NSF Integrated Circuits Research, Education, and Workforce Development Workshop 2021

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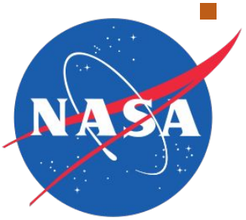
Overview – NASA GSFC MSAG

- **Code 500 Engineering and Technology Directorate**
  - **Code 560 Electrical Engineering Division**
    - **Code 564 Instrument Electronics Development Branch**
      - **Mixed Signal ASIC Group (MSAG):**
        - Jeff DuMonthier, Dr. Gerard Quilligan and George Suárez (Lead)
  - **Focus:**
    - Functions: Time-of-flight, ADCs, DACs, front-end/Readouts and “utility” chips.
    - “Big Analog - Small Digital” designs
    - Older nodes, mostly 180nm CMOS with 1.8V/3.3V/5V devices.
    - Emphasis on radiation hardening by design.
    - Screening and qualification per NASA EEE-INST-002 and MIL-STD (883 etc).

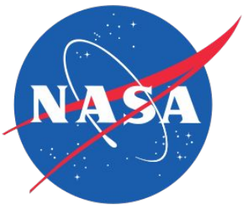
NSF Questions

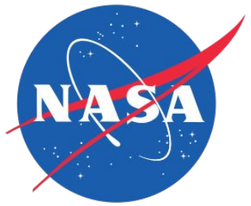
- **Where and how do you recruit and why?**
  - Internships and Pathways https://intern.nasa.gov/, Full-time https://www.usajobs.gov/
  - Collaborations are always welcome. NASA EPSCoR, ROSES, etc.
  - NASA is a well diverse workforce, and we are very proud!
  - Positions for ASIC design are very few and do not come out often.
  - Other positions include for analog, mixed-signal and digital (FPGA) electronics.
- **How do you utilize internships, academic research funding, and on-the-job training?**
  - Very few summer students apply with IC design background.
  - We are currently engaging with Oklahoma State University to explore research topics.
  - R&D funding is limited. A lot of emphasis in flight work which relies on heritage. New ASICs can be risky for an established flight program.
  - On-the-job training with senior engineers and scientists as mentors.



NSF Questions

- **How can open-source hardware and EDA tools help?**
  - Currently using opencircuitdesign.org Qflow for small digital blocks (<10k gates) .
  - Working with Oklahoma State University (Dr. Stine) to use OpenRoad.
  - Open-source can really reduce the cost of software and can help us work on additional designs. Leasing commercial tools (Cadence, Mentor, etc) can be cost prohibitive.
- **What are the problems with open-source hardware and EDA?**
  - In general, support can be lacking and/or slow (understandably). Also, foundry support.
  - Most open-source tools are for digital designs. Not many options for analog/mixed-signal design.
  - Magic VLSI + LTspice are not practical for complicated designs.





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Q&A

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