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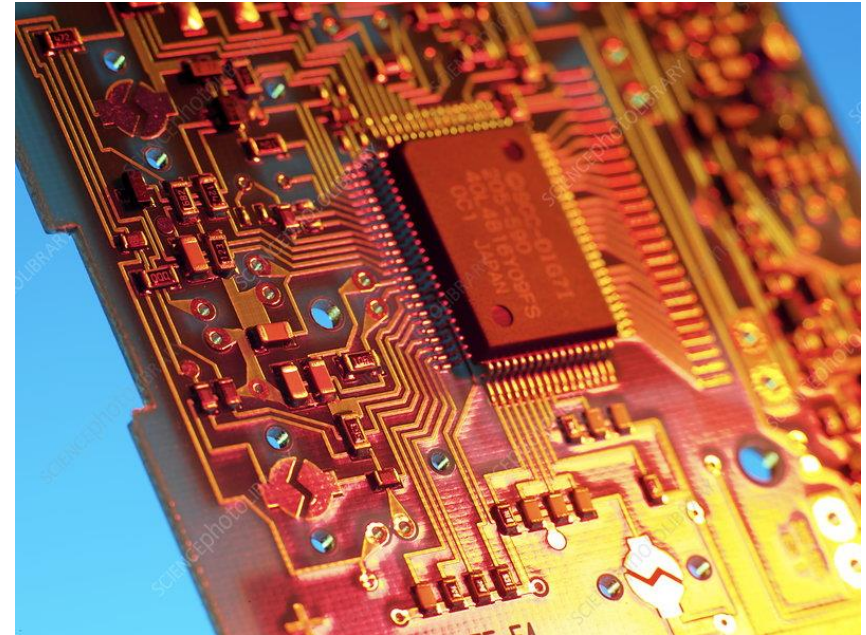
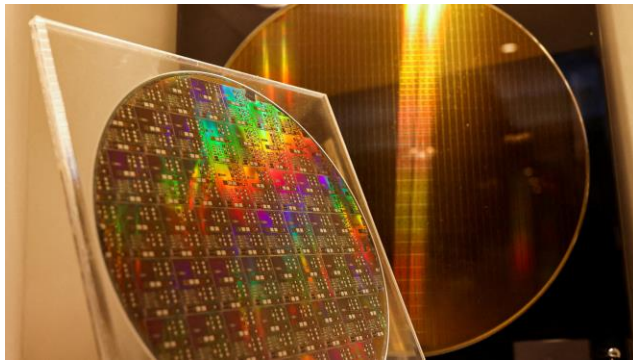
# Product Research

By: sdmay25-28

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# Digital ASIC fabrication

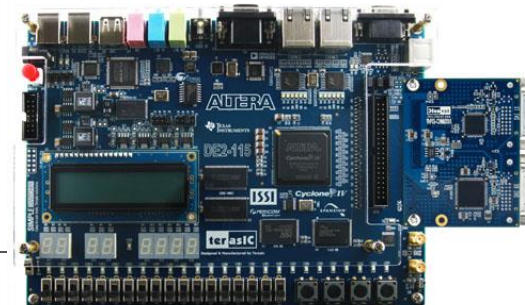
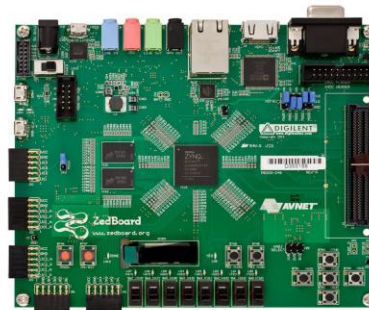
- Develop an ASIC (Application Specific Integrated Circuit) to be fabricated by eFabless in the spring
  - Decide on project idea (Open ended design)
  - Ensure chip is open source
  - Digital test design to ensure accuracy
  - Silicon harden to be fabricated by eFabless
  - Submit in April



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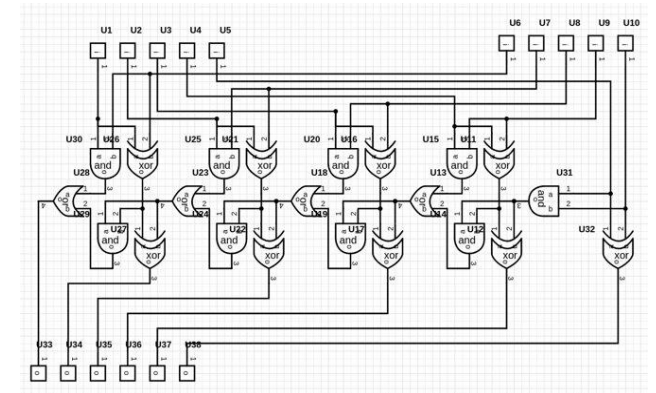
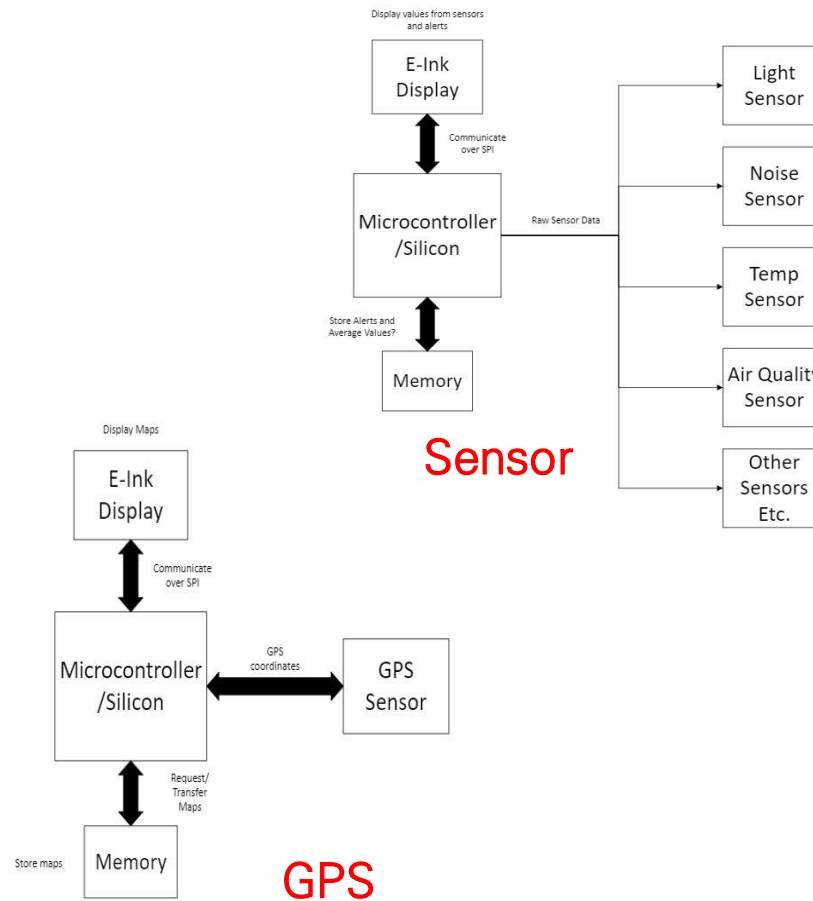
# List and Description of Related Products

- Our project has changed a lot over the course of deciding what to work on, with our current idea of designing an extension of the RISC-V ISA to allow for custom runtime defined ALU operations, our target demographic becomes those at the university who would wish to test ALU operations. Some possible current resources for these people would be:
  - Avnet Zedboard – a resource currently present and used in the labs for various classes for testing hardware. These are versatile tools that allow for custom hardware written in Verilog or VHDL to be tested by users, they include an ARM CPU integrated into them for bare-metal testing as well
  - Altera DE2115 board – a resource used in 281 that allows for manual digital input to circuits specified by the user through Quartus

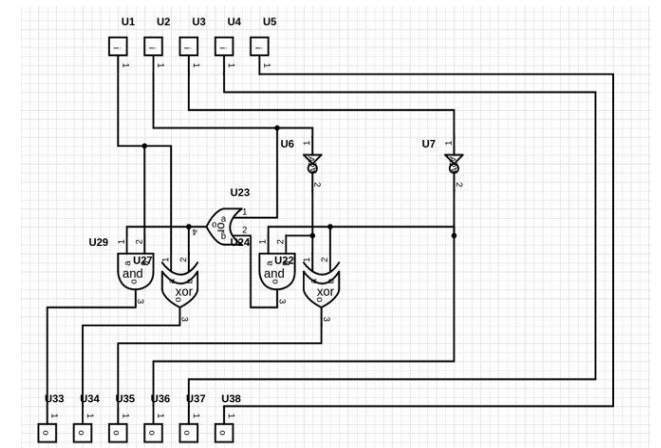


# New Ideas Generated by Product Research

- We explored a lot of ideas
  - Intermittent computing
    - GPS system
    - Environment analysis system
  - Model specific ASIC
    - ML on Chip
  - Reprogrammable ISA
    - General purpose instructions

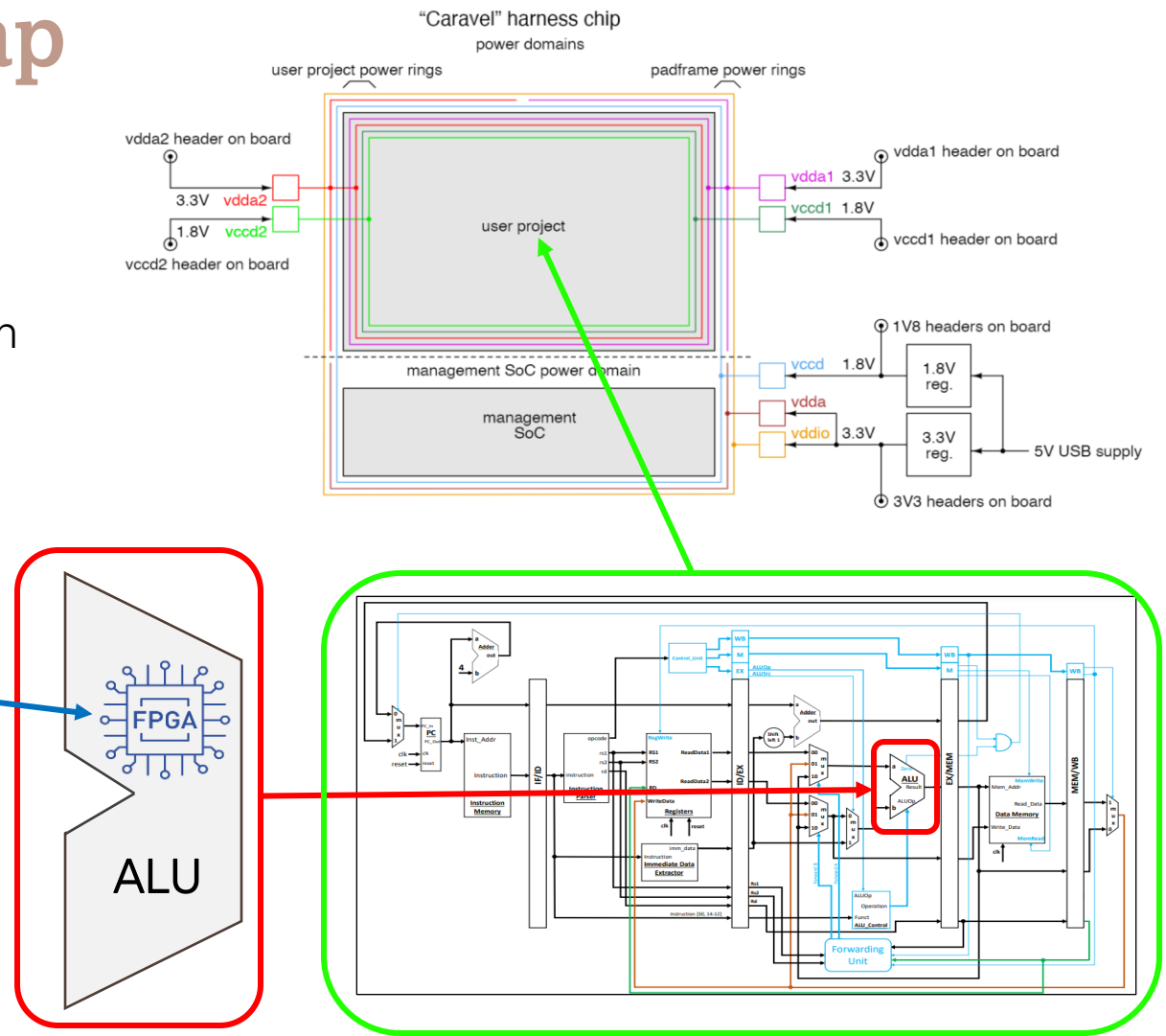


**Model Specific ASIC**



# Description of Market Gap

- What we chose: Reprogrammable ISA
  - Currently there is no hardware implementation that will let students work with ISAs or with accelerators
  - The reprogrammable ISA could be used by students to be able to accelerate process, as well as **create their own instructions**
  - For students interested in computer architecture this would be very beneficial to learn and to experience



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# Conclusions

- Our programmable instruction utilizes a circuit similar to an FPGA.
  - Existing options don't utilize an FPGA or similar circuits for custom user-defined instructions.
  - This will allow our processor to natively support any operation programmed by a user. There are various use cases for this in both professional and educational applications.
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