IoT Standard Project

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Introduction

- Simulation of health data of different teams.
- 3 Teams:
  - Team1 : Walker
  - Team2 : Runner and sometimes Walker
  - Team3 : Sprinter and sometimes Runner
- Evaluation of their data by simulating :
  - vital parameters : heart rate and body temperature.
  - speed
  - position
  - acceleration
- Simulation of the data via an mqtt broker
- Presentation of the data on a dashboard

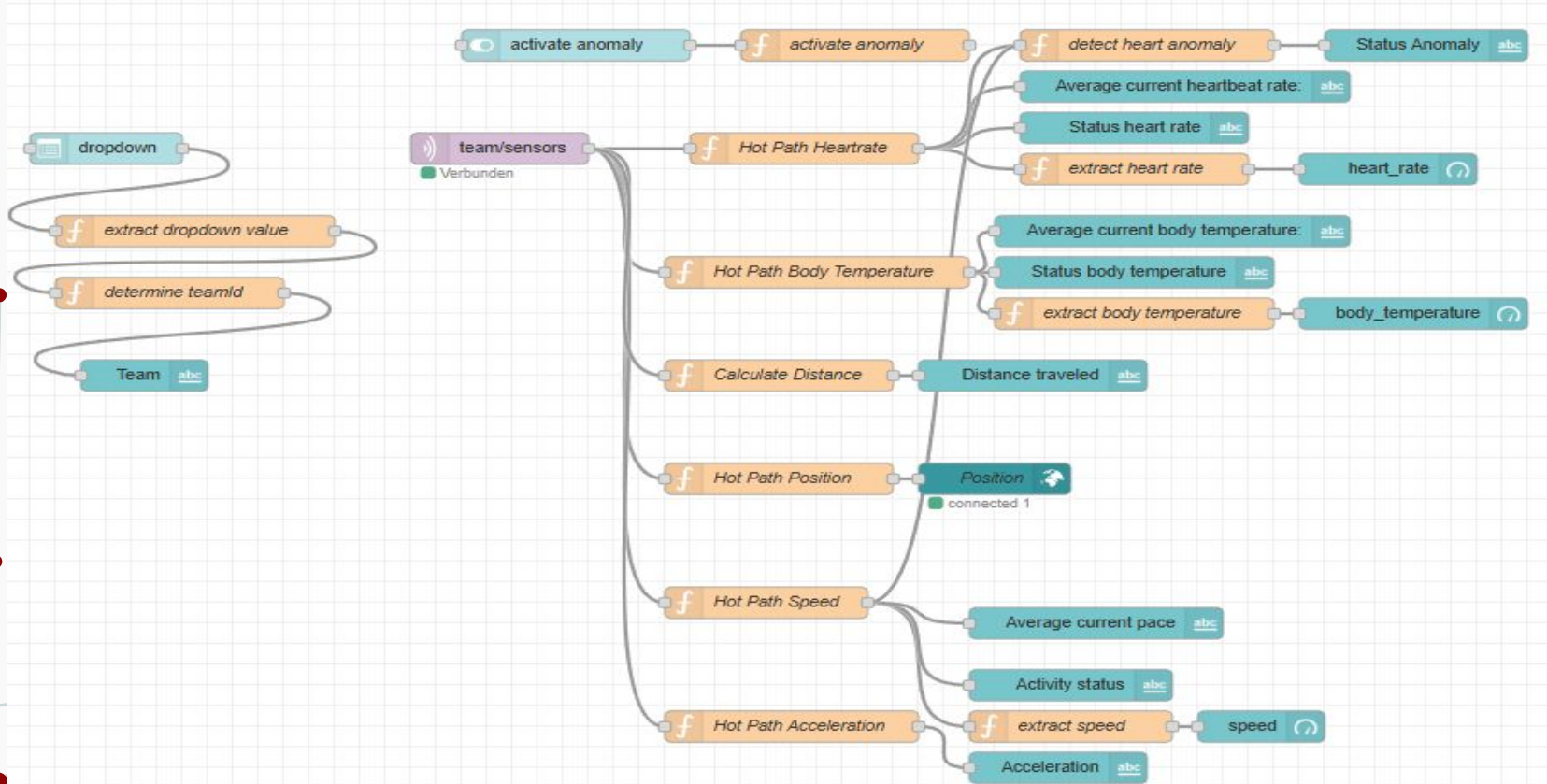
Technical Requirements

- Node-RED: An open-source flow-based development tool for visual programming.
- Node-RED Dashboard: A set of nodes for creating dashboards in Node-RED.
- JavaScript: The programming language used for implementation
- MQTT: A lightweight messaging protocol for streaming the sensor data.
- Node.js: A JavaScript runtime for simulating the sensor data

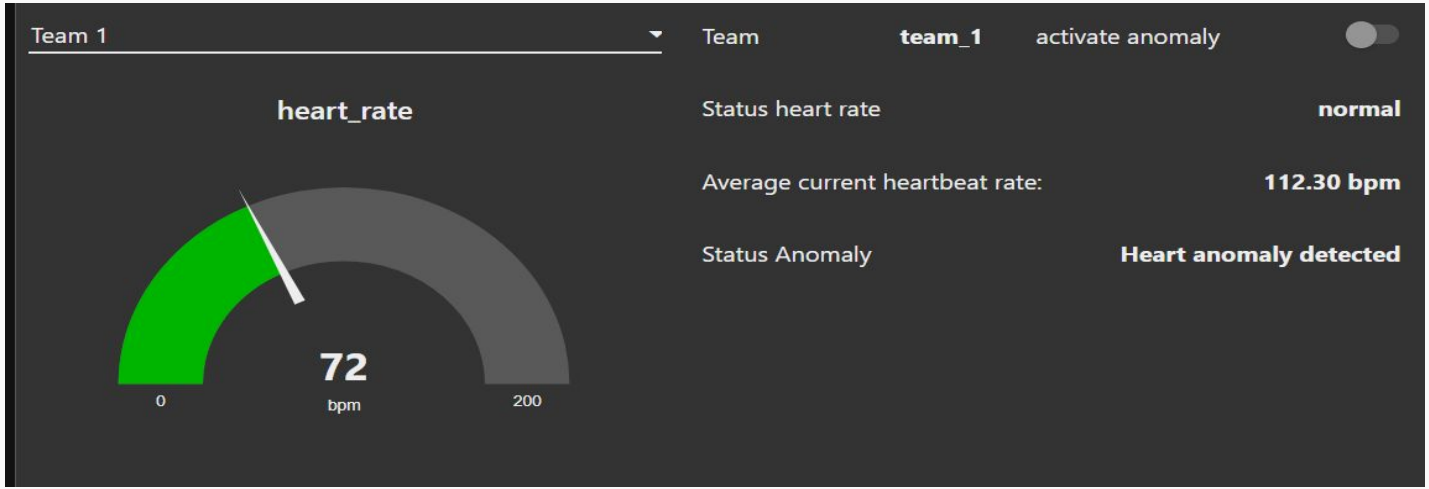
Hot Path Data

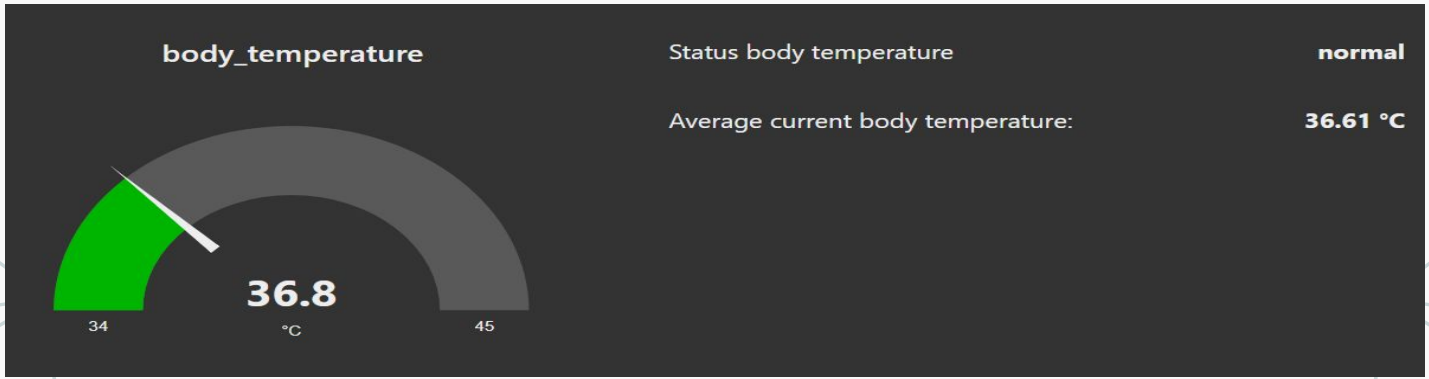
- Displays the generated data received from the mqtt Broker in real time.
- Vital parameters, speed, position and acceleration should be shown on a Node-Red dashboard
- The data will also be processed to get more information of the received values
- Team are choosable at any time and the presentation of combined team values is always possible.

Hot Path Data

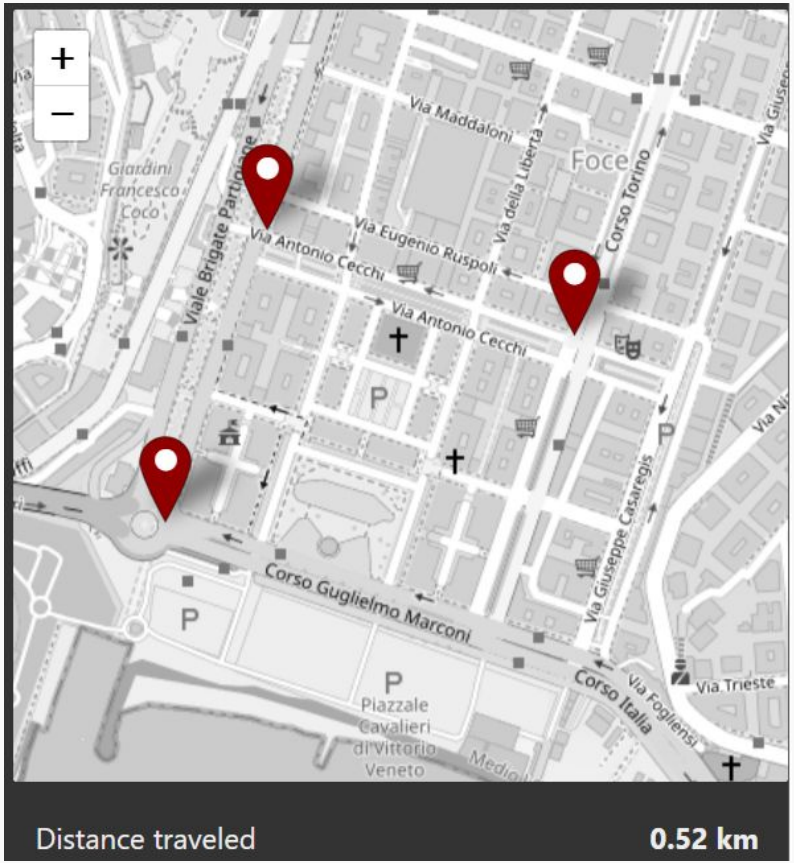


Hot Path Data

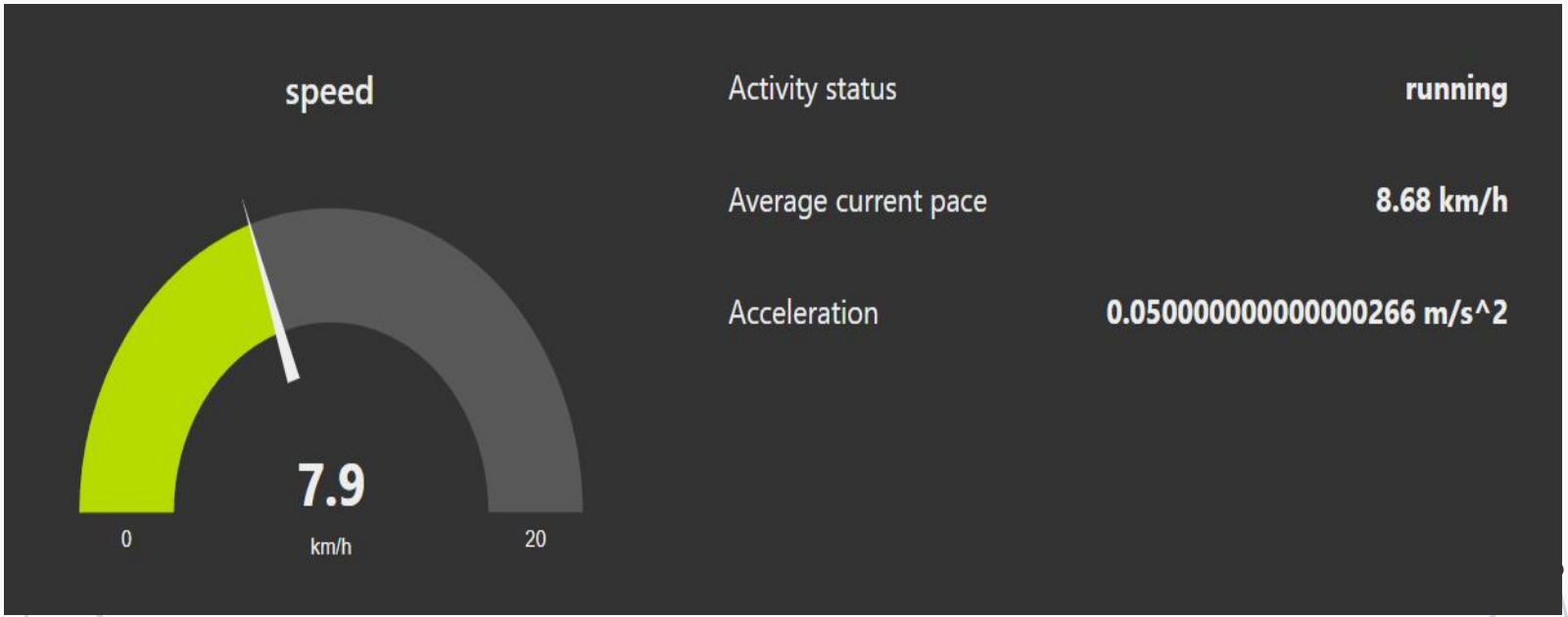




Hot Path Data



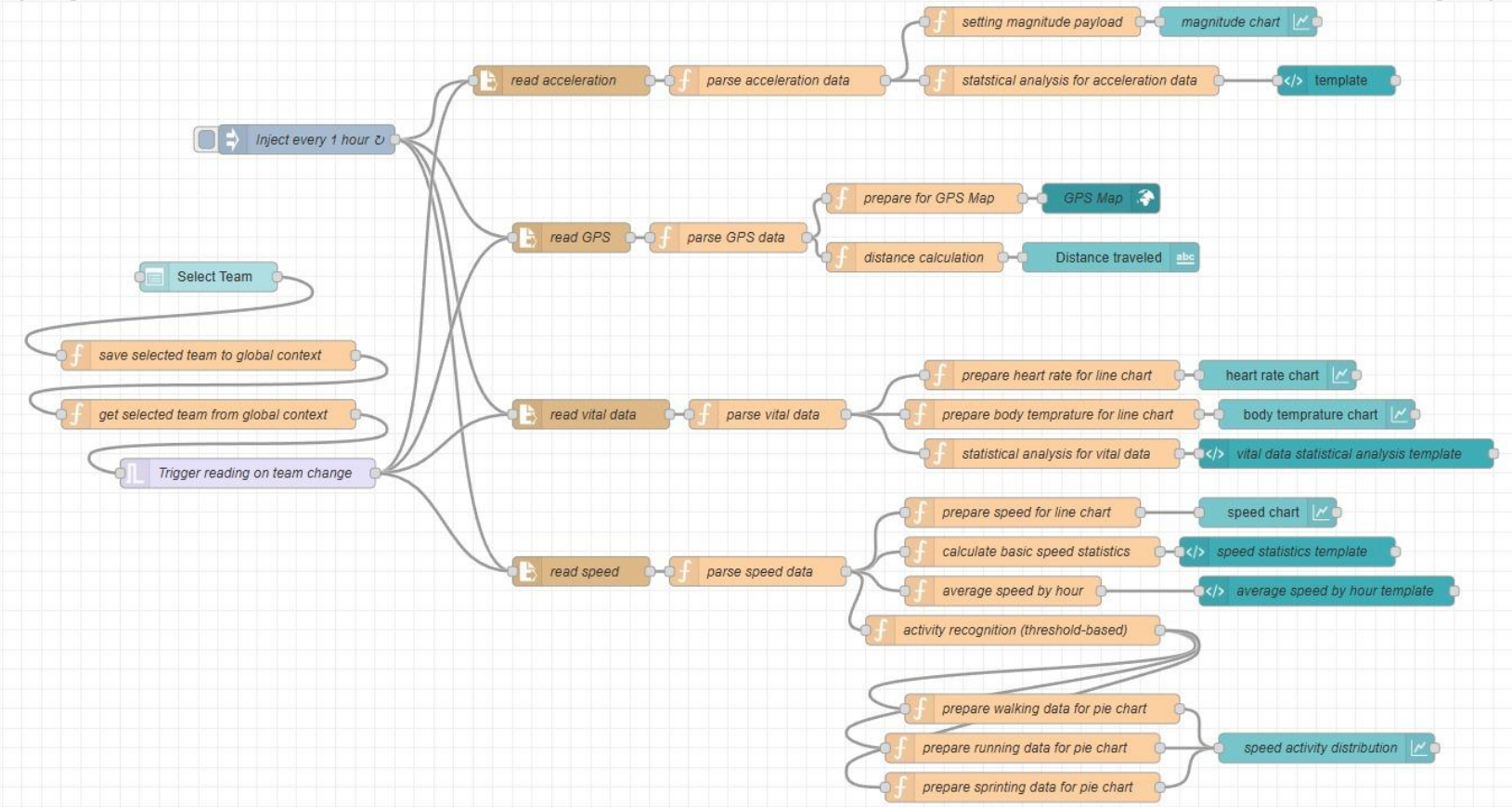
Hot Path Data



Cold Path Data-Processing

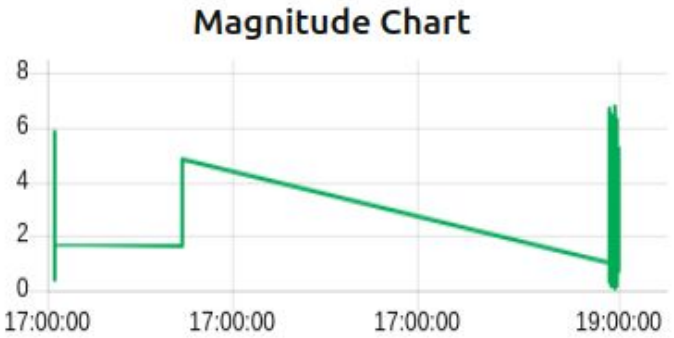
- handles data that isn't time-sensitive but requires analysis to uncover valuable insights over extended periods
- Streamed data is written to csv files of each sensor type
- The data processing is configured to be triggered every hour
- Read and parse the data
- Process the sensor data
- And display it on node red dashboard

The Flow


Inject every 1 hour
Select Team
save selected team to global context
get selected team from global context
Trigger reading on team change
read acceleration
parse acceleration data
setting magnitude payload
magnitude chart
statstical analysis for acceleration data
template
read GPS
parse GPS data
prepare for GPS Map
GPS Map
distance calculation
Distance traveled
read vital data
parse vital data
prepare heart rate for line chart
heart rate chart
prepare body temprature for line chart
body temprature chart
statistical analysis for vital data
vital data statistical analysis template
read speed
parse speed data
prepare speed for line chart
speed chart
calculate basic speed statistics
speed statistics template
average speed by hour
average speed by hour template
activity recognition (threshold-based)
prepare walking data for pie chart
prepare running data for pie chart
prepare sprinting data for pie chart
speed activity distribution

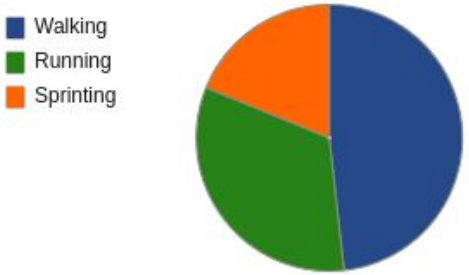
Cold Path

Select Team All teams



Acceleration Statistic	X	Y	Z	Magnitude
Mean	-1.33	-1.32	-1.36	2.88
Median	-1.03	-0.98	-1.06	3.10
Variance	1.82	1.87	1.98	2.73
Standard Deviation	1.35	1.37	1.41	1.65

Speed Activity Distribution

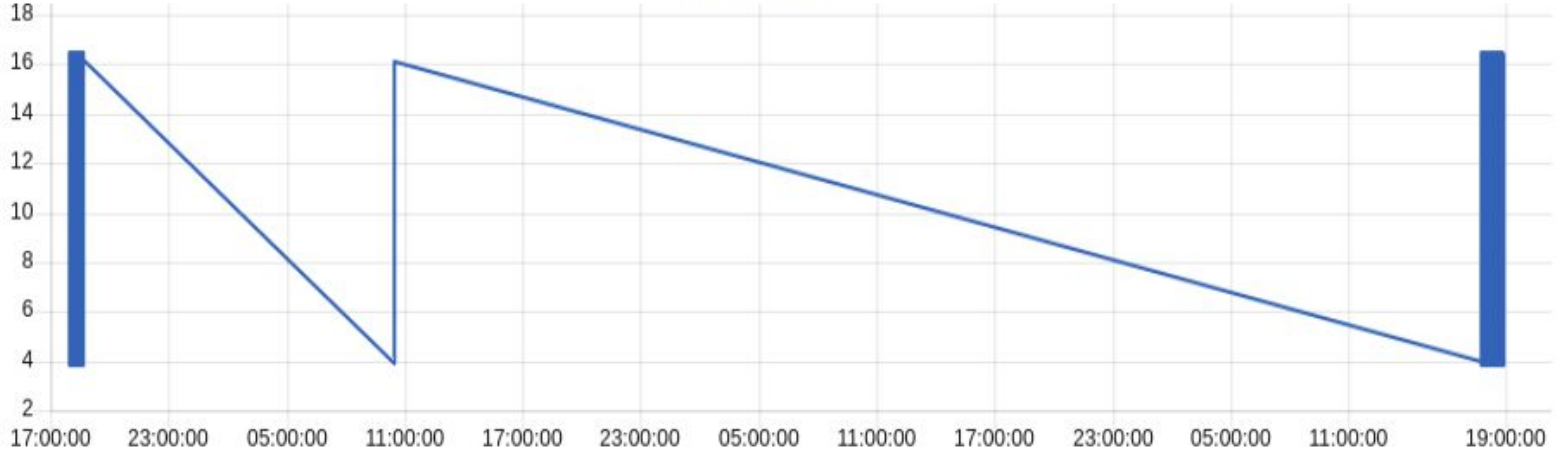


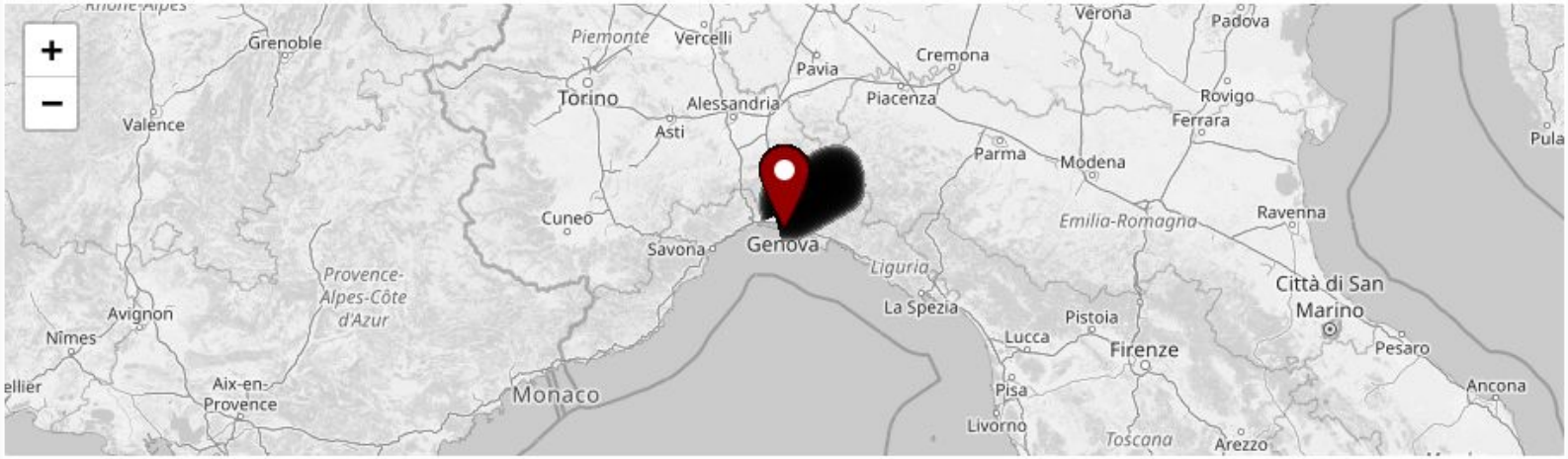
Speed Statistics

Average Speed: 9.34 m/s
Max Speed: 16.50 m/s
Min Speed: 3.80 m/s
Standard Deviation: 5.00 m/s

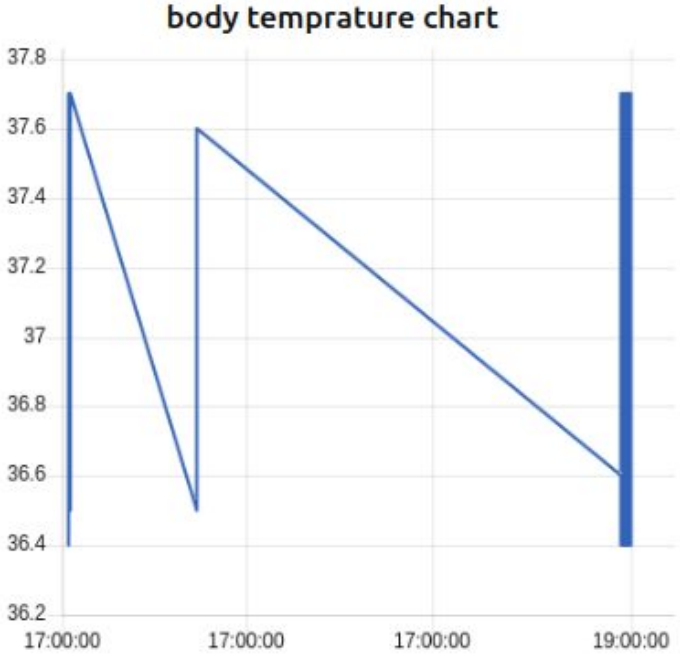
Hour	Average Speed (km/h)
8	9.23
15	9.35
16	9.33

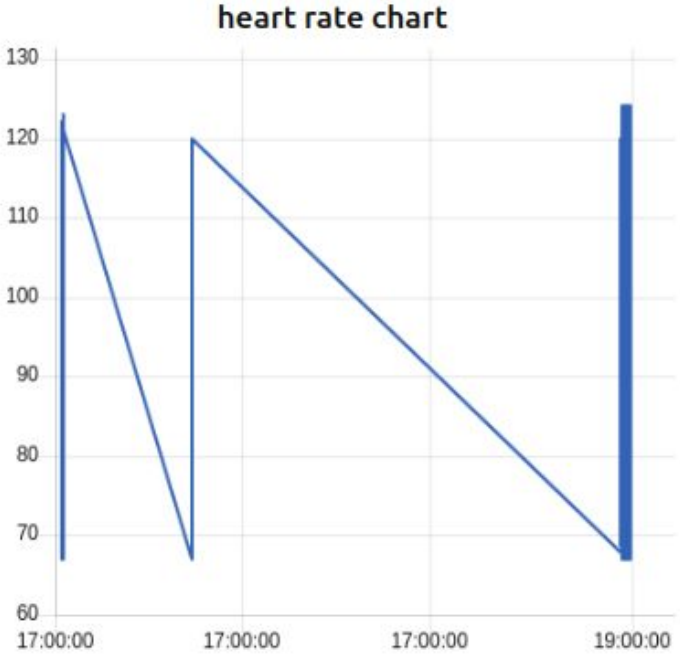
speed chart





Distance traveled **34.77 km**





Vital Statistics

Average Heart Rate: 95.72 bpm
Maximum Heart Rate: 124 bpm
Minimum Heart Rate: 67 bpm
Average Body Temperature: 37.03 °C
Maximum Body Temperature: 37.70 °C
Minimum Body Temperature: 36.40 °C

Conclusion

- Successfully displayed sensor data on the dashboard.
- Fascinating to see data changes by grouping values.
- Gained a deep understanding of IoT system development.
- Highlighted the need for careful planning and teamwork.

Thank you!