Implementation of a Total Power Radiometer in Software Defined Radios

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February 10, 2014

Overview I

Overview II

Introduction

Presentation Goals

The goal of this thesis and presentation is to explore other methods that could be used for a remote sensing radiometer and specifically the implementation of a software defined radio as a total power radiometer. The end goal is to develop a radiometer that is more flexible than most radiometers and still maintain the accuracy and stability of a traditional radiometers if not exceed these specifications.

Secondary goal

A secondary goal was to use off the shelf components and components that are generally more accessible. This would allow radiometers to be more accessible to a wider scope of researchers in this field.

Tertiary goal

And finally a tertiary goal was to ensure that the system as a whole is fairly easy to use. This ties to our secondary goal of making radiometers more accessible to a wider range of researchers and research topics.

T

his thesis looks to explore the following questions: (1) Can we use a SDR along with GNURadio to recreate a radiometer in software? (2) If so, what performance can we get from the system? (3) What benefits do we gain (if any) from using a SDR from a more traditional radiometer? The results of this research and experimentation are the subject of this thesis.

Background

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ISU currently owns a total power radiometer centered at 1.4 GHz with a fixed bandwidth of 20 MHz. This radiometer is unique in that it does a total power evaluation by undersampling the A/D converter. This current radiometer however has experienced a number of issues that hindered its performance.

This thesis looks to explore the following questions: (1) Can we use a SDR along with GNURadio to recreate a radiometer in software? (2) If so, what performance can we get from the system? (3) What benefits do we gain (if any) from using a SDR from a more traditional radiometer? The results of this research and experimentation are the subject of this thesis.

Paragraphs of Text

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Bullet Points

- Lorem ipsum dolor sit amet, consectetur adipiscing elit
- Aliquam blandit faucibus nisi, sit amet dapibus enim tempus eu
- Nulla commodo, erat quis gravida posuere, elit lacus lobortis est, quis porttitor odio mauris at libero
- Nam cursus est eget velit posuere pellentesque
- Vestibulum faucibus velit a augue condimentum quis convallis nulla gravida

Multiple Columns

Heading

1. Statement
2. Explanation
3. Example

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Table

Treatments	Response 1	Response 2
Treatment 1	0.0003262	0.562
Treatment 2	0.0015681	0.910
Treatment 3	0.0009271	0.296

Table : Table caption

Theorem

Theorem (Mass–energy equivalence)

$E = mc^2$

Verbatim

Example (Theorem Slide Code)

```
\begin{frame}
\frametitle{Theorem}
\begin{theorem}[Mass--energy equivalence]
$E = mc^2$
\end{theorem}
\end{frame}
```

Figure

Uncomment the code on this slide to include your own image from the same directory as the template .TeX file.

Citation

An example of the \cite command to cite within the presentation:

This statement requires citation [Smith, 2012].

References

📄 John Smith (2012)

Title of the publication

Journal Name 12(3), 45 − 678.

The End

SDR Radiometer