

Bachelor/Master Thesis

Integration of CoAP into Flask

Motivation

Flask is a Python micro web framework [1]. Unsurprisingly, it supports the HyperText Transfer Protocol (HTTP).

The Constrained Application Protocol (CoAP) is a lightweight application protocol for devices with constrained resources (computational power, memory, but also energy and network bandwidth) [2]. CoAP bears similarity to the HTTP in many regards, e.g. request-response paradigm, client-server model and resource identifiers. Flask does not support CoAP yet, but it would make sense to support it to help adoption of CoAP in the real world, ultimately reducing network traffic and operational cost.

Goal

The goal of this thesis is to integrate CoAP as a transport into Flask, and evaluate the performance of the implementation.

Depending on the type of the module (Bachelor/Master thesis or software project), the scope can be adjusted accordingly.

Tasks

- get familiar with the Magdeburg Internet of Things Laboratory (MIoT-Lab), its architecture and its nodes
- integrate CoAP as a transport in Flask
 - CoAP endpoints, options et cetera
 - existing CoAP libraries for Python can be used e.g. aiocoap [3]
- evaluate the implementation
 - run experiments on tens or hundreds of nodes on the MIoT-Lab testbed [4][5]
 - collect performance metrics such as throughput, round-trip time et cetera
 - compare with existing CoAP implementations, but also with Flask over HTTP
- write a thesis about it

References

- [1] *Welcome to Flask - Flask Documentation (3.1.x)*, Apr. 2026. [Online]. Available: <https://flask.palletsprojects.com/en/stable/>.

Project type Bachelor/Master Thesis
Software Project

Language(s) English, German

Field Computer Science



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- [2] Z. Shelby, K. Hartke, and C. Bormann, *The Constrained Application Protocol (CoAP)*, RFC 7252, Jun. 2014. DOI: 10.17487/RFC7252. [Online]. Available: <https://www.rfc-editor.org/info/rfc7252>.
- [3] *chrysn/aiocoap: The Python CoAP library*, Apr. 2026. [Online]. Available: <https://github.com/chrysn/aiocoap>.
- [4] K. Kientopf, M. Buschsieweke, and M. Güneş, "Technical report: Designing a testbed for wireless communication research on embedded devices," *18. GI/ITG KuVS Fachgespräch Sensornetze–FGSN 2019*, pp. 41–44, 2019.
- [5] *Communication and Networked Systems (ComSys) - MIOT-Lab*, Mar. 2025. [Online]. Available: https://comsys.ovgu.de/MIOT_Lab.html.

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