No Data Error
Search
datasource:InfluxDB
View as
Grouped List State
Clear filters
Expand all
4 rules 1 errors 1 pending 2 normal
New alert rule
More
Grafana
GrafanaCloud › High temperature
1 errors 1 normal 5m
GrafanaCloud › Low humidity
1 pending 5m
GrafanaCloud › Sound alert
1 normal 1m
Mimir / Cortex / Loki
No rules found.

Dashboard with alarms

High temperature alarm



Issue with humidity resolved



HVALA NA PAŽNJI!

Aleksa Mitrovčan
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