

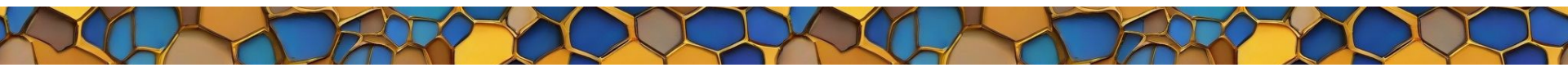


# Weather prediction for beekeepers

## Andmetorm hackathon

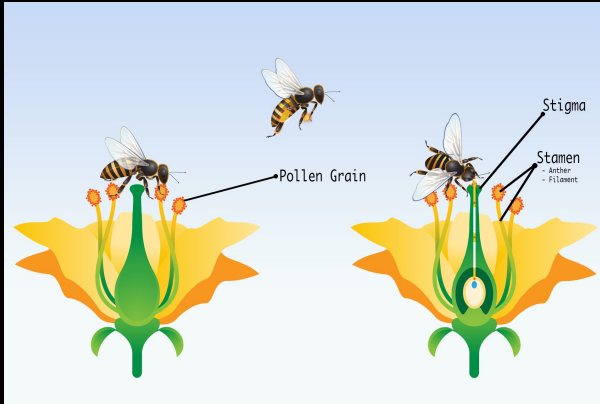


**Artjom Kurapov**  
Founding engineer



# Problem statement - Food security

- Farmers need precise pollination to increase crop yields
  - ex. oilseed ([+37%](#)), coffee, cocoa, almond and soybean
- **Beekeepers** providing services to **farmers** earn 9x more money compared to simply selling honey
- Demand of pollination grows 2x faster than growth of honeybee colonies



# Problem statement - Beehive collapsing

- Storm wind knocking down beehives
- Brood and colony is chilled, weakens and dies ☠️



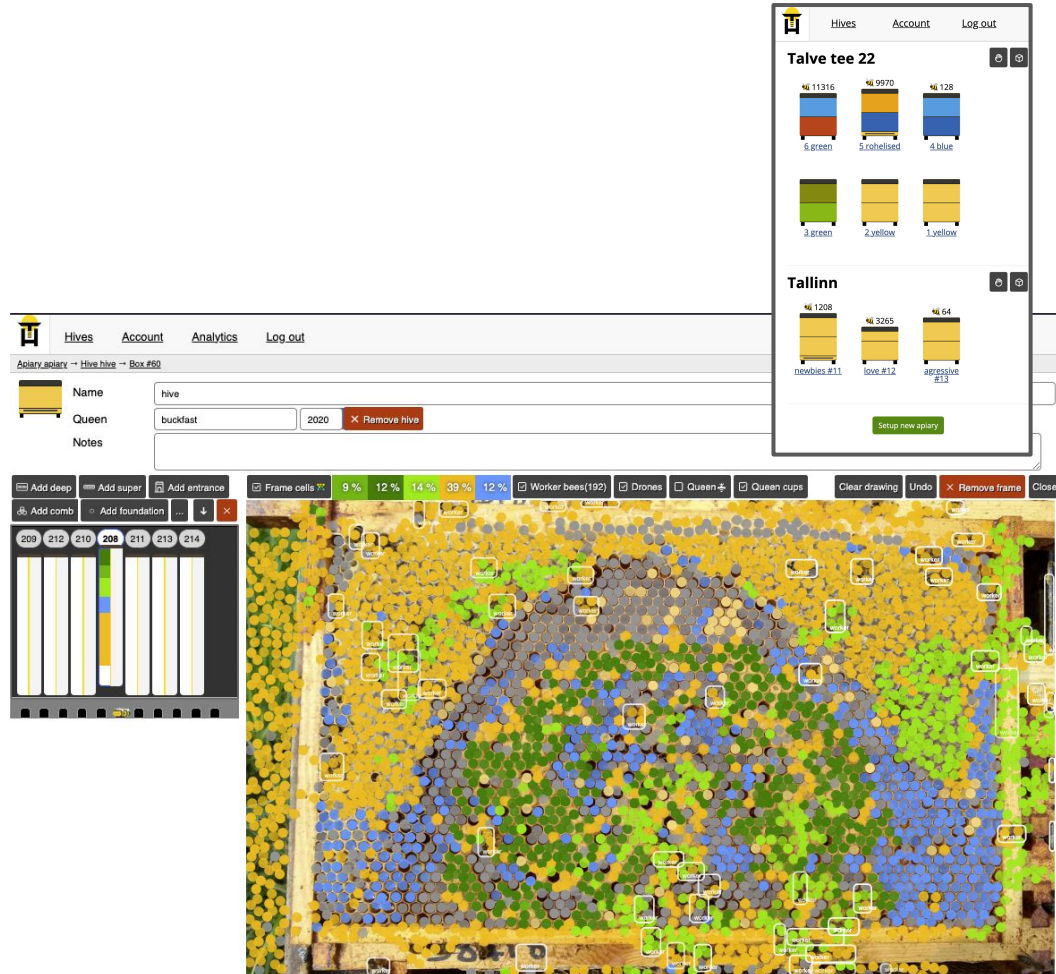


# Vision

app

## Data analytics SaaS app for beekeepers

- ✓ AI detections of a frame photo
  - ✓ Bee counts
  - ✓ Queen and queen cups
  - ✓ Varroa mites
  - ✓ Frame cells
- ✓ Manage apiaries, hives, frames, photos
- ✓ AI advisor
- ✓ Mobile app
- ✓ Manual inspections, inspection timeline
  - Re-train on user data



# Vision

app

Beehive  
IoT sensors

Hardware to send infrequent telemetry data:

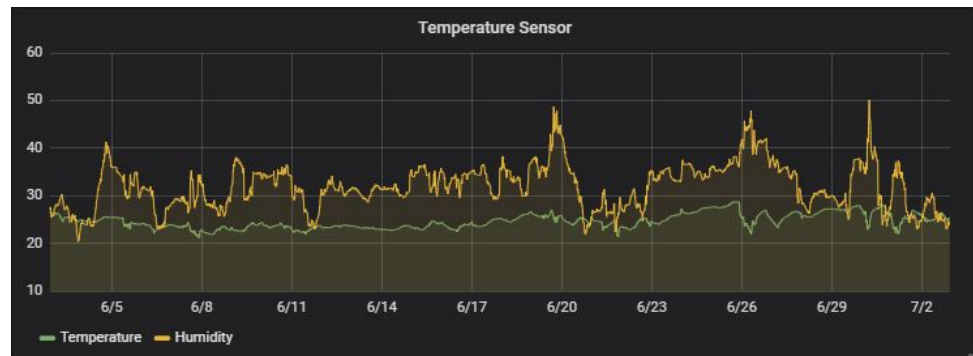
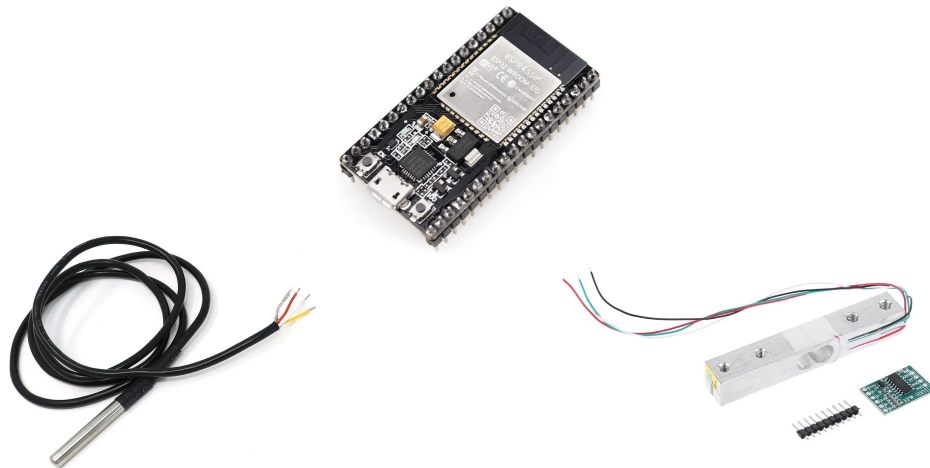
- Hive internal temperature
- Hive weight
- Humidity
- Atmospheric pressure
- CO2 levels inside the hive
- PM2 pollution outside the hive
- Wind speed
- Audio (optional)

In web-app:

- Plot result timeseries data in grafana
- Analytics (graphs) to find correlations/anomalies
- Alerts

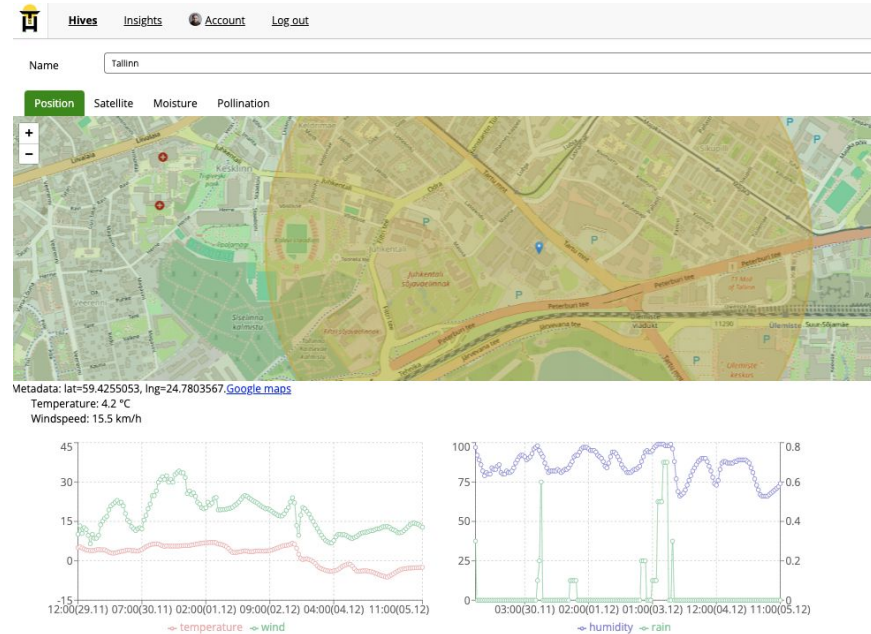
In mobile app:

- easy way to connect device to the app (wifi / LoRa)



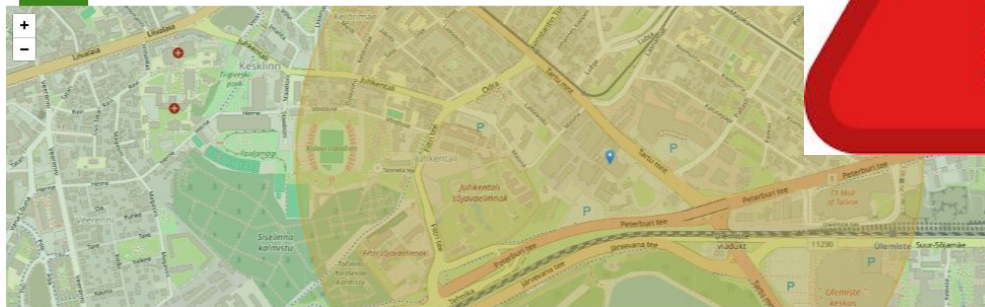
# Weather use-case

- Use Estonian weather data to predict weather
- Alert beekeepers in case of danger



Name

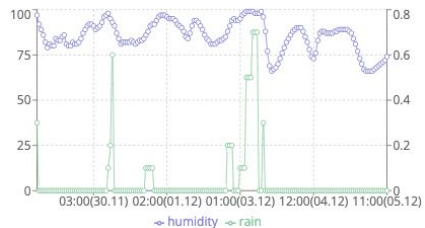
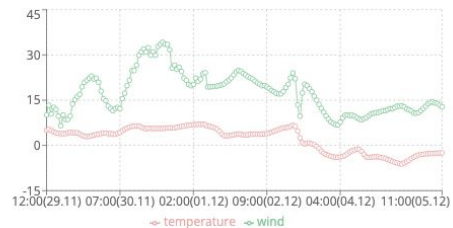
[Position](#)
[Satellite](#)
[Moisture](#)
[Pollination](#)



Metadata: lat=59.4255053, lng=24.7803567 [Google maps](#)

Temperature: 4.2 °C

Windspeed: 15.5 km/h









# Team

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## [Artjom Kurapov](#)

Founding engineer / beekeeper  
(ex-Pipedrive, Clarifai)



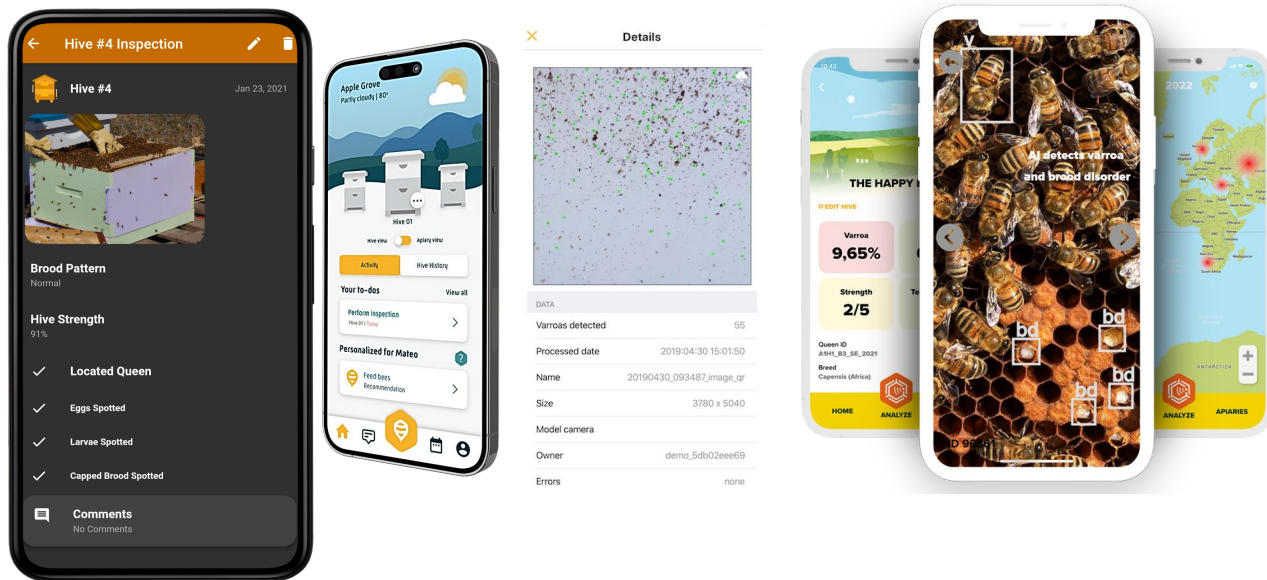
## [Aleksei Prokopov](#)

Robotics, backend engineer



# Competition - Data organizer apps

- nectar.buzz
- BeeScanning
- ApiZoom
- HiveTracks
- HiveBloom
- BeeQueenDetector
- apimanager
- apiary book



# Competition - IoT (audio, humidity, temperature)

- beehero.io
- beep.nl - opensource
- broodminder.com
- beelab.se
- intelligenthives.eu
- beehivemonitoring.com
- solutionbee.com
- beehivemonitoringusa.com
- osbeehives.com
- beesage.co

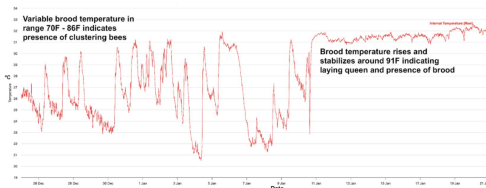


Fig. 2: Using Brood temperature to detect onset of laying queen in late winter/early spring

