

PROPOSAL



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Expanding HassIO smart home capabilities via low-code automation development

What is your motivation to take part in Google Summer of Code?

Google Summer of Code (GSoC) offers a unique opportunity for me to learn about collaborative development on open-source projects and to put my skills to the test by contributing to a real-world problem, with guidance from experienced mentors. It's also a valuable opportunity to use the coding and computer science knowledge I've gained through my studies and practical experience to help develop a meaningful open-source project.

Why did you choose GFOSS?

The emphasis on Openness, Open Standards, and Technologies within GFOSS strongly aligns with my personal values and opinions about how software should be treated: freely distributed, with open access to everyone. Their spirit is reflected in their proposed ideas, which I find both technically interesting and consistent with the open-source ethos.

Why do you want to work on this project?

This project is based on multiple concepts of Internet of Things (IoT), which I am familiar with, due to previous work on my Undergraduate Thesis, specifically by developing an IoT web

application that collects data from multiple devices and retrieves them for data access by the user of for visualization. My experience implementing a REST web application for my thesis directly aligns with the project's goal of adding REST protocol support to SmAuto. Furthermore, I am excited by the opportunity to contribute to the development of a powerful tool for smart home automation, which will allow me to apply my existing knowledge and acquire new skills in this evolving domain.

What are your expectations from us during and after successful completion of the program?

During the program, I expect the help of experienced mentors, to refine my technical choices and develop a system in accordance with the needs of the users. After successful completion of the program, I hope to continue collaborating with GFOSS and maintaining and expanding the project and its features.

Project Details

What are you making?

The current scope of the project is to expand the already existing SmAuto Domain Specific Language (DSL) capabilities, by moving into three directions: support for REST Protocol with communication with external data sources, auxiliary concepts that aid better the development of applications in SmAuto DSL and integration with the Home-Assistant platform.

1. **REST Protocol Support:** Building upon the existing REST API infrastructure of SmAuto DSL, I will implement a new layer to handle the necessary CRUD operations for user-specified external data sources. This layer will be incorporated inside the language as an independent or expanded concept, implementing the necessary functionalities to communicate with the other concepts of the language.
2. **Auxiliary Functionality:** Additional concepts, such as `Switch`, `Delay` and `Compute Node`, will be explored and implemented as supplements to existing concepts. Some of these concepts will be integrated to others (for example, similar to the `Action` concept being part of the `Automation` concept, a `Delay` concept could be integrated to the `Automation` concept as well) or be separated independent concepts, based on the needs of the application.
3. **Home-Assistant Integration:** Home-Assistant is an open-source platform for Smart Home Automations, powered by the community. Through its [add-on support](#), I will develop an open-source add-on for Home Assistant that will provide a graphical interface

for users to design and deploy automations using the SmAuto low-code environment. Since SmAuto DSL currently lacks a graphical user interface, this add-on will provide one, acting as an additional layer that generates and executes the corresponding `.auto` files based on user input.

How will it impact Open Technologies Alliance (GFOSS)?

By expanding SmAuto DSL with these new capabilities and integrating it into Home Assistant via a user-friendly add-on, this project will provide the community with a more powerful and accessible tool for smart home automation. This will empower users of all technical levels to create sophisticated automation scenarios, fostering innovation and adoption of open technologies in the smart home domain.

What technologies will you be using?

Trying to stick to the codebase and the requirements defined by the Home-Assistant for add-on design, the primary tools that will be used are:

- Python
- FastAPI
- textX
- IoT Concepts (e.g. Broker, Devices, Communication Protocols, API)
- Unix/Linux
- Docker
- GitHub
- REST Architecture
- HTTP
- Home Assistant Platform & Tools (as referred to developers.home-assistant.io/docs/add-ons)
- Web Technologies (e.g. HTML, CSS, JavaScript, React)

Potentially, additional equipment could be used, such as Raspberry Pi or Arduino, accompanied by the proper peripherals, such as sensors and actuators.

Timeline

Bonding Period (8 May – 1 June)

- Bonding with the community.
- Meeting the mentors.
- Familiarizing with the codebase.
- Familiarizing the concepts and the syntax of the SmAuto DSL.
- Familiarizing with Home-Assistant ecosystem.
- Finalizing project's scope.
- Researching further technologies and concepts.

Phase 1 – REST Protocol Support (2 June – 22 June)

- *Week 2 June – 8 June (Total Hours: 30)*
 - Design of the REST Concepts.
 - Implementation of the Concepts.
 - Design of SmAuto syntax for these Concepts.
- *Week 9 June – 15 June (Total Hours: 24)*
 - Modification of the SmAuto DSL parser, integrating syntax for the new Concepts.
 - Further testing and debugging of the new Concept with the SmAuto syntax.
 - Binding new Concepts with the existing Concepts.
- *Week 16 June – 22 June (Total Hours: 30)*
 - Further testing and debugging the binding of the Concepts.
 - Documenting evaluation about the REST Protocol Support.

Phase 2 – Auxiliary Functionality (23 June – 20 July)

- *Week 23 June – 29 June (Total Hours: 26)*
 - Tracking down additional Concepts that might be useful and suitable.
 - Investigating the principles of the auxiliary Concepts.
 - Design the new Concepts.
- *Week 30 June – 6 July (Total Hours: 30)*
 - Further design of the new Concepts
 - Implementation of the new Concepts.

- *Week 7 July – 13 July (Total Hours: 30)*
 - Further implementation of the new Concepts.
 - Modification of the SmAuto DSL parser, integrating syntax for the new Concepts.
 - Binding new Concepts with the existing Concepts.
- *Week 14 July – 20 July (Total Hours: 26)*
 - Further testing and debugging the binding.
 - Documenting evaluation about the Auxiliary Functionalities.

Phase 3 Home-Assistant Integration (21 July – 1 September)

- *Week 21 July – 27 July (Total Hours: 30)*
 - Researching the Home-Assistant add-on development process.
 - Testing with custom add-ons.
- *Week 28 July – 3 August (Total Hours: 26)*
 - Developing a user-friendly interface for designing and deploying smart home automations (the interface has not functionality yet).
 - Testing the interface in the add-on.
- *Week 4 August – 10 August (Total Hours: 30)*
 - Further developing the interface.
 - Adding functionality to the interface, by binding it with the SmAuto DSL.
- *Week 11 August – 17 August (Total Hours: 26)*
 - Further binding the interface with the SmAuto.
 - Testing the add-on with the functional interface and the SmAuto DSL.
- *Week 18 August – 24 August (Total Hours: 30)*
 - Further testing the add-on.
 - Documenting evaluation of the Home-Assistant Integration.
- *Week 25 August – 1 September (Total Hours 12)*
 - Further documenting evaluation of the Home-Assistant Integration.

Off-The-Grid

- 27 August - 31 August: participation in both Sindos Youth Band Festival from 27 August to 30 August and Youth Symphony Orchestra of Greece's 2 days concert (30 August and 31 August).

GSoC Evaluations

- **Evaluation 1 (End of June):** Completion of the REST protocol support implementation, including basic CRUD operations and integration into the SmAuto DSL syntax. Initial documentation for the REST functionality. Research on auxiliary functionalities.
- **Evaluation 2 (End of July):** Implementation and integration of the auxiliary functionalities (Delay, Switch, Compute Node) into the SmAuto DSL, along with their corresponding syntax. Documentation for the auxiliary functionalities. Design of the Home-Assistant add-on.
- **Evaluation 3 (End of August):** A functional Home-Assistant add-on with a basic graphical interface capable of generating and deploying simple SmAuto automations. Initial testing and documentation of the add-on.

POST GSOC

- Further enhancing the SmAuto DSL with more Concepts, towards edge-cutting technologies, such as AI and Edge Computing.
 - Maintenance of the codebase.
 - Optimize the performance of the SmAuto, by combining other technologies, such faster programming languages and better libraries.
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Why am I a good fit for the project?

I believe that my previous experience with IoT will be crucial for this project, as its core, smart home automation, is fundamentally based on IoT principles. My familiarity with various IoT concepts, such as data communication, sensing devices, and wireless communication protocols, forms a strong foundation for the applications involved in smart home automation. Additionally, my passion for open-source, coupled with my strong belief in open-source software, makes me a suitable candidate for that project.