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SatNOGS Website Project

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SatNOGS Website Project

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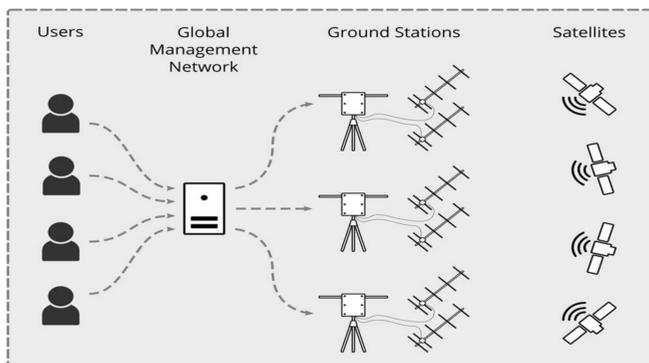
Abstract

The SatNOGS Website project aims to create a web interface for the SatNOGS, or Satellite Network Open Ground Stations, project. The intent of the ongoing project is to make the main SatNOGS project more accessible by creating a web based software system that contains many of the necessary features needed to run a ground station, and do it in a way that is visually appealing and human-friendly, and to also provide an extension to the main client for control and information presentation needs. A large feature that the application will offer is displaying the information that the transmitter is receiving, such as where in the sky the satellite that is being observed is at, whether the ground station is currently on the network, whether it is able to receive information, and even more data on the satellite it is looking at, including possibly a picture and the raw data the satellite is transmitting. This work is being done in collaboration with the ECE Department at Valparaiso University, which is working on aspects of the physical and electronic components. This project, in addition to contributing to this international effort, also provides a laboratory for experiencing and learning the technology and processes for large-scale software system construction.

Background

Our work is only a small part of the larger SatNOGS project. As stated by the SatNOGS website: *SatNOGS project is a complete platform of an Open Source Networked Ground Station. The scope of the project is to create a full stack of open technologies based on open standards, and the construction of a full ground station as a showcase of the stack.*

The goal of the project is to create an open source, openly accessible global network of ground stations that can be used to send and receive data from the satellites observable by the SatNOGS system. Presented below is a simple diagram of this system. Our focus is on the means by which the users access information about the satellites at the ground station level. For this we are developing a web application that presents the relevant information to the user of the ground station.



The Ground Station

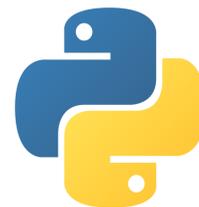
The SatNOGS system is based around the Ground Station, the device which sends and receives the satellites signals as well as tracks their movement across the sky. The code for this system is written in Python and interacts with a host computer that operates the whole thing. To get the information from the Ground Station so that it can be displayed to the user/operator, we have to use JSON. This is all part of the management interface and is where our portion of this project becomes important. The ground station will be constantly updating its information regarding the satellites position, freq, and name and in order to make this information easily accessible to the user it is necessary to display it on a well organized interactive webpage. This makes it easier for the users to get the information that they need to operate the ground station and use the whole network.

Software Engineering Context

We face many challenges coming into this project, the first of which is we had to start with other peoples pre-existing code, which is also still concurrently in development. Since it is also in development, we are not entirely sure at any point if their programs and applications are still functioning, or if they will remain how they are. To add to this, the SatNOGS team is consists of an international group of people, all with their own time zones, languages, and other various barriers. In the process of the development of our application, we also cannot touch any of the code that the other teams are working on, and must simply conform to what they have written.

Implementation Environment

The choices of possible software options we could use for the project were limited. This is because we are making a web application that is part of a larger project, and the project must conform to the existing suite of code and platforms that have been made. The installed base project uses a variety of languages and frameworks, but is mostly being developed in Python. An initial attempt at a web application was developed using the Flask micro-framework



Current Features

At the moment our current web application allows the user to review information about the satellite that they are interested in. Some of this information includes:

- Satellite position (Altitude and Azimuth)
- Satellite Frequency
- Satellite Name and Number
- Doppler Shift of Satellite Signal

Since this information is the most useful to have up for the user it is the first to be implemented into the web app. After these core features are working well then other additional features may be added.

Future Work

After having implemented the core features of the application it is planned to add some additional features to increase its attractiveness and functionality:

- Improved Style and Appearance to Create a Visually Appealing Environment for the User
- Ability to Pull up Information on Multiple Satellites at Once
- Graphical Representation of Satellite Position (Far off Goal)

The program is going to be extensively tested. Only after the application has proven to be reliable in its basic tasks will we be able to move onto the more sophisticated abilities of the application.

Summary

This software is showing great promise in being able to provide Valparaiso University SatNOGS team and the actual SatNOGS organization with an extremely useful tool for their ongoing development of their international project. It is hoped that the quality of this code and its implementation will be not only useful to future users but also understandable so that the code can be edited by not only professors and developers, but by future students as well. Future work should focus on improving the user experience and making sure that this application continues to meet the needs of the SatNOGS group.

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