



Radio Telescope at UON-WILSON Airport and Longonot Ground Stations for Astronomical Studies



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UNITED NATIONS Office for Outer Space Affairs

Background

The Longonot I and II Earth stations are 29 and 32-meters antennas that were previously used by Telkom-Kenya for data and voice transmission via satellite. The University of Nairobi (UON), Department of Physics has teamed up with the newly formed Kenya Space Agency to utilize the two antennas and fabricate radio telescopes for astronomical studies. A simple Radio telescope prototype is also being developed by undergraduate Astronomy and Btech students at UON-Wilson Airport grounds.

Introduction

The obsolete antennas at the Longonot ground stations can be used as teaching and research tools for radio Astronomy. The design and development of RF receiver for the radio astronomy projects introduce the students to radio telescope technology.

The Longonot I and II earth Station (Fig. 1) are located along the Equator and offers a good opportunity for studying RF signals from extraterrestrial sources along the equatorial plane¹.



Figure 1. Longonot I and II Earth Station

Radio Telescope Set-up

The radio telescope set-up shown in Figure 2 has Low-noise amplifiers connected to band pass filters BPF and receiver circuitry interfaced to analogue to digital converters embedded in a microcontroller and results displayed in a computer.

The embedded system incorporated in this work has possibilities of wireless connection thus making the system to be remotely monitored and controlled.

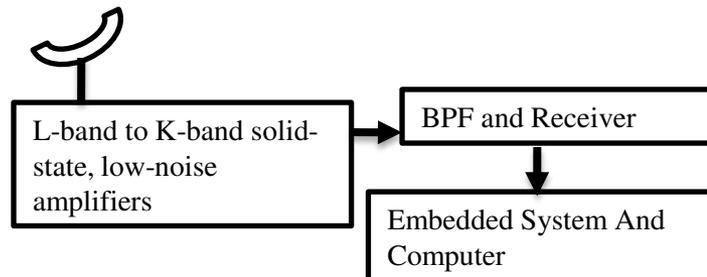


Figure 2. Simplified Radio Telescope Set-up

Hardware

The Free-scale Kinetis microcontroller² MK64FN1M0VLL12 unit used for this project prioritizes performance and integration. The microcontroller is based on Cortex M4 ARM-processor and supports Ethernet connections. The system has been designed to transfer data to a cloud service making it easily accessible through the Internet.

Conclusion

The radio telescope project integrates the traditional methods and most recent low cost signal processing technologies. The systems are mainly based on the commercial-off the shelf electronic IC technology

References

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2. "Datasheet for MK64FN1M0Vxx12, "Kinetis K64F Sub-Family Data Sheet", Freescale Semiconductor, Rev 6, 2017.

Acknowledgement

- Kenya Space Agency for support
- Department of Physics, University of Nairobi and its staff
- Telkom-Kenya for training and technical advise at Longonot Earth station