Field Programmable Analog Arrays Enable Mixed Signal Prototyping of Embedded System

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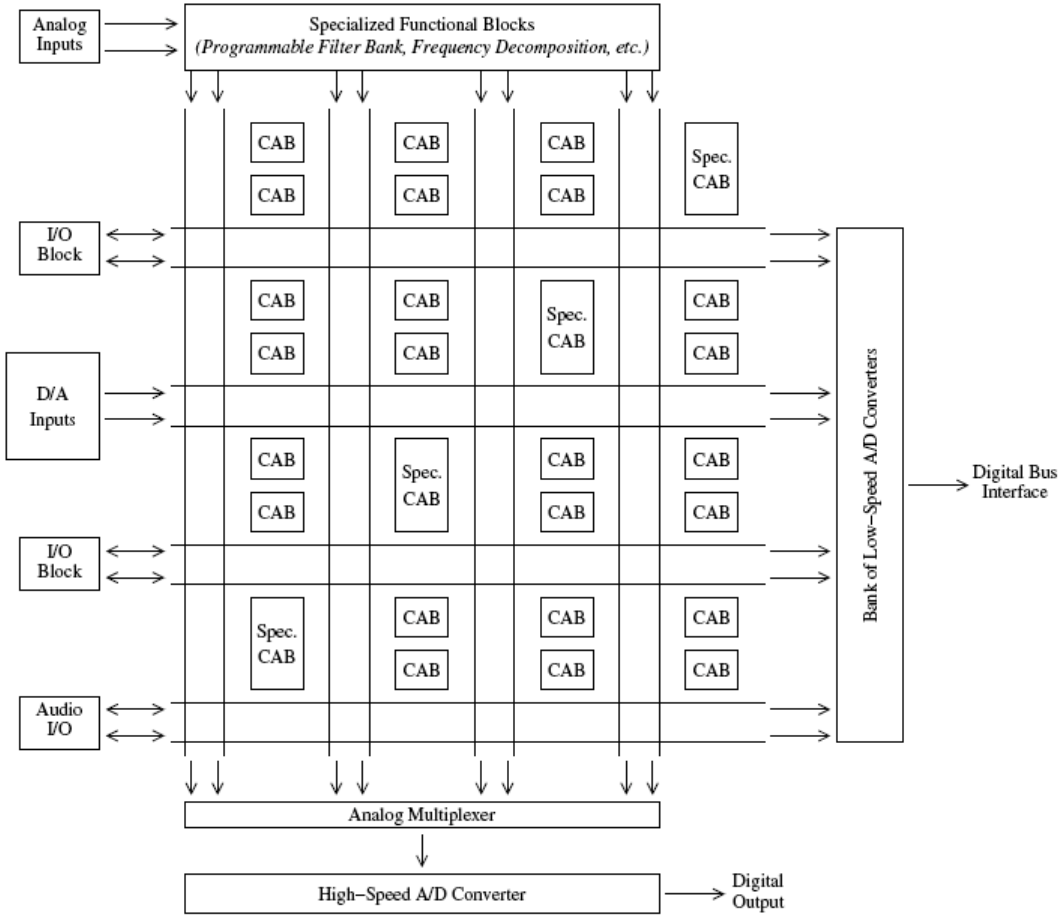
FPAA

- Field-Programmable Analog Array
- Like an FPGA for analog circuits
- Low level components: transistors, resistors, capacitors
- Medium level components: Op Amps
- High level components: Filter blocks, peak detectors
- Interconnection network

FPAA Block Diagram



Mixed Signal Systems

- Combination of digital and analog
- Embedded Systems $+$ Real World Problems $=$ Mixed Signal Systems
- Digital logic is used for control and computation.
- DSP blocks used for processing signals.
- Analog circuits are used just for interfacing.

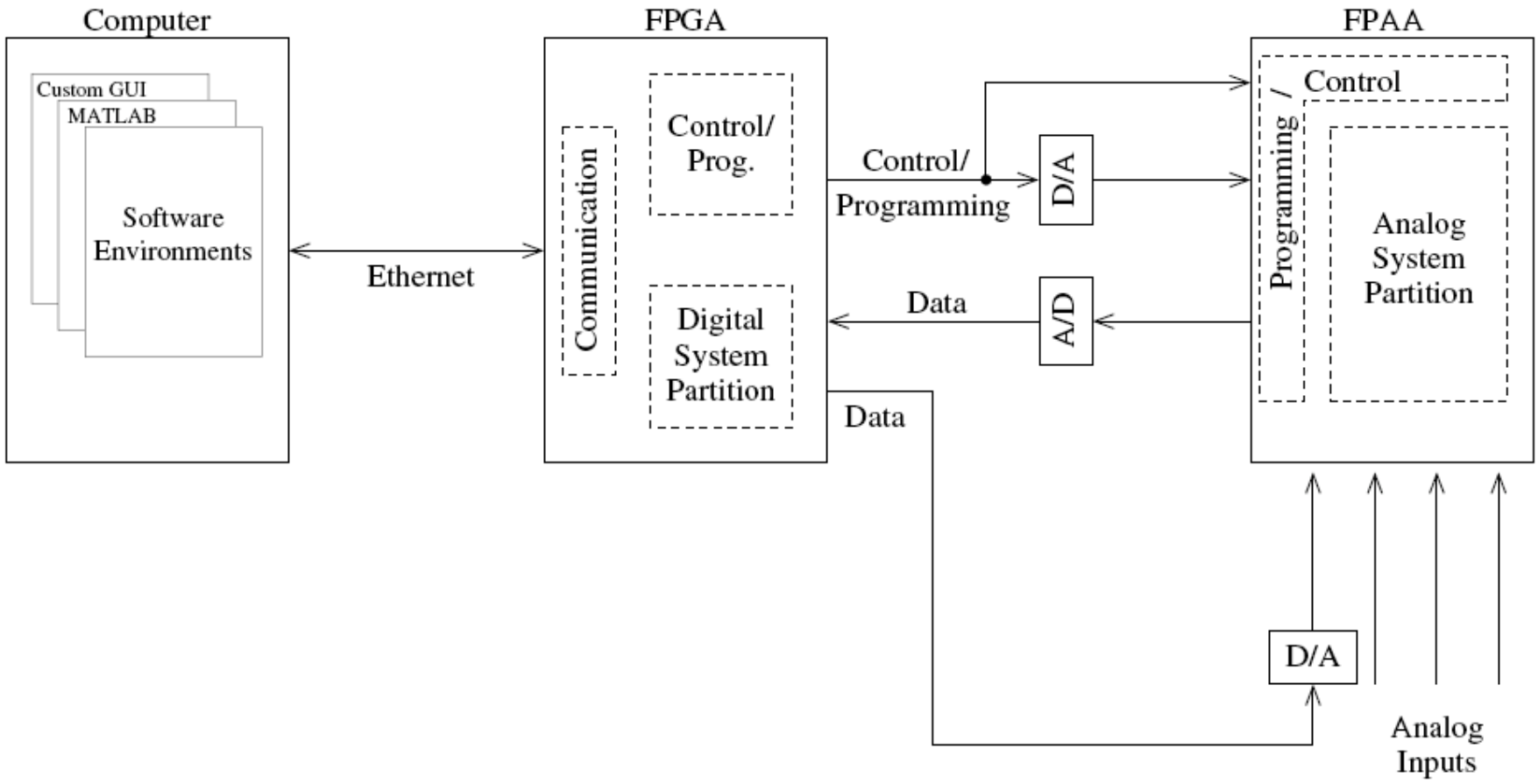
Motivation for FPAAs in Embedded Systems

- DSPs use a lot of power.
- Doing the signal processing with discrete analog parts uses less power than a DSP.
- Discrete analog parts are not flexible for evolving design.
- FPAAs can be reprogrammed to meet new specifications and changing environments.

Proposed System

- FPGA + FPAA for prototype and development
- Fixed logic/circuits for production
- Reconfiguration on production systems can be very useful
  - Changing requirements
  - Changing environment

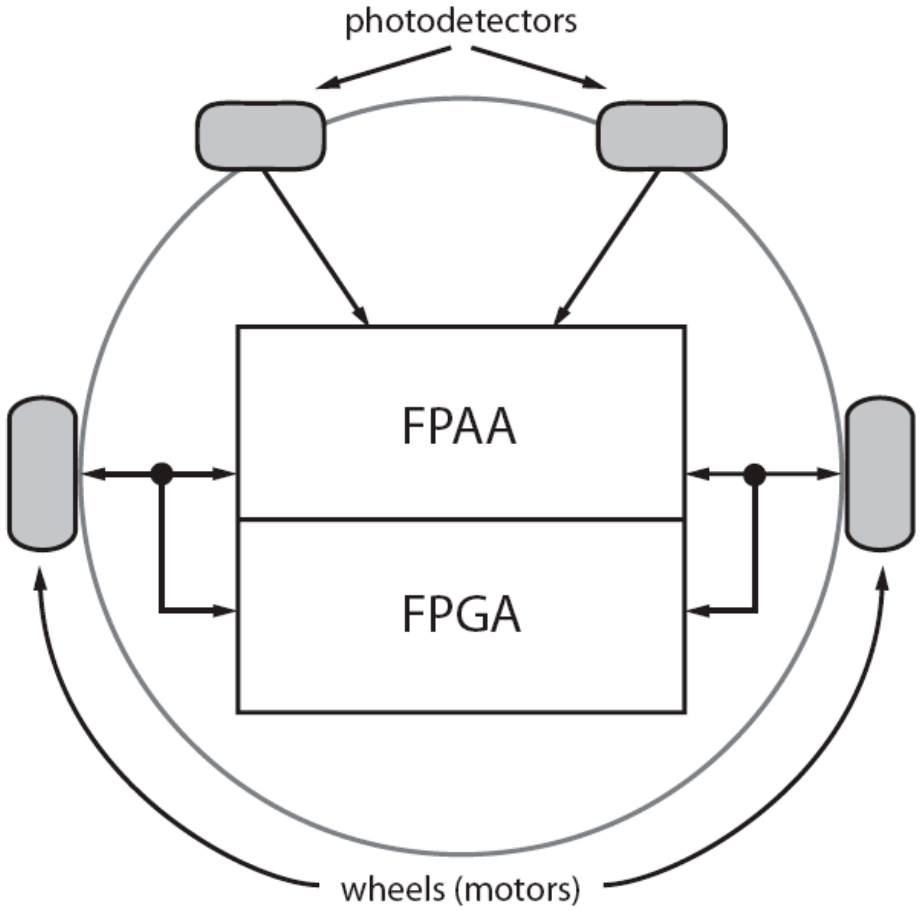
Development system Block Diagram



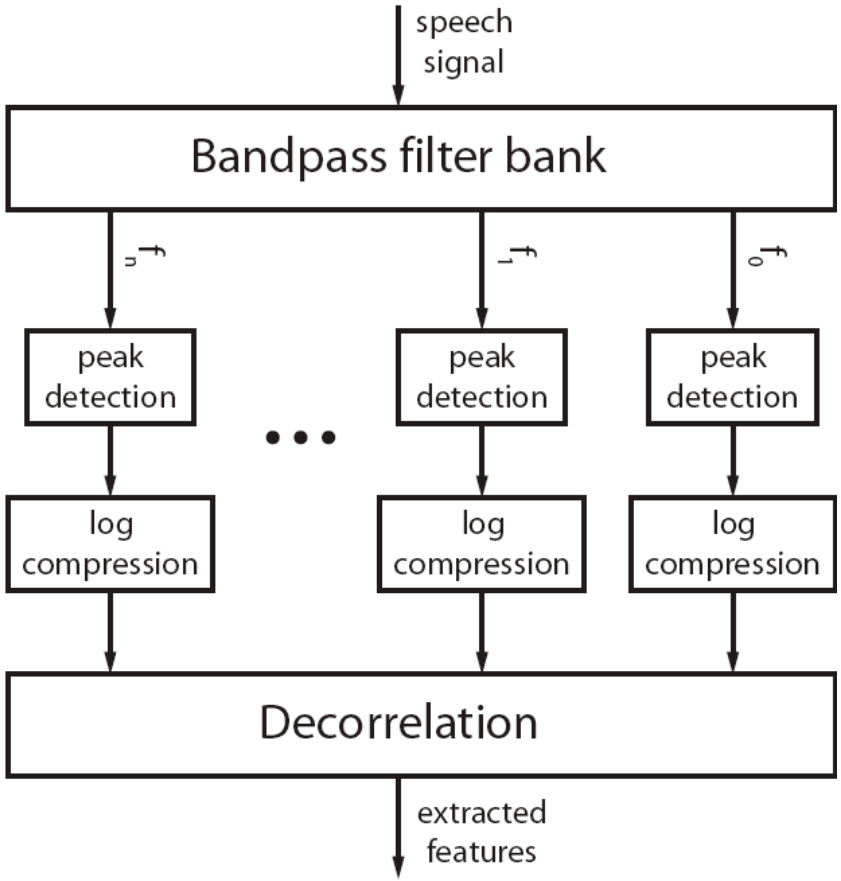
Example Applications in Embedded Systems

- Robotics - Analog Control loops
- Signal Processing - Voice command

Simple robot follows light



Initial filtering for Speech Recognition



Conclusions

- Many benefits of FPAAs in mixed signal embedded systems.
  - Rapid prototyping and development
  - Lower power than DSP
  - Flexibility in final product.

Any Questions?