TFE4850 - EiT - Student satelite
Bluebox

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Abstract

This project aimed to create and test a BlueBox, an USB-driven ground station, developed for AAUSAT3 by Aalborg University to send and recieve signals from satelites. The NUTS project have a problem with low transfer rate between the single ground station at the university and the satelite, and by setting up a network of BlueBoxes at different ground stations around the globe, we can increase the time which the satelite is available for data transfering.

Since setting up the network proved too time consuming, we set as our goal to make a BlueBox, and test that it can recieve signals from a satelite, and in this way make it easier for others to set up the network, in that they already have documentation on how to set up and configure each indiviual ground station.

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Introduction

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1.1 The Project group

This is a description text of the project group

Name	Background
Eirik Skjeggestad Dale	Computer technology

Table 1.1: Group members

Chapter 2

Theory

Before we started our project, we did quite alot of prestudy, covering which technology was available, to determine which fit our project best. This chapter will contain a summary of the different technologies, and also some theory behind the reasoning for having multiple ground stations listen to our satelite.

2.1 Network technology for ground stations

When we decided to work on a network of ground stations, we first looked into four different ground station network technologies. We first hoped to work on a BlueBox, but this would require support from Aalborg that we couldn't get, as they were busy with a satelite launch of their own. Because of this, we decided to look into Carpcomm, that seemed more complete and doable than connecting to PYXIS with a BlueBox.

2.1.1 Pico

information about Pico

2.1.2 Genso

information about Genso

2.1.3 Carpcomm Space Network

Carpcomm is a private company that delivers a plug and play ground station [3]. It is compatible with the Carpcomm Space Network [4]. The advantage of using their solution is that they have a working network. Disadvantages are cost and that it would lead to a reduced learning outcome for us.

2.1.4 PYXIS

The BlueBox is part of a distributed ground station network called PYXIS, developed primarily for the AAUSAT3 by Aalborg University (2013 [2]). The PYXIS goal is to offer a robust and effective ground station network for satellite developers, and one of the key factors is that everyone is free to setup a ground station using the open source BlueBox hardware.

The PYXIS concept includes a backend server, BlueBox hardware and a Ground Station Server (GSS). The backend server runs an individual instance for each satellite utilizing the BlueBox, and is operated by the persons responsible for the ground station.

The BlueBox itself is hardware to recieve and transmit signlas from the satellites.

Control of the BlueBox and ground station mechanics is handled by the GSS, and both the BlueBox and the GSS is operated by the responsible for the Ground station.

Both the backend server and the GSS is already in place at each ground station, and to join the PYXIS network we would only have to make a BlueBox, and test that it works.

2.2   Raspberry pi

Raspberry Pi is a small computer, with everything gathered in one board. In our project we will be using the B model, revition 2, which have a 700MHz ARM CPU, 512MB of RAM and a SC-card reader, in addition to the leads to connect to different devices, for the full overview, see figure 2.1. The recommended operating system is Raspbian, a linux distribution based on Debian.

The Raspberry pi was originally intended to help teach programming, but it can also perform many of the standard computer tasks, and it can be connected to a monitor or tv using an HDMI lead. In our project we hope to be able to use a Raspberry pi to run the software required to control the ground stations. The software provided by the carpcomm project has Raspbian as one of its supported plattforms, so we hope this will work well.
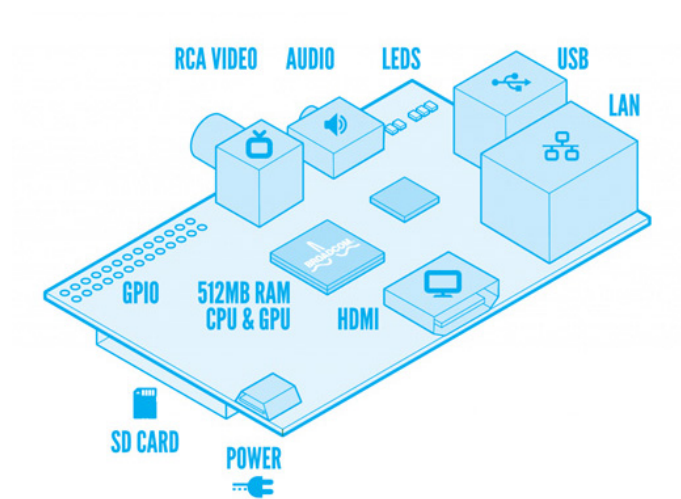
Figure 2.1: A highlevel schemantic of the Raspberry pi, mobel B rev 2

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[3] *Carpcomm Ground Station 1*. October 2012. Available at: <http://carpcomm.com/gs1/>

[4] *Carpcomm Space Network.* Available at: <http://carpcomm.com/howitworks.html>

[5] *Raspberry pi.* Available at: <http://www.raspberrypi.org/>