Bachelor-Thesis Medical Engineering

Communication Platform for a Medical Breath Acetone Detector

Figure 1: Breath Acetone Detector from Alivion AG, used for non-invasive measurement of acetone levels.
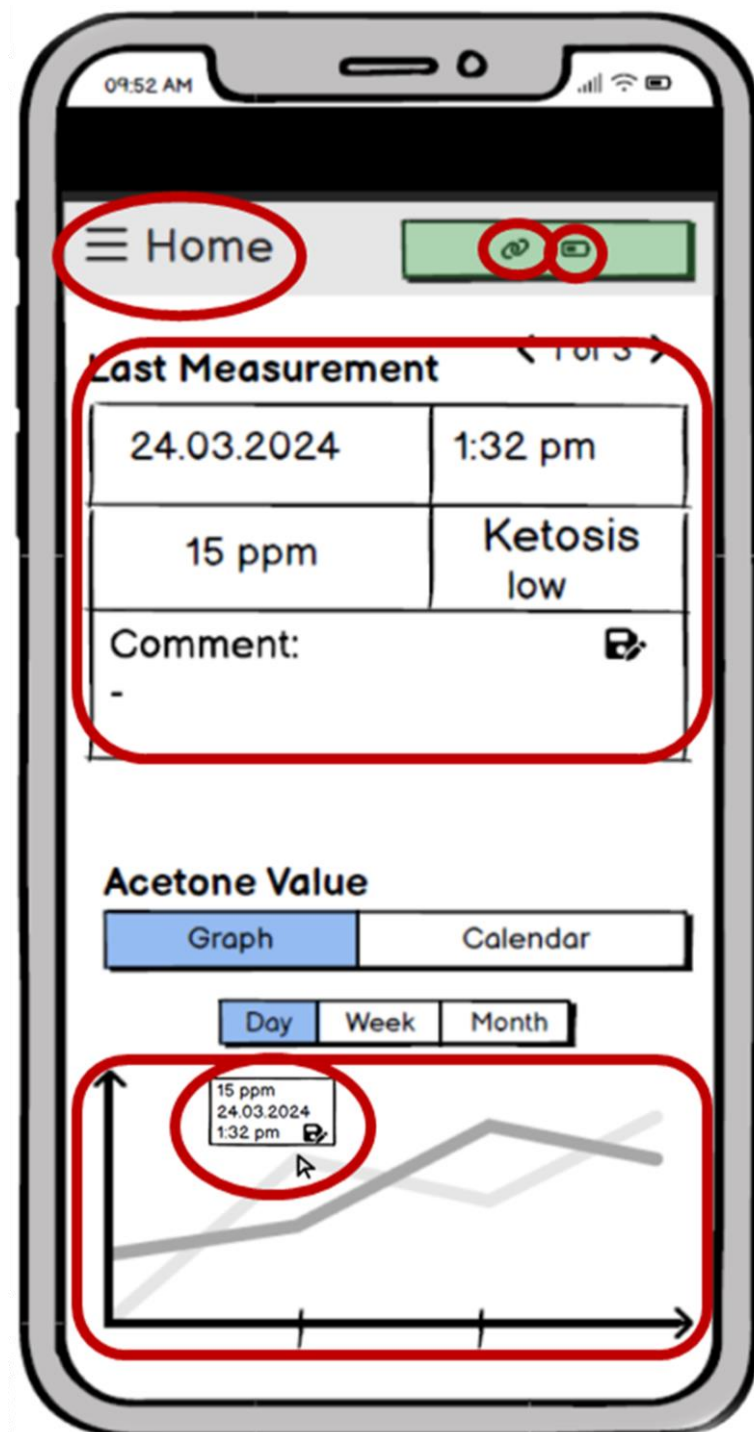

Figure 2: Wireframe of the home screen of the Alivion web-app. Must-have requirements are highlighted with red circuits.

Figure 3: Home screen of the Alivion web-app, featuring the measurement and graph sections.
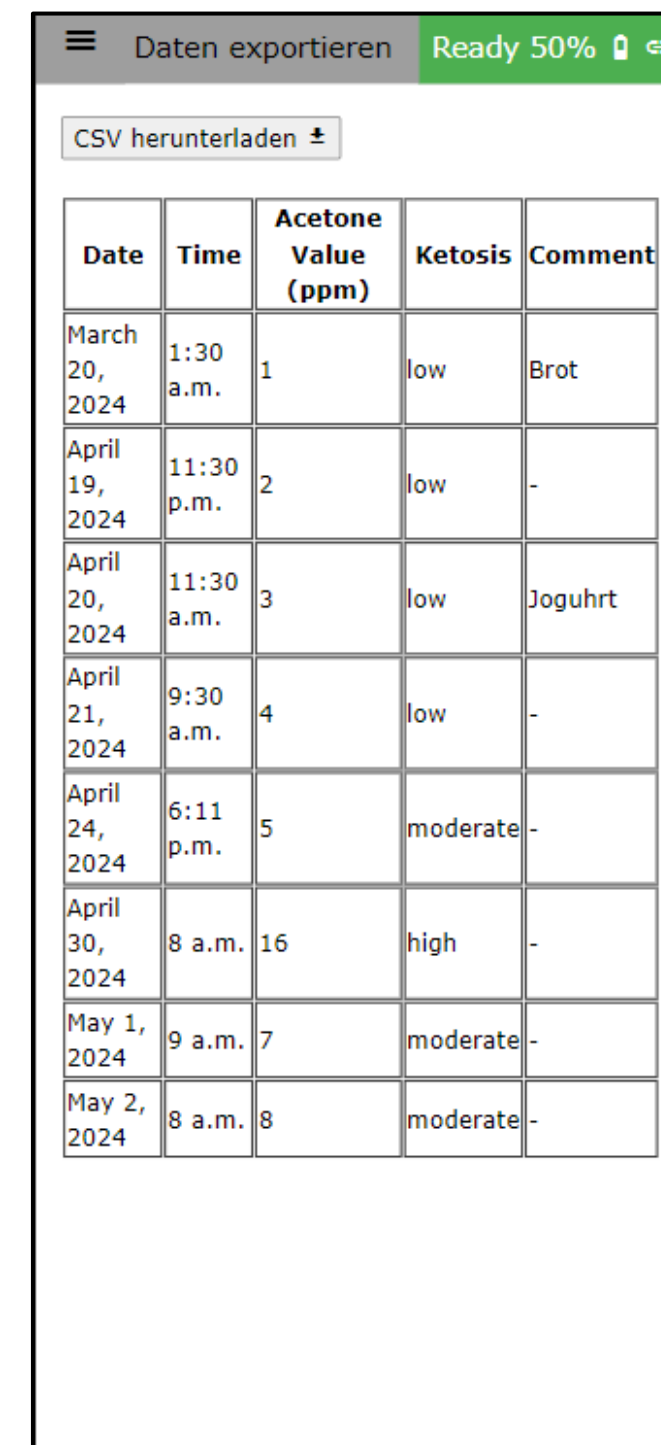

Figure 4: Data export screen of the Alivion web-app, displaying the option to download all data as a CSV file and a table presenting the available data.
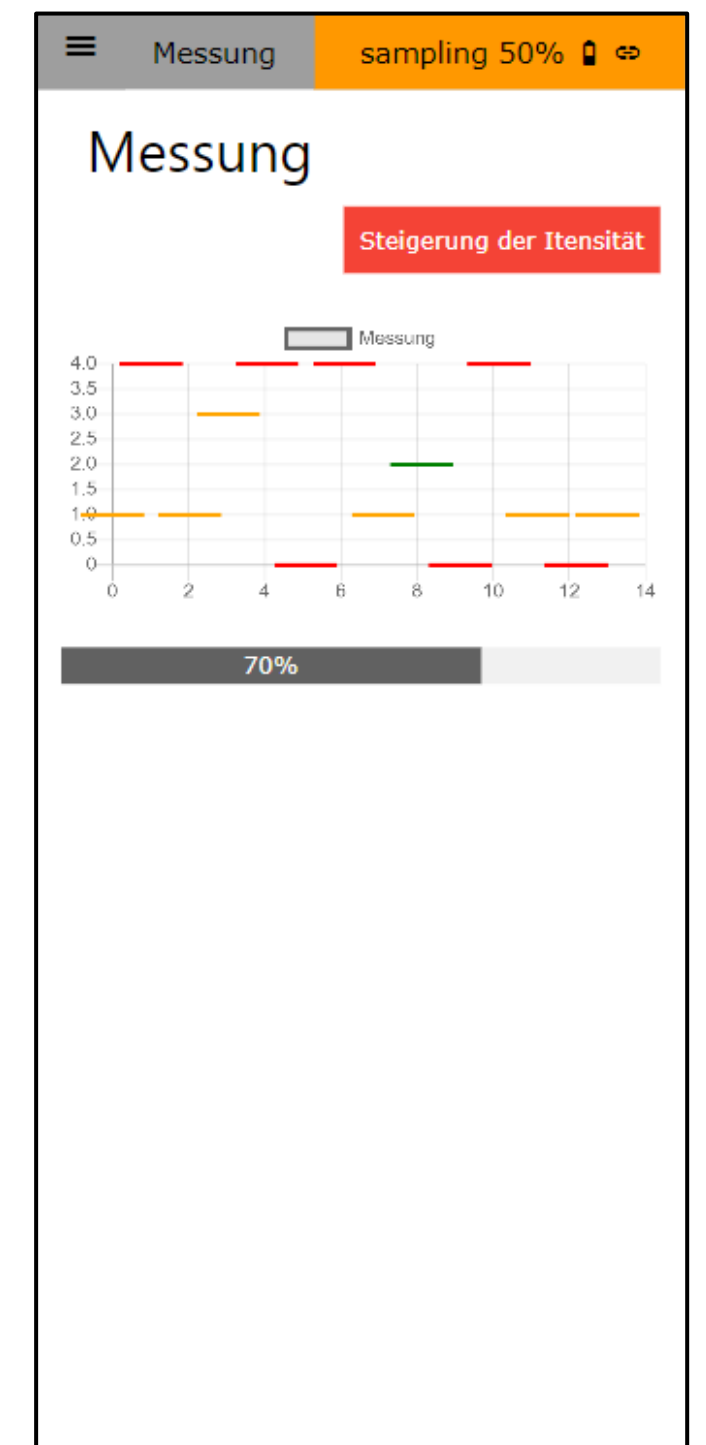

Figure 5: Measurement screen of the Alivion web-app, displaying a plot with blow intensity lines every 0.5 seconds. Colors indicate intensity levels. Top bar provides feedback on blow intensity, bottom bar shows measurement completion status.

Research Theses

The objective of this bachelor's project was to develop a web-based demonstrator app for Alivion AG's medical breath acetone detector. Alivion, a spin-off from ETH Zurich founded in 2020, pioneered a non-invasive method to measure acetone levels through breath analysis. This technology benefits physicians and nutritionists in tailoring personalized treatment plans based on an individual's fat-burning process.

An essential part of the project involved defining team requirements for the web-app, analysing competitor features, and understanding regulatory demands. The primary focus was on the development of the web-app. Initial development included creating a web-based demonstrator app for presentations and studies, gathering user insights to refine the design. The web-app needed to communicate with the device (Figure 1), focusing on reading, transferring, and displaying measurement data.

Approach

The solution concept for Alivion's web-based demonstrator app involves key steps: testing competitor apps and documenting features, refining app requirements through meetings with Alivion, creating a wireframe of the web-app, detailing specifications using Cucumber a behaviour driven development tool, selecting a suitable development framework and integrated development environment, and researching EU regulations for compliance.

Results

The key result of the project is the web-based application. The favourable features of the five competitor apps (Acetrack, Lumen, Ketoscan, Ketonix, and Keyto) and the result of the discussion regarding the requirements and specifications can be seen in Figure 2. With the red circles on the wireframe the "must" specification are indicated.

The demonstrator web-app was developed using Django, with SQLite as the database, and Visual Studio Code as the integrated development environment. The app features measurement display (Figure 3), data export (Figure 4), measurement intensity (Figure 5) and real-time device status updates are the main features.

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ALiViON