

Abstract geometric lines in the top left corner of the slide, consisting of several overlapping, irregular polygons and lines in black.

# GREENHOUSE DIGITAL TWIN

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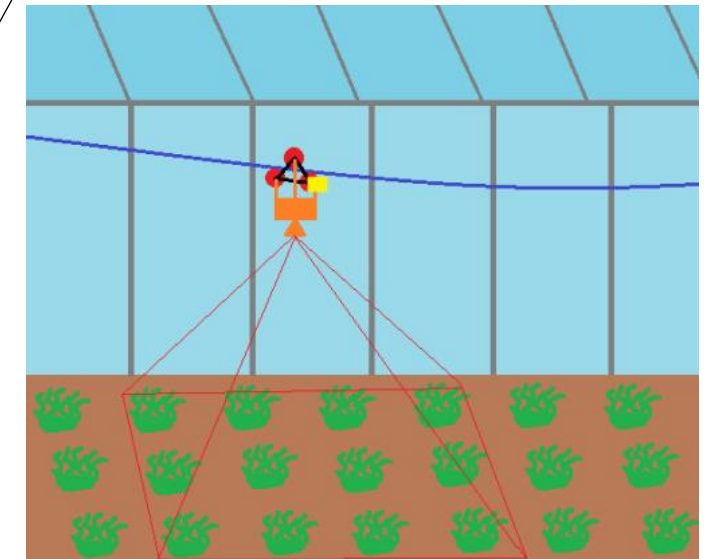
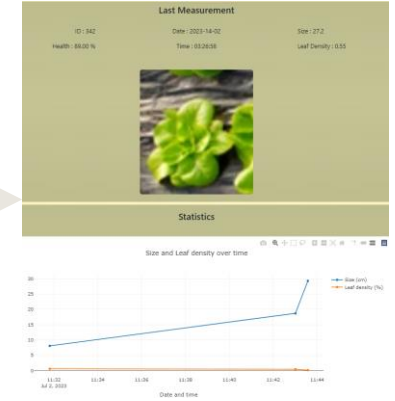
Our Work / Timetable

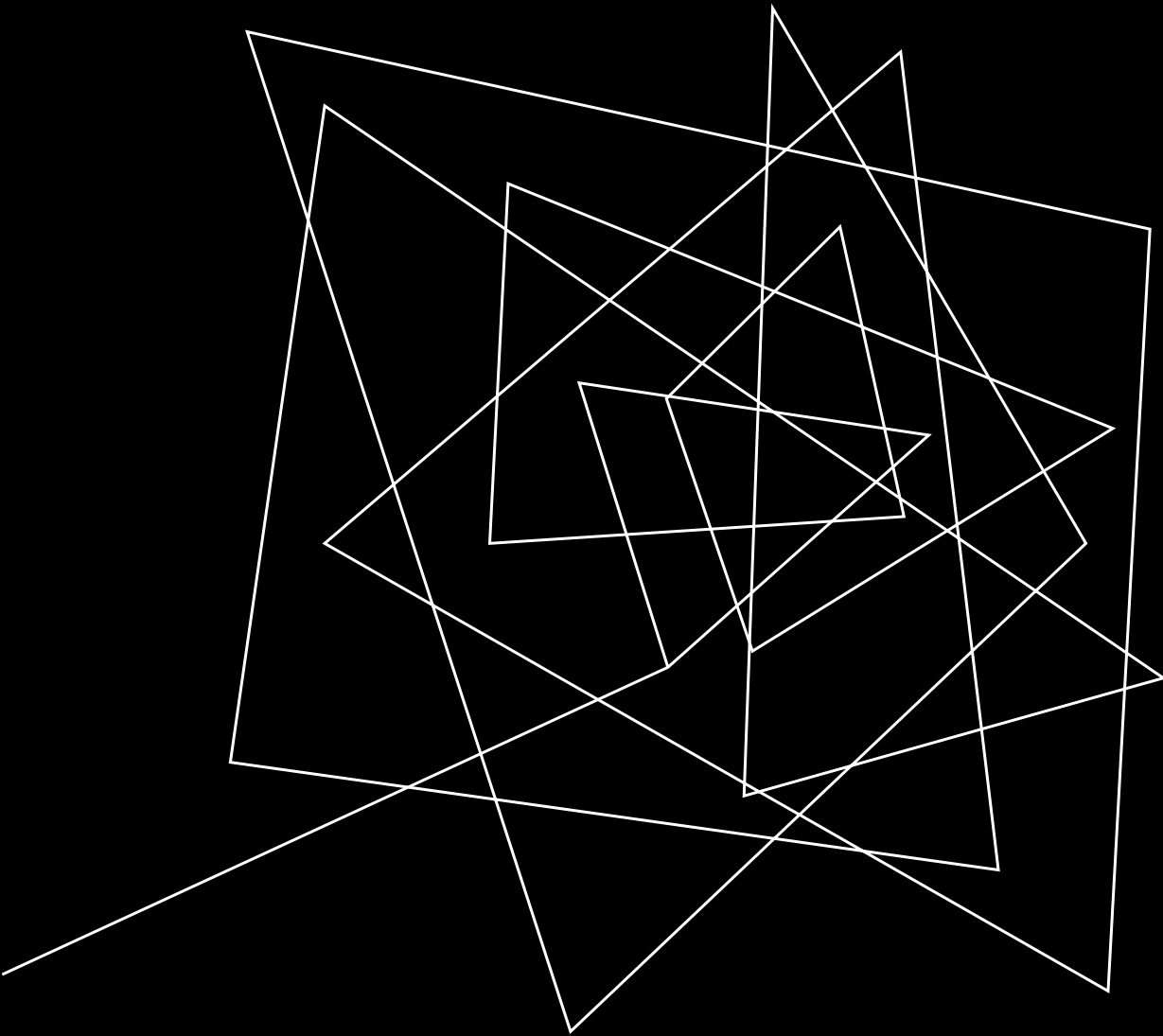


	0	1	2	3	4	5	6	7	8	9	10	11
0	89.3%	81.1%	64.3%	88.2%	65.8%	60.0%	37.6%	45.0%	32.6%	52.4%	53.7%	84.5%
1	22.1%	42.4%	47.6%	30.0%	88.5%	62.4%	42.8%	98.4%	65.4%	45.3%	71.6%	67.8%
2	80.3%	87.1%	51.6%	69.7%	50.5%	88.1%	23.4%	47.4%	27.4%	25.3%	74.5%	35.8%
3	52.4%	52.4%	86.6%	98.0%	55.0%	90.8%	63.2%	84.3%	67.6%	70.3%	80.8%	82.1%
4	86.6%	57.9%	50.1%	85.0%	64.7%	97.0%	81.2%	94.2%	31.0%	88.9%	58.9%	0.0%
5	76.0%	78.5%	70.5%	53.4%	94.7%	91.3%	80.5%	80.8%	92.4%	40.8%	72.1%	28.3%

# THE PROJECT

- A Device, Cloud and Processing infrastructure for distributed digital twins of herbaceous plant type greenhouses.
- Taking advantage of dwindling power and hardware cost for edge data ingestion we implement an AI solution in top-view image mapping and detection along with a distributed database cloud solution.
- Our cable-lift low cost and easy installation robot moves through the length of a greenhouse, takes top-down images and in real time maps it's position while detecting individual plants, saving multiple snapshots for each and forwarding metrics & sensor data to the cloud.





# PRIMARY GOALS

*Optimization Axes*

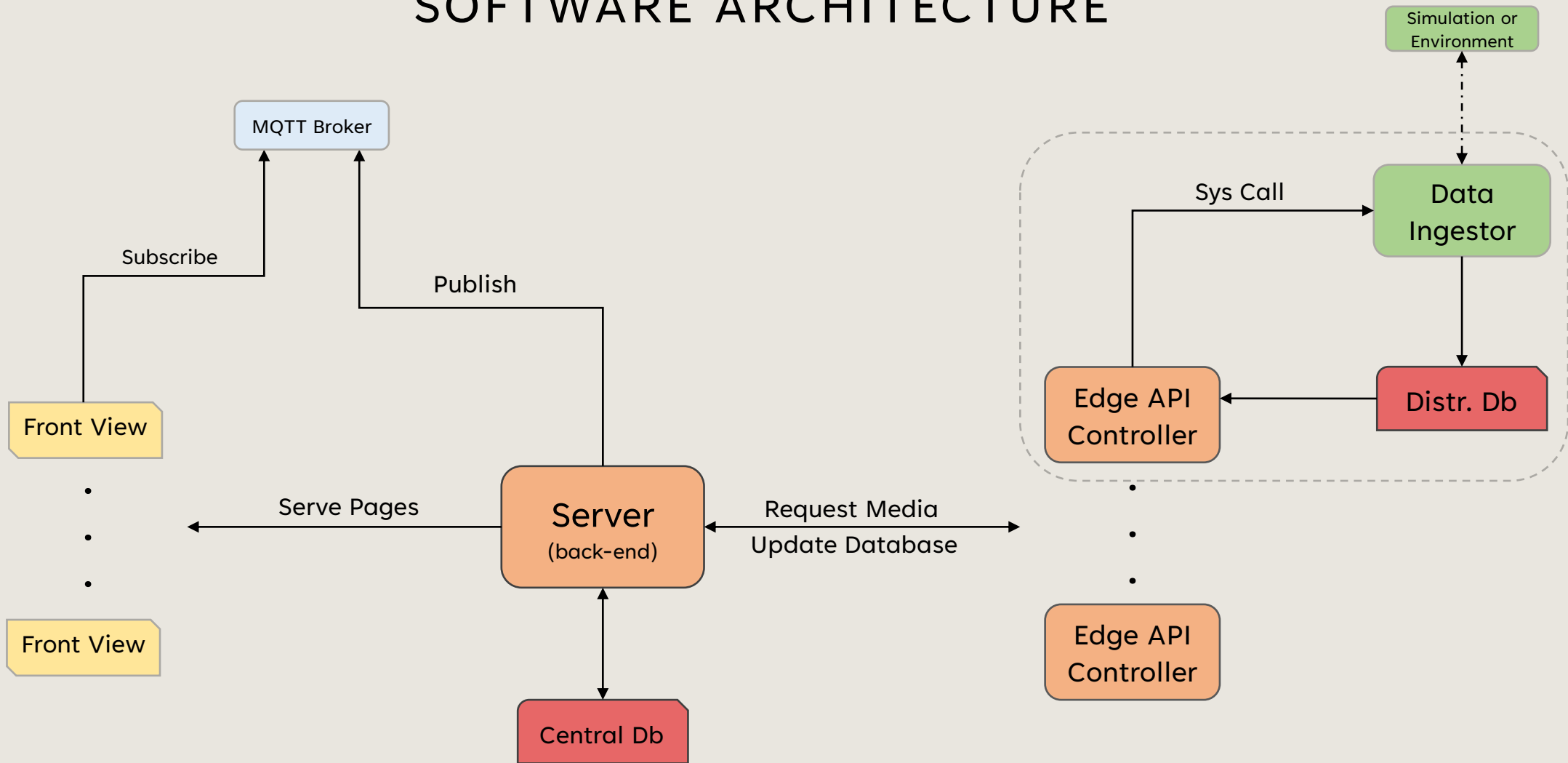
- Low cellular data usage
- Inexpensive hardware & installation
- Full digital representation

# ARCHITECTURAL CHOICES

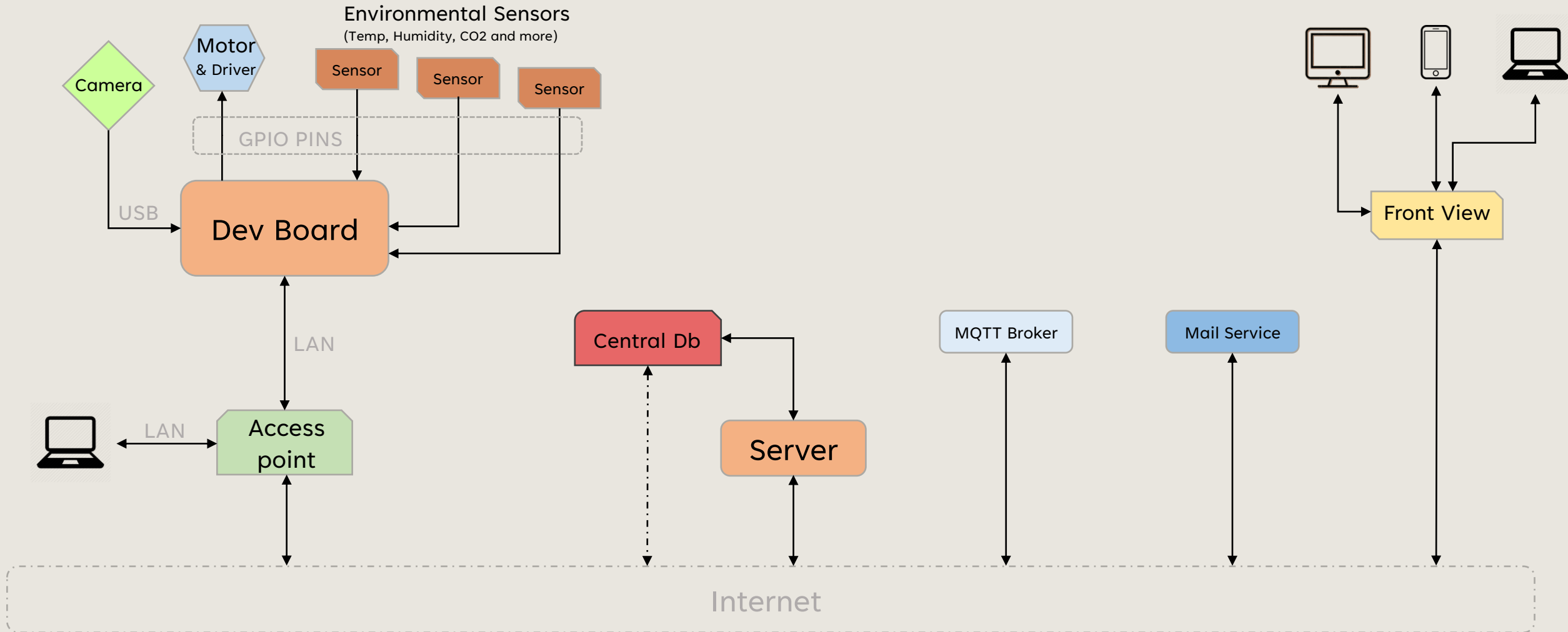
*System Design*

- Mapping and detection on edge (cost, data usage)
- Metrics extraction on site , updating central Db only for metrics (data usage)
- On demand access to media through distributed Db, central Db cache (data usage)
- MQTT front view refresher
- LAN option for data extraction (data usage)

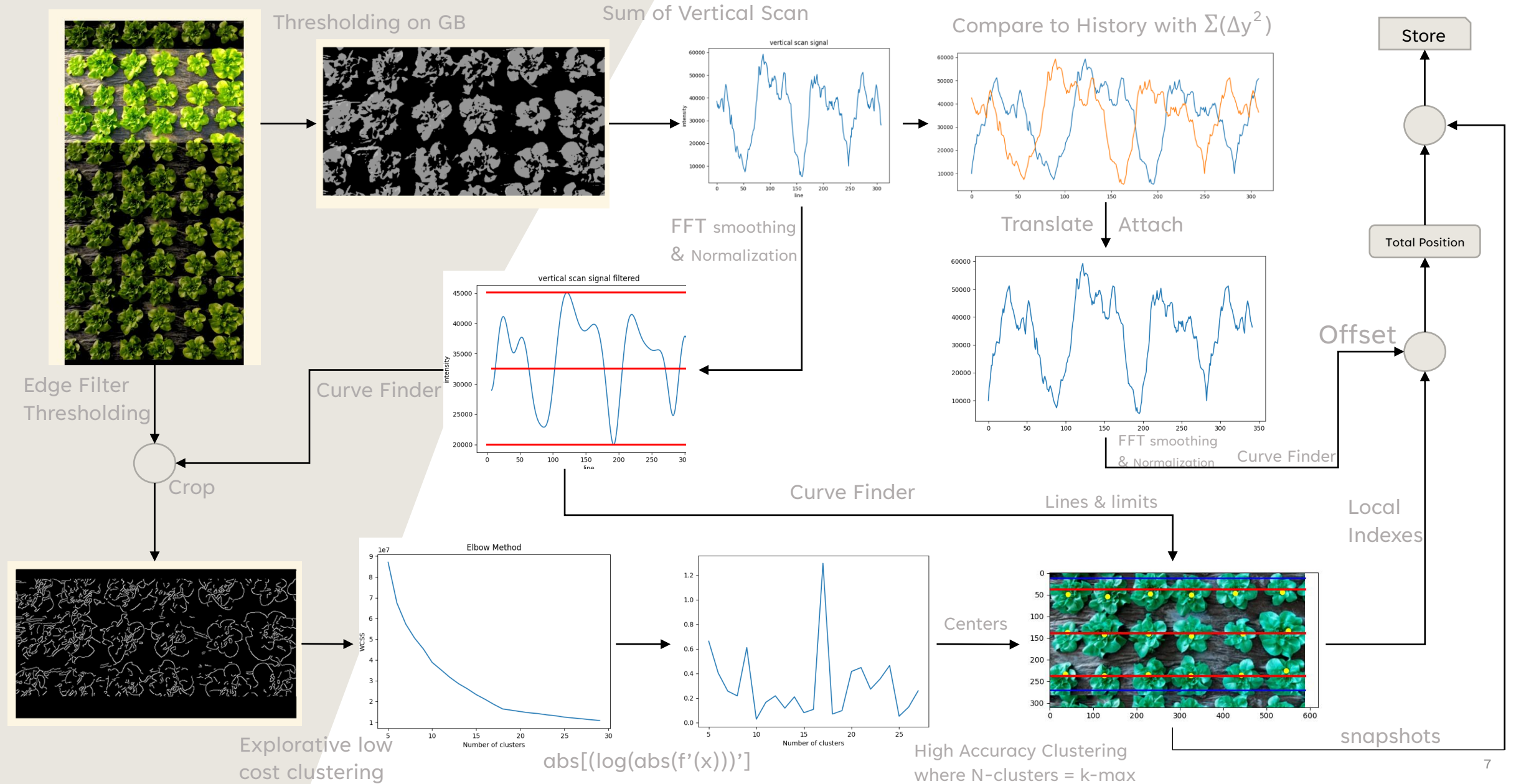
# SOFTWARE ARCHITECTURE



# DEVICE FLOW DIAGRAM



# OUR MODEL





# LIVE DEMO

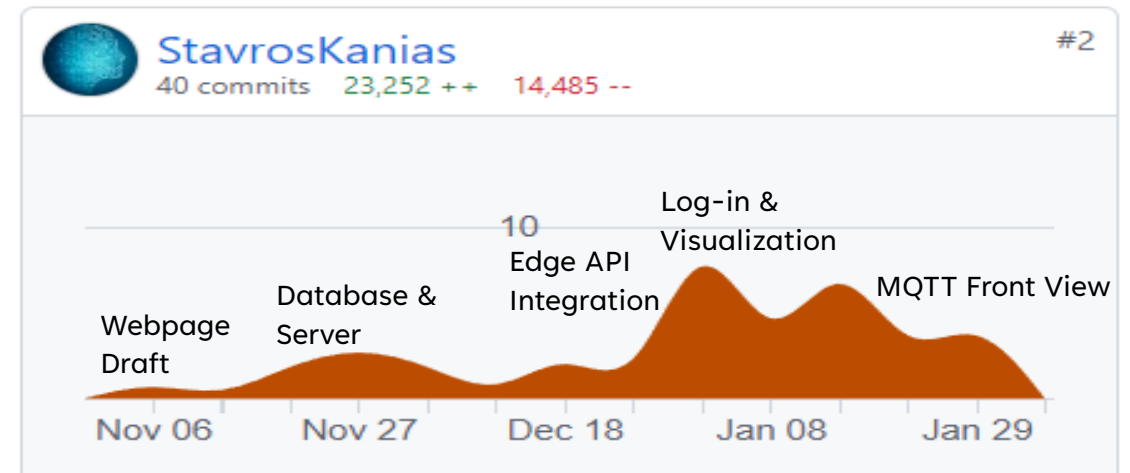
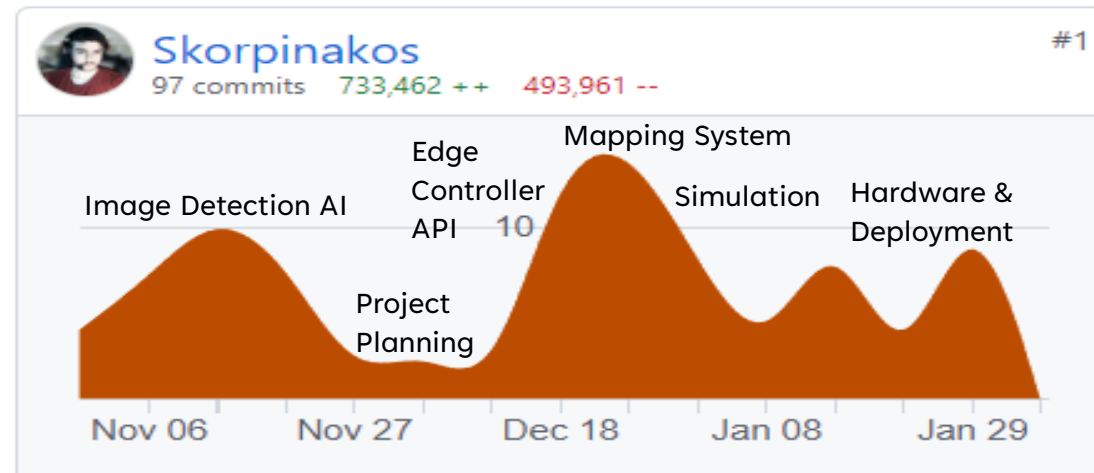
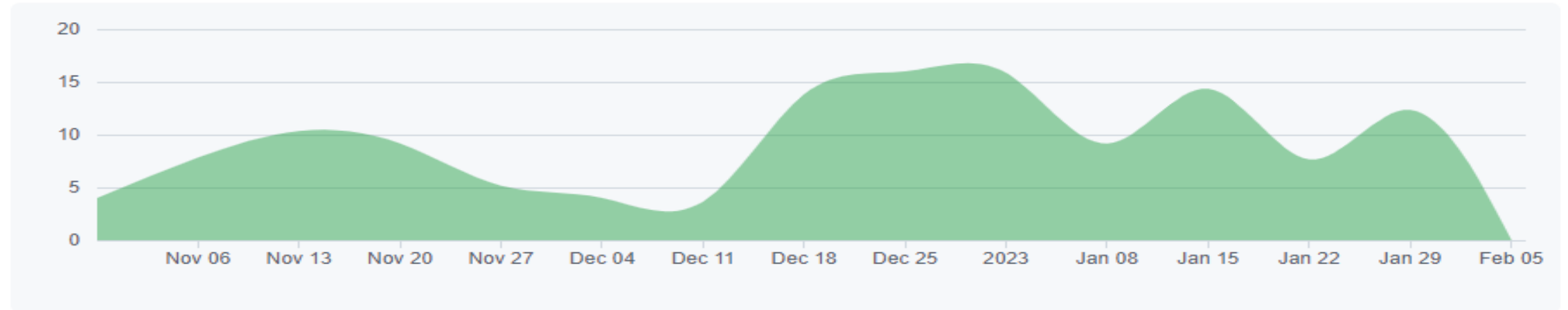




Oct 30, 2022 – Feb 6, 2023

Contributions: Commits ▾

Contributions to main, excluding merge commits and bot accounts



TIMELINE



# THANK YOU

Ioannis Tsampras & Stavros Kaniias

[www.github.com/Skorpinakos/IoT-2022](https://www.github.com/Skorpinakos/IoT-2022)