BEE HAPPY DASHBOARD

Web-based visual analysis application by D3

NTNU Data Visualization

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Introduction - The importance of bees

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80%

Of plants rely on bee pollination

60%

Less apples without bees

33%

Less food without insect pollination

Bee - Third Most Important Farm Animal in the World

Today **50 % less bees** in Germany.

06.02.2020 National Geographic

50 % decrease of beehives in North America since 1961.

2014 FAO – Food and Agriculture Organization of United Nations

"Bees are under great threat from the combined effects of climate change, intensive agriculture, pesticides use, biodiversity loss and pollution" *20.05.2019 FAO's Director-General José Graziano da Silva*

Our Mission: **Data-Driven Health Monitoring of Beehives**

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Target group: beekeepers

Problem:
Traditional beekeeping is time-consuming and an intensive process

Solution:
Interactive monitoring dashboard of live bee data of a beehive to support **the beekeeper's decision-making process**.

- Finding the optimal time point for harvesting, feeding, and parasite treatment
- **Saves time** by utilizing data visualization to inform actions and **enhance convenience** while performing beekeeping tasks
- Gives an **improved understanding** of beekeeping and beehive behaviors.
- Allows comparison of beehive behavior with **local weather** variables in Germany.

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USAGE SCENARIO

"Sylvie is a beekeeper that maintains a beehive in her backyard. She wishes for the beekeeping process to be more time efficient and convenient. She grows tired of the time-consuming process of having to put on and take off her protective gear each time she wishes to check on the status of her beehive. Additionally, she finds it inconvenient to carry out this process and physically check on her hive even when it is cold or raining outside.

Using the Bee Happy Dashboard, Sylvie is able to monitor key information relating to the status of her beehive in a more time-efficient and convenient manner from within the comfort of her home. Using the data visualization on the Bee Happy Dashboard, she checks the total weight of her beehive, alongside its internal temperature and humidity. She wants to analyze how this data compares to the status of her hive during the same month last year. She then uses the timestamp tool to filter the data being displayed to this same month last year."

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USAGE SCENARIO

"Sylvie notices the weight of her beehive has decreased since two months ago. She uses the Bee Happy Dashboard to observe if there is any correlation between the activity occurring within her beehive and the weather in her region.

By using the Bee Happy Dashboard, Sylvie is able to look for trends and patterns between key variables and the activity within her beehive. She is also able to check on its general health in a more time-efficient and convenient manner."

Data – self-generating bee data set (every 10 min)

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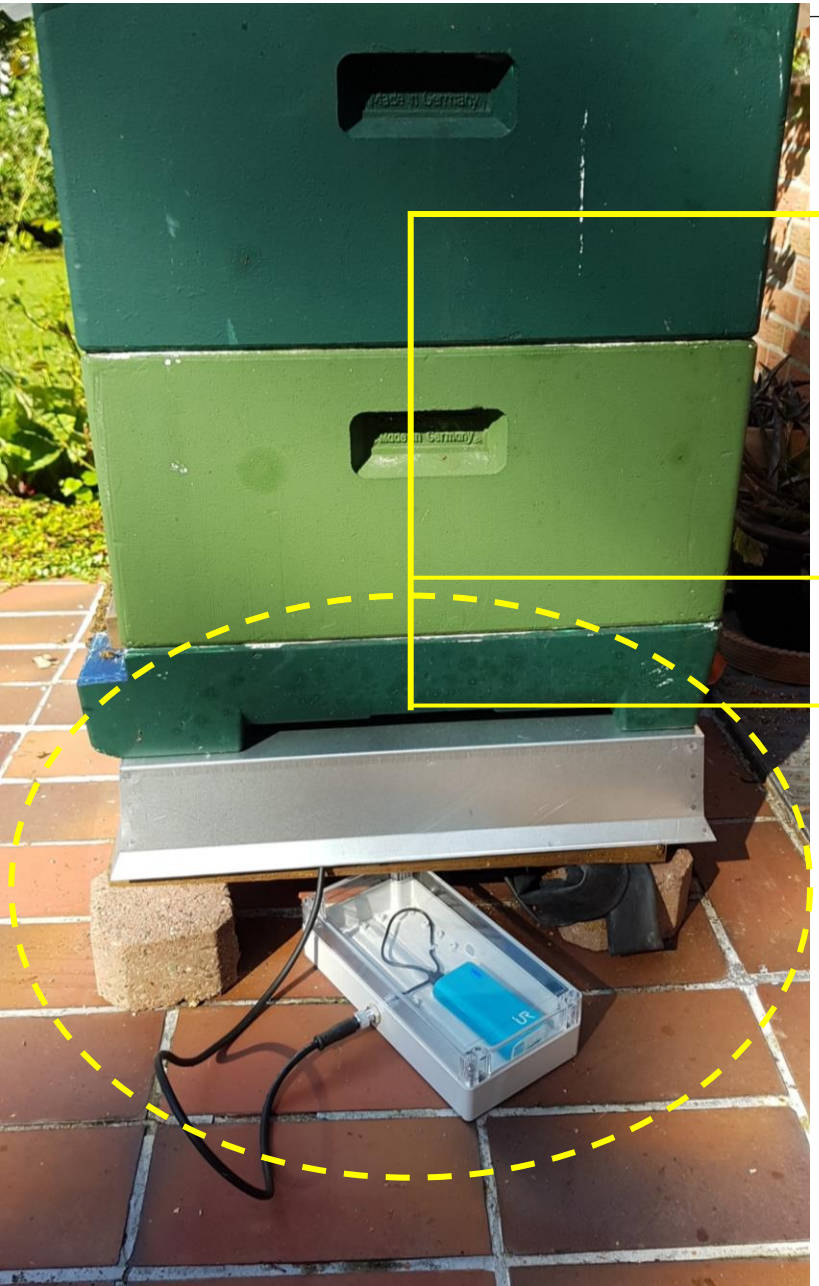
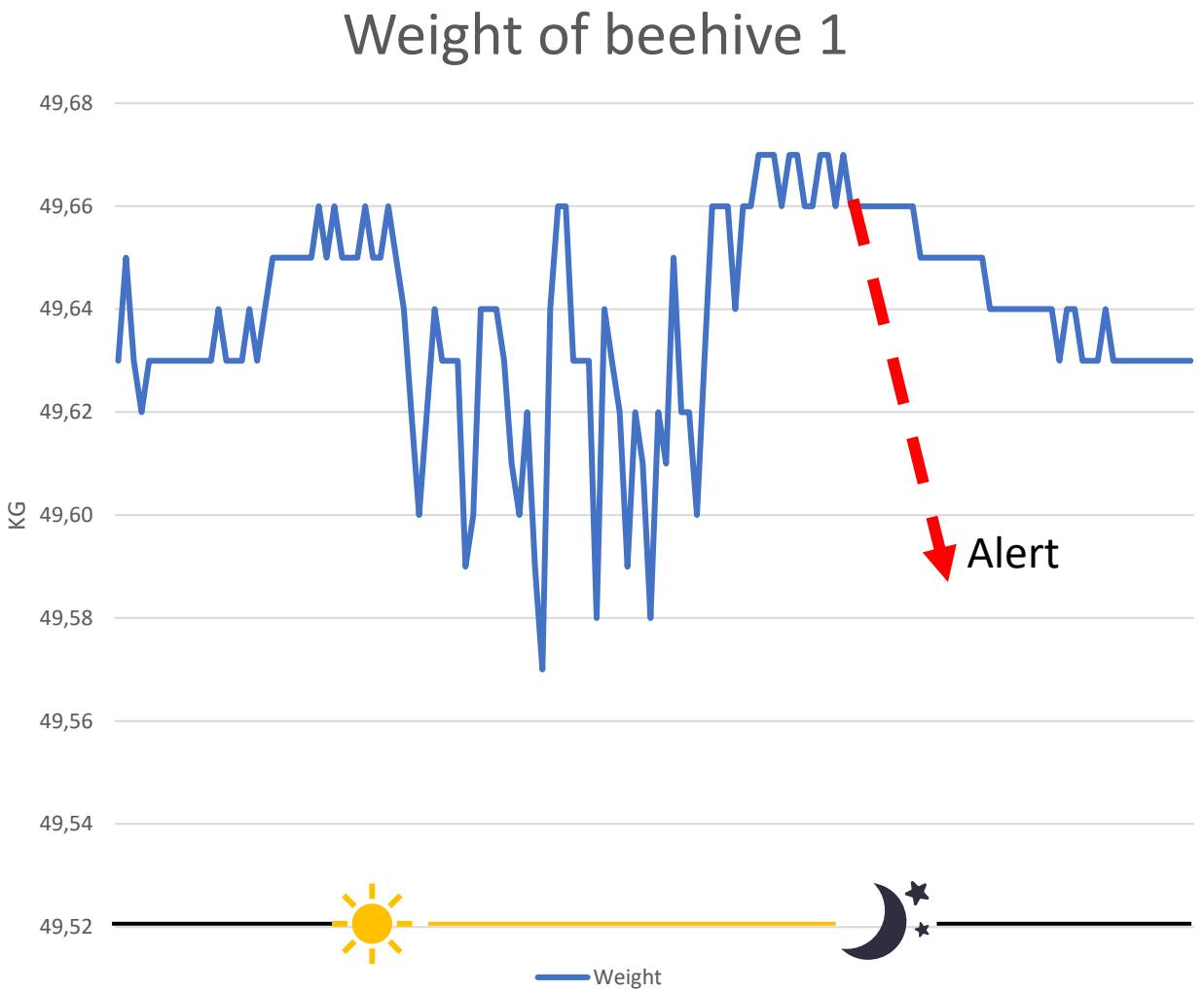


Weight

Temperature

Humidity



The network records data on the following three variables from inside the beehive every 10 minutes.

Data – Environment Datasets from **DWD** (Deutscher Wetterdienst)

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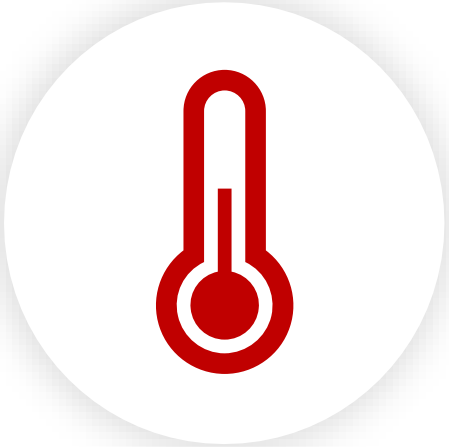
Public datasets were used that measured information on the following data every 10 minutes. This information was gathered in the same area of Germany where the Bee Hive resides.



Temperature

Precipitation

Wind

Solar

Our Bee Happy Dashboard

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1. Displays 3x **Time-Series Line Graphs** with linked brushX and zooming
2. Implemented **ToolTip** for detailed information
3. Shows dynamic **weather** display
4. **Map** of the location of beehives (for future development)

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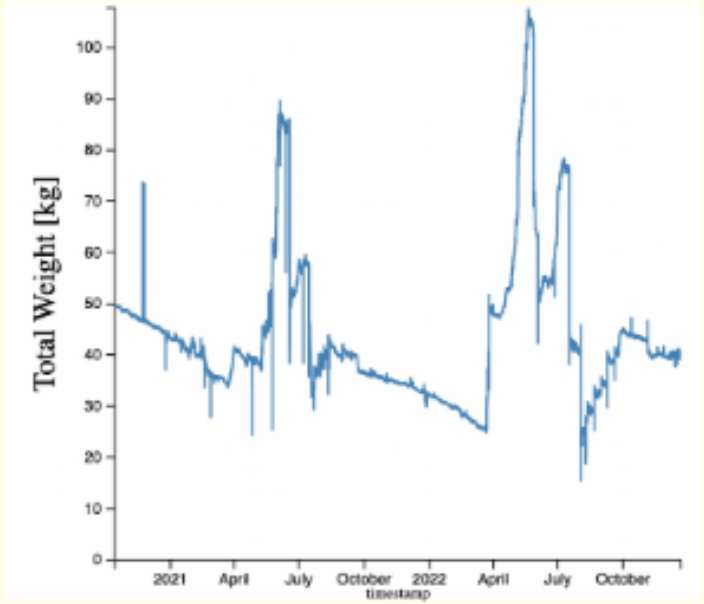
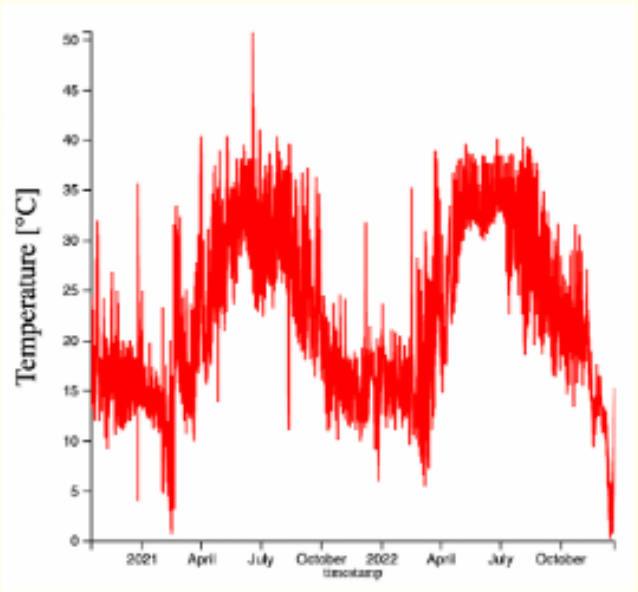
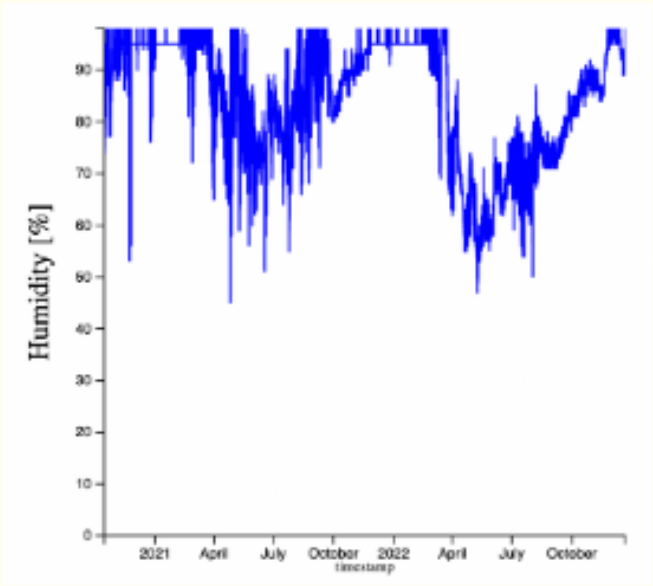
Time-Series Line Graphs



Weight



Temperature



Humidity

Time-series line graphs use a dynamic filtering mechanism to ensure data displayed on all graphs are for the same time period, enabling more convenient viewing.

Through the use of a timestamp filter, the user can drag their cursor across a certain part of the graph to view information from that time period in more detail.

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Dynamic Weather Display

Average Weather Data Approx.

Temperature: 12 ° C

Max Temperature: 39 ° C

Min Temperature: -5 ° C

Humidity: 71

Windspeed: 4 m/s

uvIndex: 11

Precipitation 0 mm

Today's Forecast Approx.

Temperature: 1 ° C

Humidity: 86

Windspeed: 3 m/s

uvIndex: 1

Precipitation: 0.1 mm

Two box displays on the dashboard depict weather data in a concise way.

The left box shows the average of weather data recorded for the current time period being viewed. The right box depicts the weather forecast for the current day.

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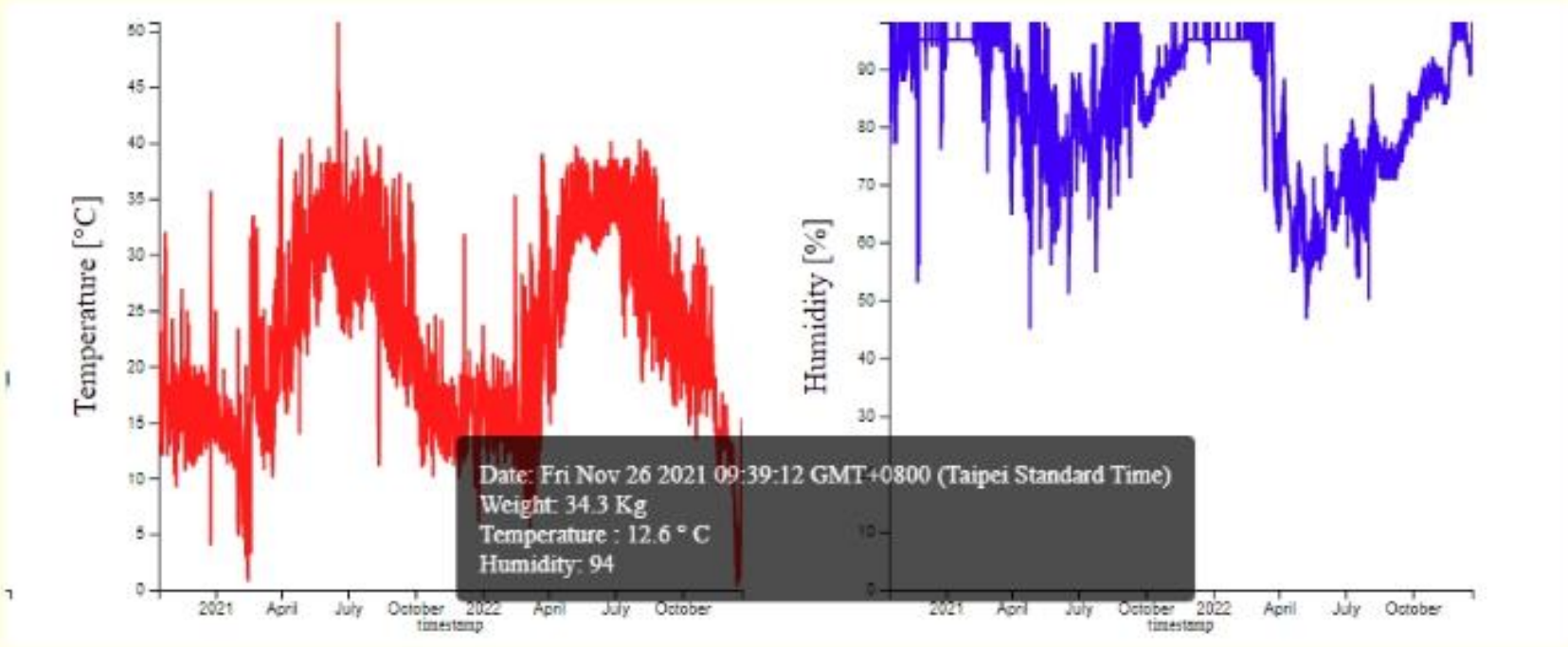
Tooltip Summary Feature



When the user hovers over a particular part of a time-series line graph, the use of a tooltip on each graph allows the user to view a summary of key values relating to the date, weight, temperature and humidity quickly.

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Map

A map is used to depict the location of the hive.

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Demo

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Q&A