

PROPOSAL FOR GSOC 2021

Development of a NodeRED compatible domain-specific language for Home Assistant

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Link to related project: <https://github.com/Asiwaju887>

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Motivation

During the first semester of my Master degree program in which I learnt about NodeRed and did some projects using NodeRed with MQTT, CoAP, HTTP and OMI-ODF linking it with MongoDB and NodeJS for the backend. It was a very interesting course in which I did series of projects on NodeRed like creating a web-based application with Raspberry Pi, Arduino and sensors kit to check the air quality and the cosiness of a room to the user and suggesting ways the user can make the room more comfortable.

Project: Development of a NodeRED compatible domain-specific language for Home Assistant

Project Description

This project involves the development of domain-specific language (DSL) for home-assistant automation (HA-auto). HA-auto will be integrated with NodeRed and using MQTT as the communication medium. Home Assistant is a completely rule-based Home Automation developed with Python and enable event-triggered automation. NodeRed which is a flow-based composition will be used alongside node.js language. The domain-specific language will be implemented on the architecture in order to allow developers to upload data file that will be used by the system. The DSL will be accomplished with a central service orchestration which will analyze received user data which can be developed with NodeJS and lastly a resource management module for service query and register and this can make use of MongoDB and javascript. MQTT can be used as the wrapper because it supports CSV, XML data file which can be the input DSL. MQTT will also be preferred because it is broadcast-based, stateless and scalable.

Timeline:

Community Bonding and Understanding of concept (First Two weeks)

Introduce myself to the team and get to know my mentors

Get constants update from mentor and onboarding to the team

Research and understand the goals and objectives of the project

Set up my working environment to start working

Official Coding Period (Four weeks)

Start setting up the NodeRed nodes and implement the HomeAssistant with the NodeRed

Start implementation of the Javascripts code

Setting up the MQTT with the broker (mosquito)

Create test cases for the system

We can try to see if CoAP can work in place of MQTT and compare the characteristics.

Rounding Up

Create unit test cases and fix any bug

Create documentation

Meet up with mentors for final proposal of work done

Pull request for code review and merge

Deliver the work implemented

Objectives

1. Develop a language with Model Driven Engineering techniques in order to implement using Home Automation system
2. Create a NodeRed flow for the objective 1 in order to manage connected devices to the HomeAssistant using a mosquito broker which is a MQTT communication channel.
3. Study the QoS of the project and see ways to improve it.

Specifications

I believe I have the right skills and manpower to take up this challenge. Having done similar work in this area, a review of HomeAssistant is enough to kick me starting and will be committed to implement my innovative ideas into the project. I am committed to work for 40 hours per week and consider this as full-time employment during the time of the program. I have a great passion for coding and working with IoT, and I believe my detailed experience in Networking will also help along the way as we proceed towards the problem.

Extra Information:

Studies and Research:

I am a current student of Erasmus Mundus Master's scholarship which requires me to study in France, UK and Sweden and for Green Networking and Cloud Computing. My program in simple terms involves the development of technology to help humans and ensure that digital devices and applications used by everyone are green for the environment.

I am currently focusing and researching how current digital technologies can be sustainable in line with SDG 7, 9 and 13.

I have an excellent background in Networking protocols, Communication System, Wireless Communication, Digital Communication and Telecommunication, IoT, Green ICT, software engineering and foundational knowledge in Machine learning, project management and Robotics and Intelligent systems. I also have good user experience with NodeRed, protocols like MQTT, CoAP, and HTTP.

Programming and Tools:

I am familiar with Python, Javascript, C#, and Node.JS. I use Windows and Ubuntu.

GSoC participation:

This is the first time I am applying for Google Summer of Code. I did not submit a proposal to any other organisation.

Milestones

I. Erasmus Mundus

I am currently an Erasmus scholar and I am studying in three different institution in Europe for my master program which is mainly research focus in Networking and IoT protocols, Machine Learning and ROS, OpenCV, and Gazebo for robotics.

II. Multiple Award Winner

Prior to my master program, I am a multiple award winner during my undergraduate studies at Nigeria.