



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





Data analytics app for beekeepers

Manages state of the apiary

Performs AI detections and provides advices

Controls modular beehive hardware

The screenshot displays the Beekeeper app's interface, which includes a navigation bar at the top with icons for Hives, Account, Analytics, and Log.out. Below the navigation bar, there are two sections: "Talve tee 22" and "Tallinn".

Talve tee 22: This section shows a grid of colored boxes representing beehive components. The counts for each color are: 11316 green, 9970 orange, 128 blue, 3 green, 2 yellow, and 1 yellow. Below this, there is a table for "Beehives #11" with columns for "Beehives", "Lover", and "Aggressive". The values are 1208, 3265, and 64 respectively.

Tallinn: This section shows a similar grid of colored boxes for the Tallinn location. The counts for each color are: 11316 green, 9970 orange, 128 blue, 3 green, 2 yellow, and 1 yellow. Below this, there is a table for "Beehives #12" with columns for "Beehives", "Lover", and "Aggressive". The values are 1208, 3265, and 64 respectively.

Analytics and Control Panel: On the left side of the main area, there is a panel for managing a specific hive. It includes fields for "Name" (hive), "Queen" (buckfast), and "Notes". Below these are buttons for "Add deep", "Add super", "Add entrance", "Add comb", "Add foundation", and a dropdown menu. A small preview image of the hive's internal structure is shown below these buttons.

AI Detection and Monitoring: The main right-hand portion of the screen shows a live video feed of a beehive frame. The video is overlaid with various colored hexagonal markers (blue, green, yellow) representing different types of bees or AI-detected features. A legend at the top of this section identifies the colors: 9% (blue), 12% (green), 14% (yellow), 39% (grey), and 12% (orange). Other buttons visible in this section include "Worker bees(182)", "Drones", "Queen+", "Queen cups", "Clear drawing", "Undo", "Remove frame", and "Close".





Vision

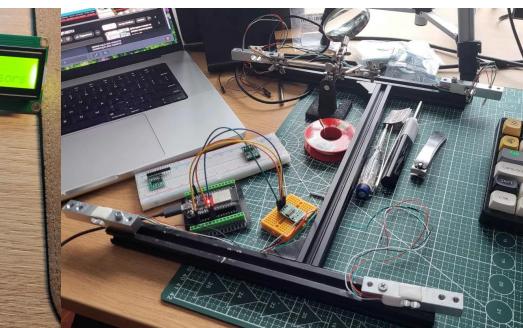
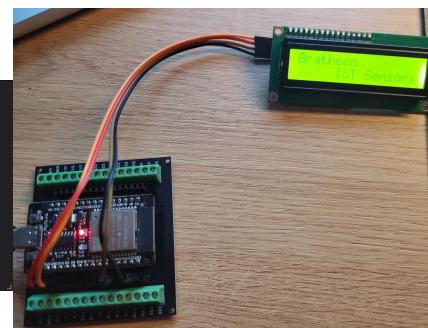
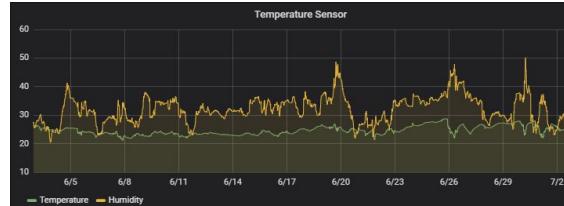
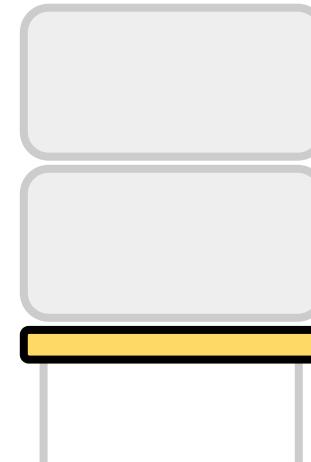


Affordable set of sensors as beehive base

Sends hive internal temperature, weight, humidity

AI detects anomalies

Sends alerts in case of swarming, storms, bear attack



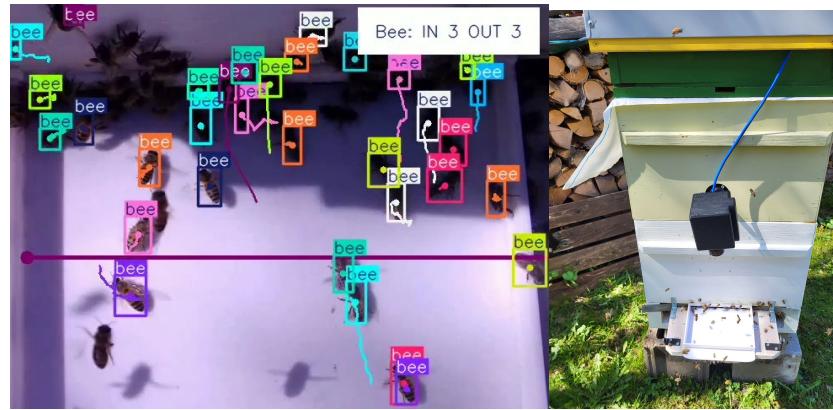
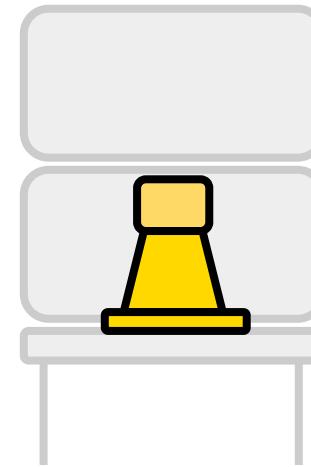


Hive entrance video monitoring device

Incoming/Outgoing bee count to estimate colony strength

Hornet and Varroa mite detection

Video streaming & playback



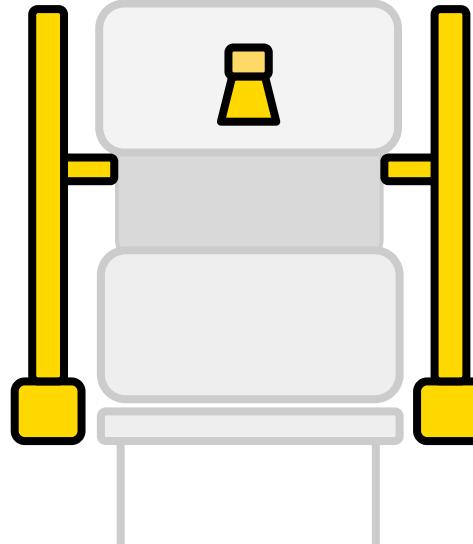
Vision



Beehive section lifting mechanism

Camera to capture photos of the hive frames

On wheels to manage multiple hives



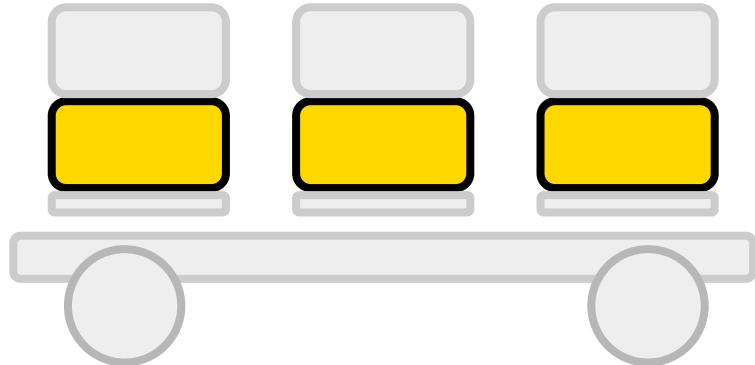


Vision



Automatic inspections of multiple hives

Car-towed / mobile for easy positioning in the field





Customer

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

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

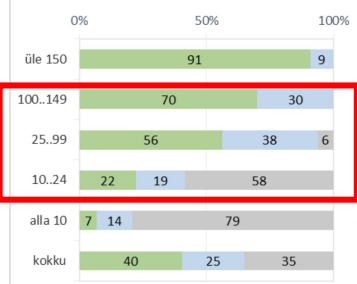
~ 60% beekeepers have > 25 bee colonies

> 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)

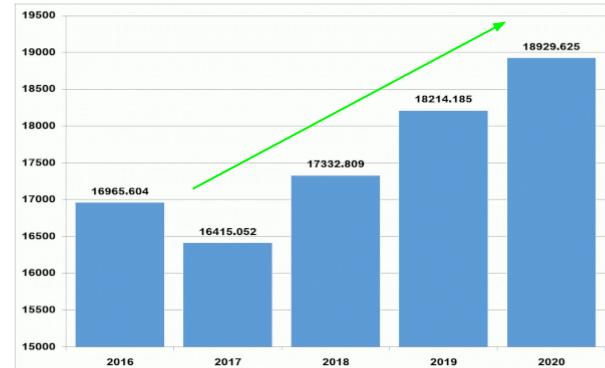


Table 1 – Number of beekeepers in selected EU countries

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

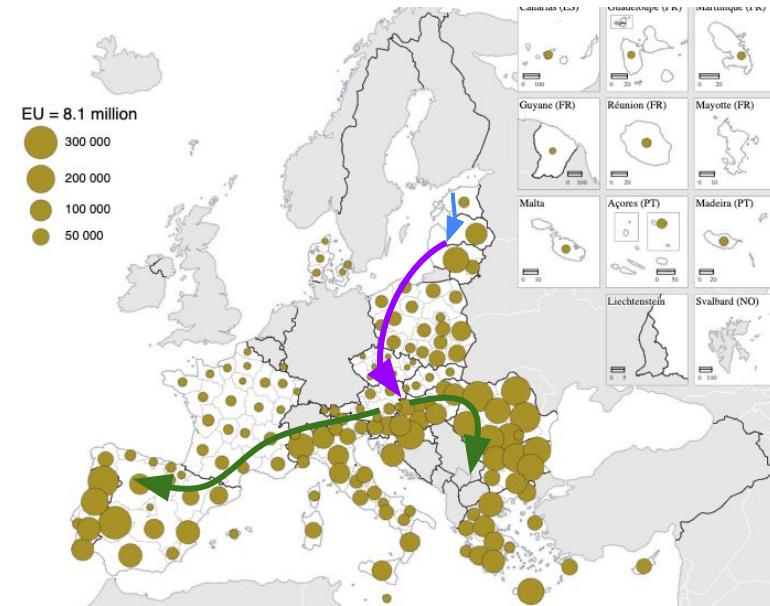
Pro tier estimated beekeeper ratio = 20%

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

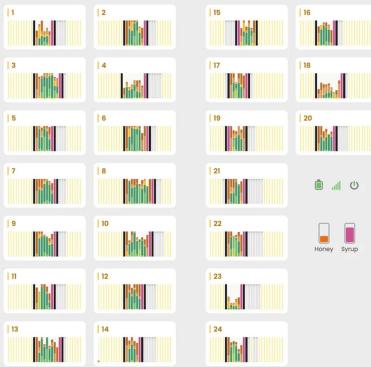
Researcher, PhD student
TaTech





Competition in AI vision and robotics

- beewise.ag - robotic multi-colony container hive, total raised 120M \$
- beehero.io - IoT, total raised 64M \$
- nectar.buzz - SaaS, raised 820k \$
- beemate.buzz - counts bees
- apic.ai
- 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

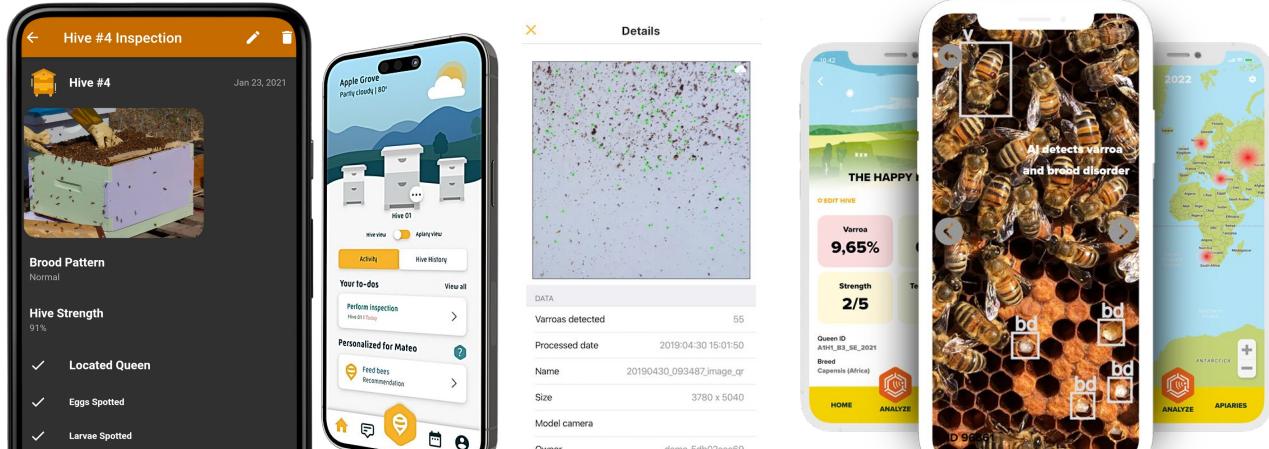
pilot@gratheon.com





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

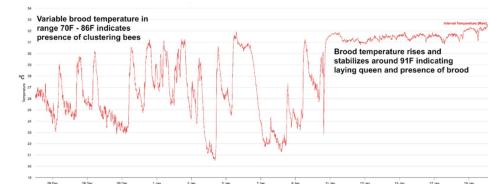


Fig. 2: Using Brood temperature to detect onset of laying queen in late winter/early spring

