Frame Decoder for Consultative Committee for Space Data Systems (CCSDS)
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Methodology

- An SDR is a “radio in which some or all physical layer functions are software defined” (IEEE Definition).
- A radio is any kind of device that wirelessly transmits or receives radio frequency (RF) signals in the radio frequency.
- An SDR is a radio communication system where components that have been typically implemented in hardware are implemented in software.

GNU Radio

- GNU Radio is a free and open source development toolkit that provides signal processing to implement software radios.
- It can be used with low-cost external RF hardware to create software defined radios, or without hardware in a simulation-like environment.
- GNU Radio applications are primarily written in Python and C++.

Applications

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Algorithm

- The algorithm uses a state machine to decode the frames.
- The state machine:
  1. STATE FLAG SEARCH
  2. STATE HAVE FLAG
  3. STATE HAVE HEADER
- The algorithm will look for the flag indicating the beginning of the payload and the end of the header.
- This flag is created by a correlator that will consider a user-configurable threshold value.
- After the flag is locked, the algorithm will start processing the frame.

Recognition

- The Universal Software Radio Peripheral (USRP) is a computer-hosted software radio designed by Ettus Research.
- The USRP connects to a host computer via high-speed Gigabit Ethernet.
- Using the open source Universal Hardware Driver (UHD), we can run GNU Radio applications using the USRP.

Acknowledgment

- This internship was funded and sponsored by Puerto Rico Space Grant Consortium. I want to thank all of the people that make this internship possible: Chatwin Lansdowne Adam Schlesinger David Lee David Jih Missy Mathias Diego Rodriguez

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