

DIPLOMA THESIS

Documentation

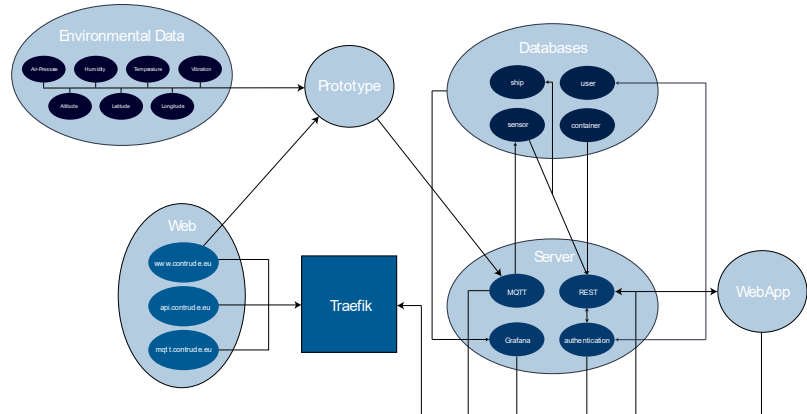
Author(s)	Luca Alexander Gekle, Maximilian Silvester Kampl, Marko Daniel Schrempf
Form, academic year	5AHWIN, 2024/25
Topic	Container-Tracking & Umweltdatenerfassung (CONTRUDE)
Co-operation partners	HTL Leoben

Assignment of tasks	Containers on a cargo ship are exposed to various environmental influences. Within a container ship, forwarding and storing environmental data from individual containers is beneficial for quality assurance, but it is often difficult to implement due to the challenging radio frequency propagation conditions.
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Realisation	<p>Kampl: Collection of environmental data (e.g., temperature, air pressure, etc.) using microcontrollers, as well as forwarding the information under challenging radio frequency propagation conditions.</p> <p>Schrempf: Analysis and evaluation of various frameworks for persisting environmental data, as well as the architectural structure of the overall application.</p> <p>Gekle: Development of a frontend for displaying environmental data on container ships.</p>
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Results	<p>Kampl: Development of three prototypes based on an ESP32 microcontroller board. Implementation of a mesh network to send the collected sensor data to a central server, with the chosen data transmission protocol ensuring efficient data transfer and processing.</p> <p>Schrempf: Design and implementation of the server-side software architecture, considering modular approaches using software containers. Design of interfaces for persisting and providing the generated data—distinguishing between time series data and master data.</p> <p>Gekle: Development of a simulator to reduce the number of required hardware prototypes while still allowing testing of the concept on a ship-sized scale. Additionally, the development of a web application is included, allowing users to view the position and neighboring or nearby containers and their environmental data.</p>
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Illustrative graph, photo
(incl. explanation)



Participation in competitions
Awards

No

Accessibility of the
Diploma Thesis

<https://github.com/bitsneak/Contrude>
hardback diploma thesis

Approval
(Date / Signature)

Examiner

Head of College