



# Modular Robotic Beehive

As a Service



**Artjom Kurapov**  
Founding engineer



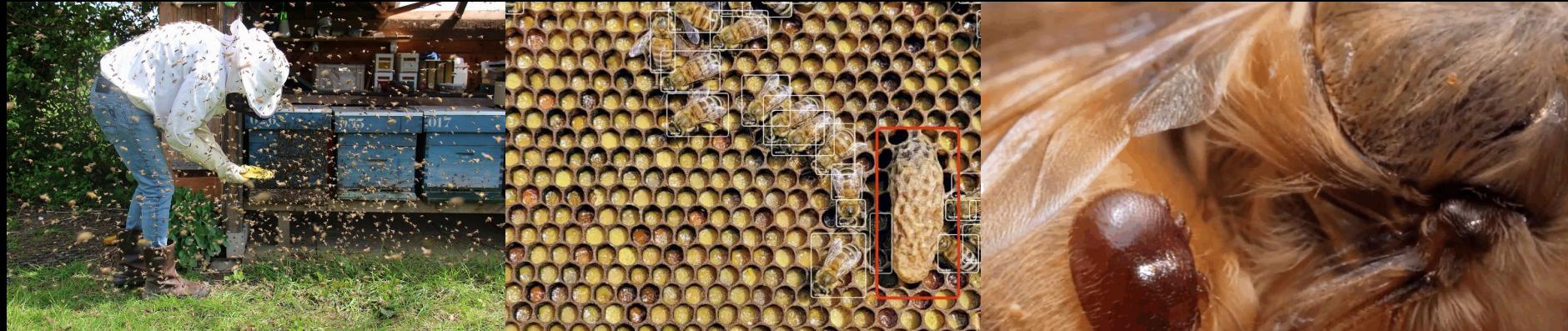
# Problem statement - Food security

- 10 Billion world population people, limited resources, poor pollination coverage
- Farmers can increase crop yields by +37% with precise pollination
- **Beekeepers** providing services to **farmers** earn 9x more  
(compared to simply selling honey)
- Demand of pollination grows 2x faster than growth of honeybee colonies



# Problem statement - Efficiency

- Bees swarm, get infested with mites or can be aggressive
- Beekeepers need to perform weekly inspections
- Beekeepers lose 20-50% of colonies every year, one colony loss impact > 300 EUR
- Common beehives are 150 years old and heavy to inspect
- Physical labour is hard to scale, it is a seasonal activity



# Vision

app

## Data analytics app for beekeepers

Manages state of the apiary

Performs AI detections and provides advices

Stores IoT telemetry

Tracks weather around apiary

Controls modular beehive hardware

State: openly accessible, in development



# Vision



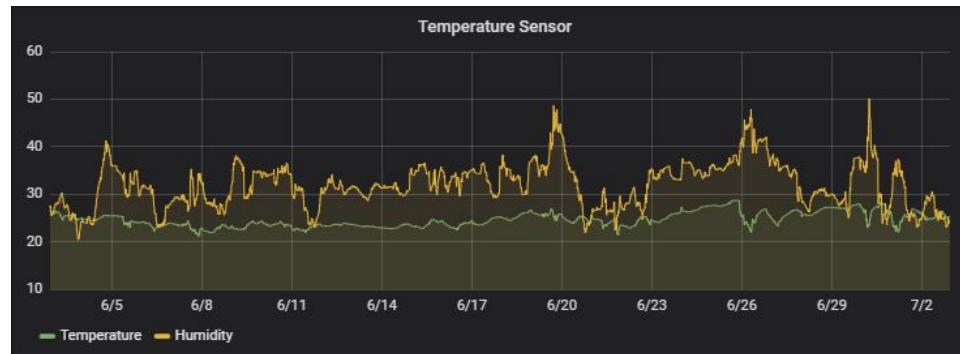
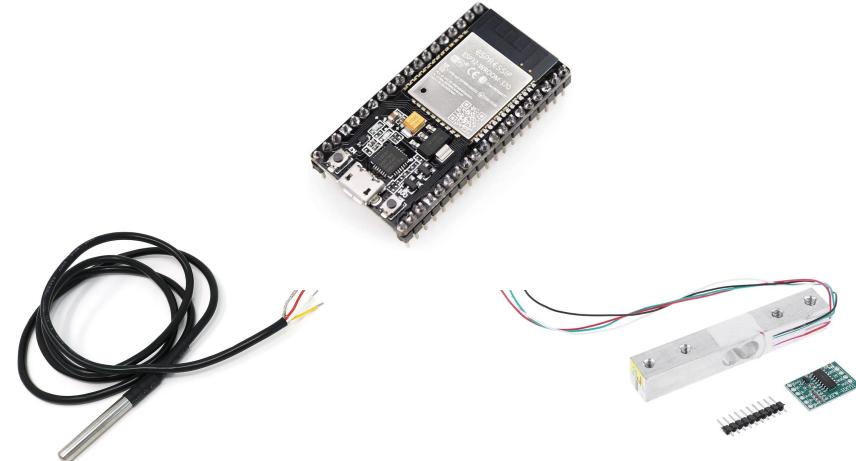
Hardware to send infrequent telemetry data:

Sends hive internal temperature, weight, humidity

Analytics (graphs) to find correlations/anomalies

Sends alerts

Price ~200 EUR



# Vision



Hive entrance video monitoring / IoT device

Video streaming & playback  
Incoming/Outgoing bee count  
Varroa mite, hornet detection

Price ~ 600 EUR



# Vision

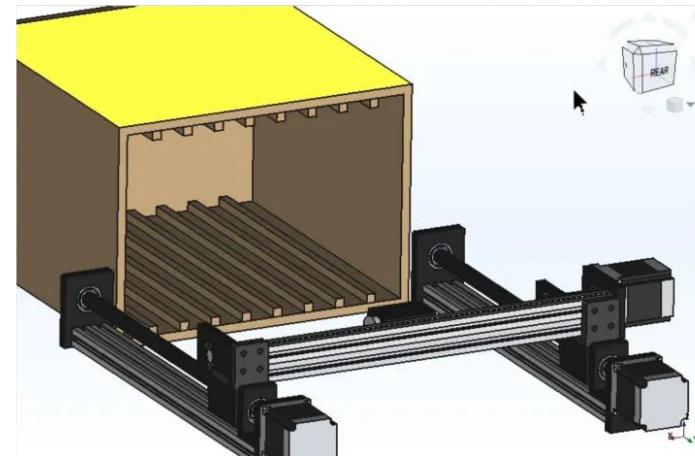


Frame extraction mechanism

Take photos of internal state

Colony demography estimation

Multi-hive robot for cost-effectiveness





# Market Opportunity

Target customers:

semi-professional beekeepers (B2B)

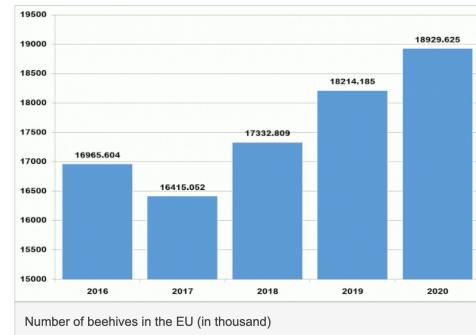
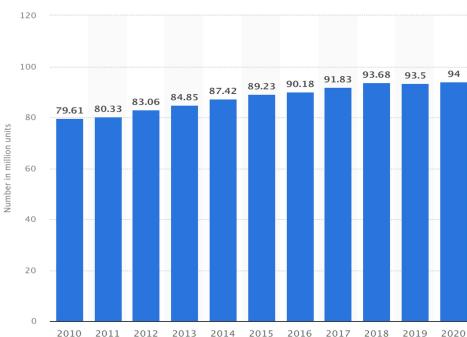
beekeepers selling their services to farmers (B2B2B)

Addressable market - **370 thousand semi-professional beekeepers in Europe**

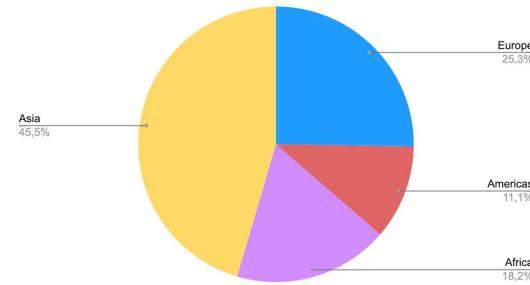
Europe - 620k beekeepers, 19-25M colonies

Estimated ~ 60% beekeepers have > 25 bee colonies

World wide - 2 Million beekeepers



Bee colonies world wide ~100M in 2021



# Business model

Subscription model for data management and analytics, usage dependent

Low-margin hardware with open hardware and software to ease adoption and trust

	Community tier	Essential tier	Professional tier
Subscription model for data management and analytics, usage dependent	free	15 EUR / month 2 weeks trial, annual billing	5 EUR per beehive per month + 10 EUR per user per month
Low-margin hardware with open hardware and software to ease adoption and trust	5 hives max	20 hives max	

	🐝 Beehive IoT sensors	⌚ Entrance Observer	🤖 Robotic Beehive	�� Robotic Apiary
Web-app subscription	5 EUR / month	20 EUR / month	50 EUR / month	200 EUR / month
Purchase retail price (estimated)	200 EUR	~ 600 EUR	~ 3000 EUR	~ 10 beehives ~ 6000 EUR
Rent (annual billing)	20 EUR / month	50 EUR / month	250 EUR / month	500 EUR / month





# Market estimate for IoT sensor product

Estimated EU market penetration = 70%

Essential tier monthly price = 15 EUR/month

Essential tier estimated beekeeper ratio = 80%

$$620k \times 0.7 \times 0.8 \times 15 = \mathbf{62.5M \text{ EUR MRR}}$$

Pro tier monthly price = 15 EUR/month

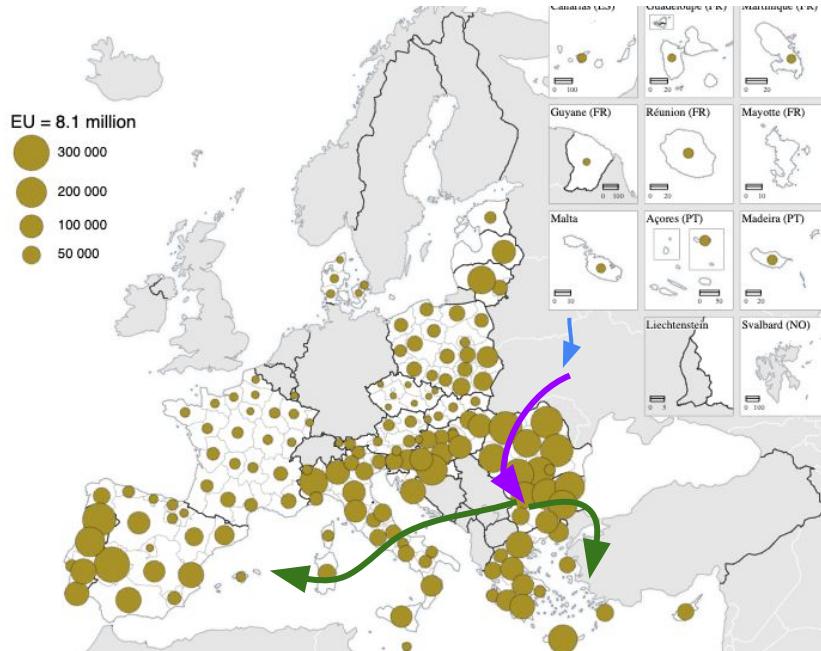
Essential tier estimated beekeeper ratio = 80%

Estimated average hive count = 32

Estimated IoT sensors coverage = 50%

$$620k \times 0.7 \times 0.2 \times 32 \times 0.5 = \mathbf{16.6M \text{ ARR}}$$

Go to market strategy by region





# Team

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## Artjom Kurapov

Founding fullstack engineer, beekeeper  
(ex-Pipedrive, Clarifai)



## Aleksei Prokopov

Robotics, backend engineer  
(ex-Fits.me, ex-Coop)



## Kurban Ramazanov

UX engineer volunteer

Research advisors, Estonia

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## **Vyatšeslav Kekšin**

Researcher, PHD student  
TalTech



## **Šimon Bilík**

Researcher, PHD  
System engineer / Beekeeper



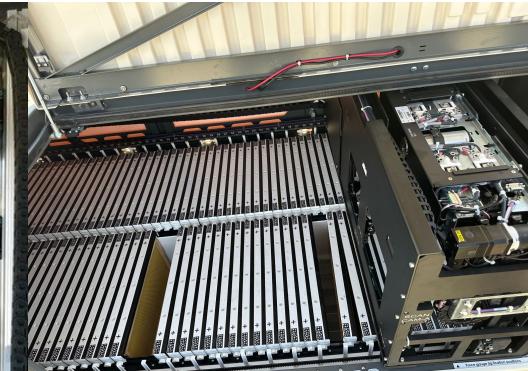
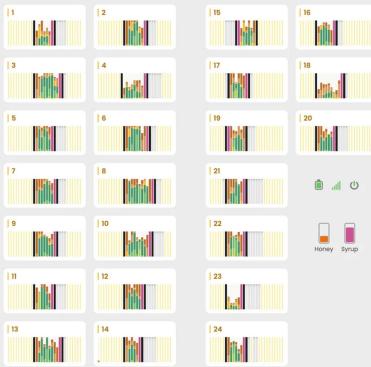
## Adam Ligocki

ML engineer, PHD



# Competition - Vision AI and hardware

- [beewise.ag](http://beewise.ag) - robotic multi-colony container hive
- [beehero.io](http://beehero.io) - IoT
- [beemate.buzz](http://beemate.buzz) - counts bees
- [nectar.buzz](http://nectar.buzz)
- [apic.ai](http://apic.ai)
- [bestbees.com](http://bestbees.com)



# Traction

- 100 registered users (0 paying)
  - 10 mobile app installs
- Community and volunteer building
  - 5+ contributors
  - 70+ discord members
  - Reached out from local research institutions  
(Kood Jõhvi, Vidrik.TalTech, University of Tartu)
- Publicity
  - 2 interviews to local newspapers
  - 200+ followers on linkedin
- Marketing channels
  - Facebook ad for beekeeping communities
  - Telegram channels for beekeepers
  - Local beekeeping group meetups





Raising 1M pre-seed round for 24 months runway

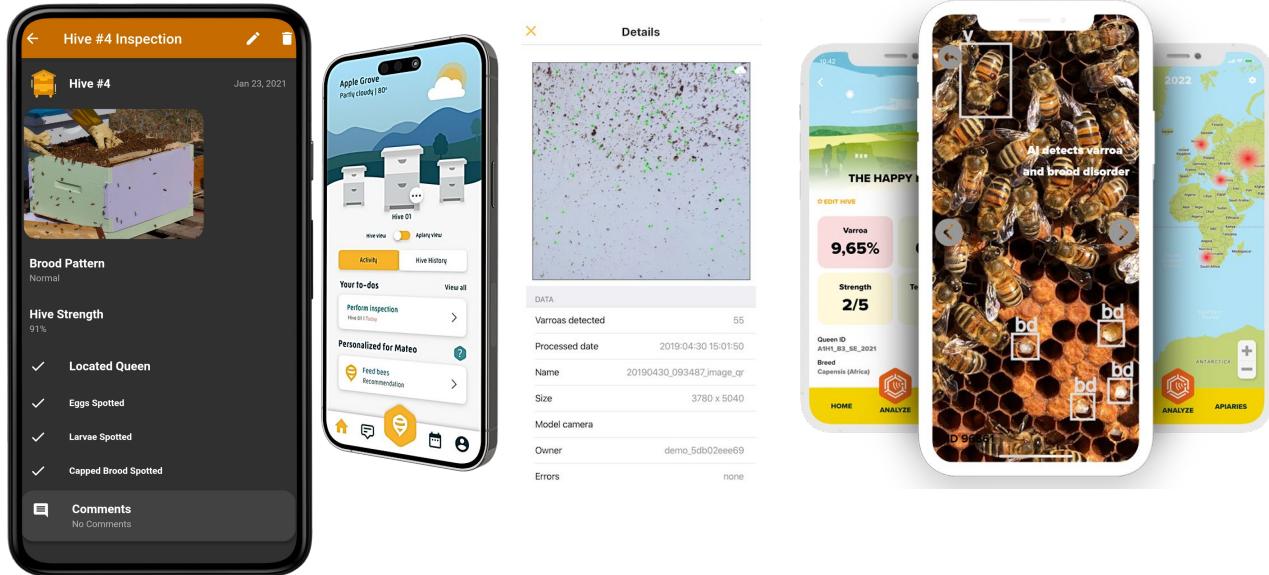
- Min. 2 summers are needed for field testing
- **Team of 4** + external contractors & beekeepers
- IoT sensors product development and release to the market
- Field testing with local beekeepers
- Entrance observer product development
- Robot prototype development

[pilot@gratheon.com](mailto:pilot@gratheon.com)



# Competition - Data organizer apps

- 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

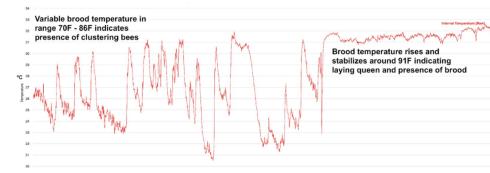


Fig. 2: Using Brood temperature to detect onset of laying queen in late winter/early spring

