



# Modular Robotic Beehive

As a Service



**Artjom Kurapov**  
Founding engineer

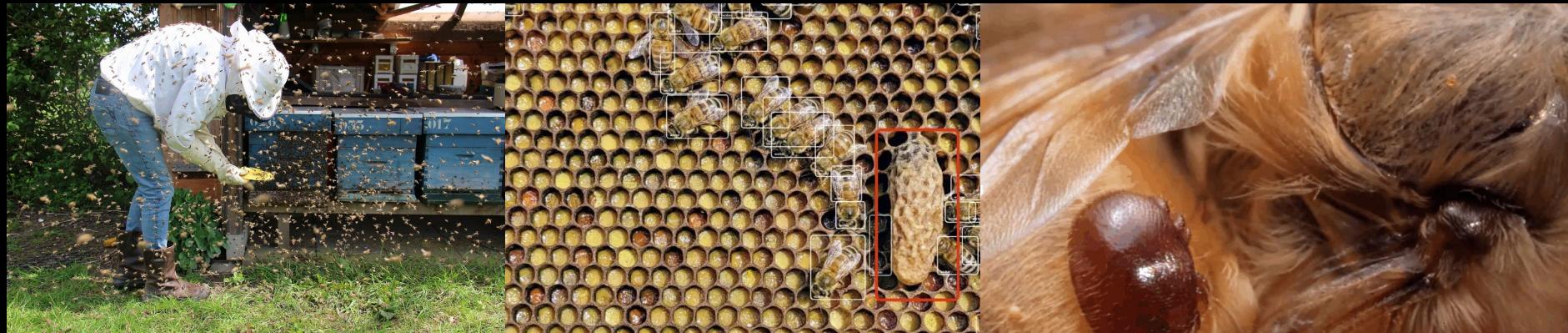
# Problem statement - Food security

- World population to reach 10 Billion, limited resources, need of advanced food production
- 75% of leading crop types are dependent on bees pollinating them (coffee, tomatoes, apples, almonds)
- Farmers can increase crop yields by +37% with precise pollination
- **Beekeepers** providing services to **farmers** earn 9x more than from selling honey
- Demand of pollination grows 2x faster than growth of honeybee colonies



# Problem statement - Efficiency

- Beekeepers lose 20-50% of colonies every year, a single colony loss impact > 350 EUR
- Bees swarm, get infested with mites or can be aggressive
- Beekeepers need to perform weekly inspections
- Common beehives are 150 years old and heavy to inspect
- Physical labour is hard to scale, it is a seasonal activity





# Vision



## Data analytics app for beekeepers

Manages state of the apiary

Performs AI detections and provides advices

Controls modular beehive hardware

State: openly accessible, in development

The screenshot displays two main sections of the Vision app. On the left, a data analysis interface shows statistics for two locations: 'Talve tee 22' and 'Tallinn'. 'Talve tee 22' has 11316 frames, 9970 brood cells, and 128 empty cells, with counts for green (6), roohelised (5), and blue (4). 'Tallinn' has 1208 frames, 3265 brood cells, and 64 empty cells, with counts for green (3), yellow (2), and blue (1). On the right, a detailed view of a beehive frame shows a grid of hexagonal cells colored in shades of yellow, green, and blue, representing different stages of the life cycle or health status. A sidebar provides controls for managing the hive, including options to add deep, super, or entrance frames, and to add comb, foundation, or queen cups. The interface is designed to be both informative and interactive for beekeepers.





# Vision



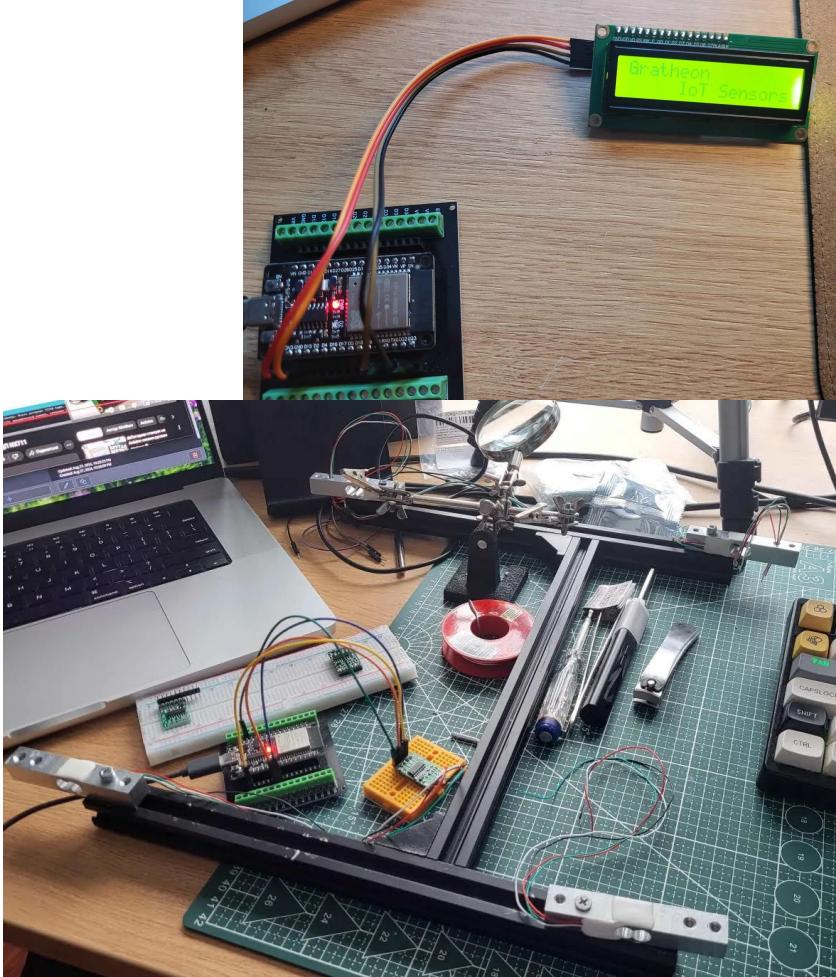
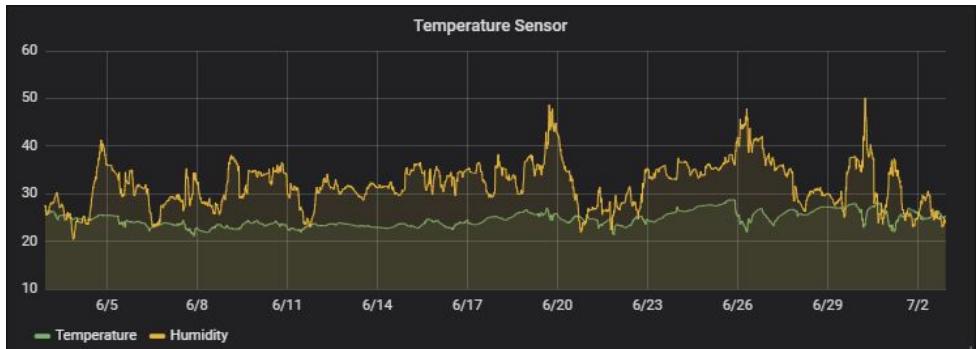
## Affordable set of sensors as beehive base

Sends hive internal temperature, weight, humidity

AI to detect anomalies

Sends alerts in case of swarming, storms, bear attack

Price ~200 EUR





# Vision



## Hive entrance video monitoring device

Incoming/Outgoing bee count to estimate colony strength

Varroa mite detection to estimate infestation level

Alerts on hornet attack or stealing state

Video streaming & playback

Price ~ 600 EUR





# Vision

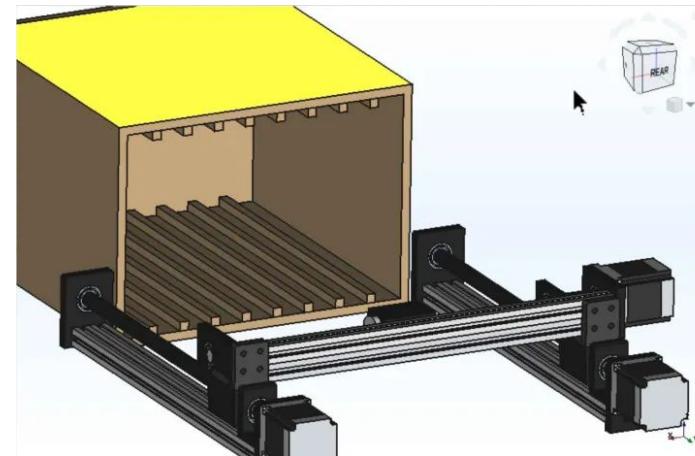


Frame extraction mechanism to autonomously inspect colony internal state

Alerts in case of swarming, starvation or missing queen

Colony development over time

Multi-hive robot for cost-effectiveness





# Customer

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

Europe in total has 620k beekeepers, 19-25M colonies

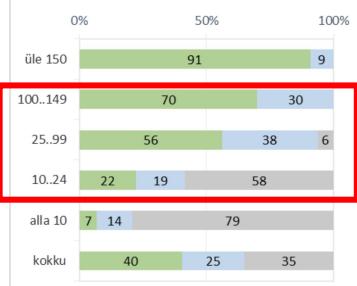
~ 60% beekeepers have > 25 bee colonies

> 50% have legal company (thus B2B)

Additional users - hobby beekeepers

Early adopters - young, tech-savvy beekeepers

percentage of customers registered as company, depending on amount of hives, (based on estonian market research)



age distribution depending on hive count (based on estonian market research)



number of beehives in EU over the years (in thousands)

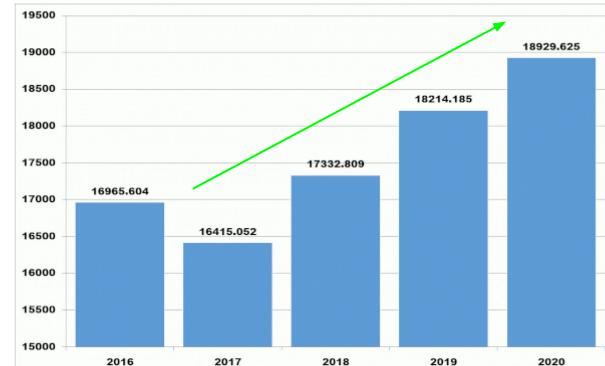


Table 1 – Number of beekeepers in selected EU countries

EU countries with more than 20 000 beekeepers	Total number of beekeepers	Beekeepers with >150 hives	
		Number	Average No of hives
Germany	116 000	81	587
Poland	62 575	324	272
Italy	50 000	2 000	413
Czech Republic	49 486	107	260
France	41 560	1 717	366
United Kingdom	37 888	50	443
Austria	25 277	380	233
Greece	24 582	7 288	165
Spain	23 816	5 361	406
Romania	22 930	1 545	194
Hungary	21 565	1 546	218





# Business model

Subscription model for data management and analytics, usage dependent

## Community tier

free

## Essential tier

**15 EUR / month**  
2 weeks trial, annual  
billing

## Professional tier

**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

Moat - hardware-to-software integration,  
Hard to migrate (telemetry) data out

	🐝 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%

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

Pro tier monthly price = 5 EUR/month/hive + 10 EUR/user

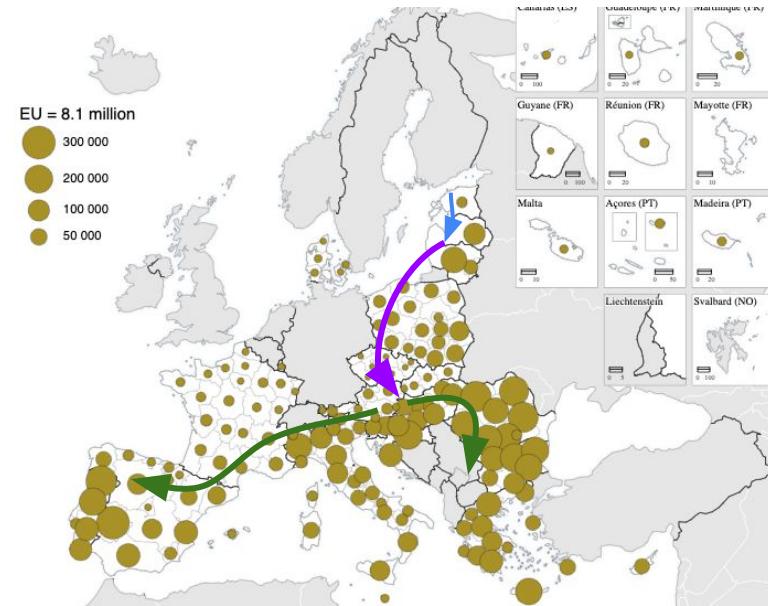
Pro tier estimated beekeeper ratio = 20%

Estimated average hive count = 32

Estimated IoT sensors coverage = 50%

$$620k \times 0.7 \times 0.2 \times (10 + 5 \times 32 \times 0.5) = \mathbf{93.7M ARR}$$

[Go to market strategy by region](#)





# Team

Research and engineering heavy team  
with unique [company values](#)



**[Artjom Kurapov](#)**

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



**[Aleksei Prokopov](#)**

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

Research advisors, Estonia



**Vjatšeslav Kekšin**

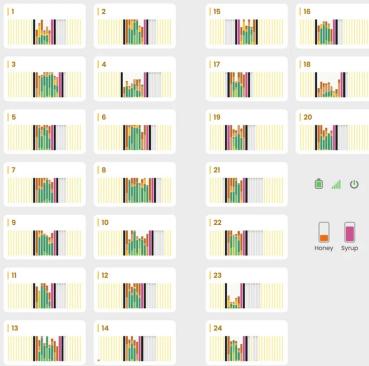
Researcher, PhD student  
TaTech





# Competition in AI vision and robotics

- [beewise.ag](http://beewise.ag) - robotic multi-colony container hive, total raised 120M \$
- [beehero.io](http://beehero.io) - IoT, total raised 64M \$
- [nectar.buzz](http://nectar.buzz) - SaaS, raised 820k \$
- [beemate.buzz](http://beemate.buzz) - counts bees
- [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

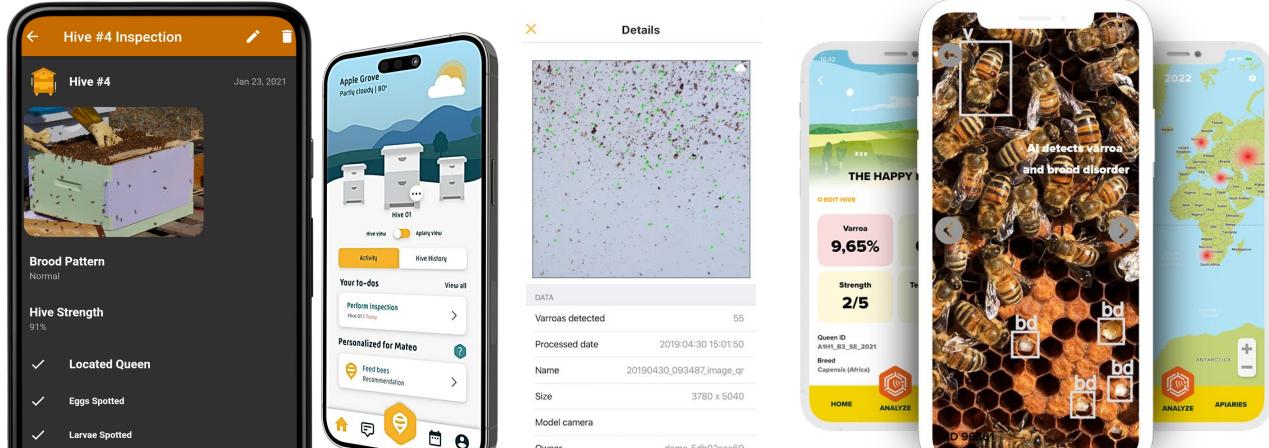
[pilot@gratheon.com](mailto:pilot@gratheon.com)





# Competition - Data organizer apps

- BeeScanning
- ApiZoom
- HiveTracks
- HiveBloom
- BeeQueenDetector
- apimanager
- apiary book



# Competition - IoT (audio, humidity, temperature)

- 3bee.com
- beep.nl - opensource
- broodminder.com
- beelab.se
- intelligenthives.eu
- beehivemonitoring.com
- solutionbee.com
- beehivemonitoringusa.com
- osbeehives.com
- beesage.co

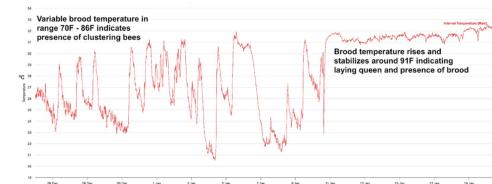


Fig. 2: Using Brood temperature to detect onset of laying queen in late winter/early spring

