Hardware Evolution of Control Electronics

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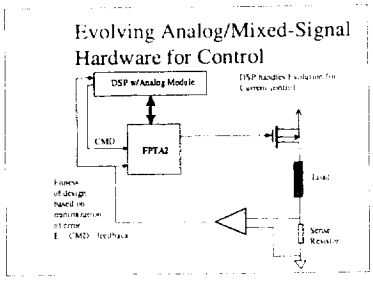
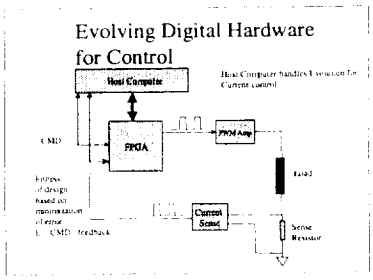
- **Exploration of the application of hardware evolution to digital and analog control system design**
  - Two application areas of interest
    - Analog circuit evolution using JPL developed 2nd generation Field Programmable Transistor Array (FPTA2)
      - Collaboration with JPL using JPL developed hardware and software to perform experiments at MSFC
    - Digital circuit evolution on FPGA's
      - Celoxica reconfigurable hardware
      - XESS XSV-800 Virtex Prototyping Board
      - JBits software – Java API developed by Xilinx under DARPA funding
  - Initial Experiments
    - Current Control
    - Motor-driven Actuator Control
    - Fitness based on minimization of error and control output





- **Goals**
  - Embedded controllers in which the hardware can be evolved to perform control functions that were not conceived before system deployment.
  - Control electronics that can evolve to operate more reliably in harsh conditions
    - Adaptation to changing environment
    - Intrinsic Fault Tolerance
  - Evolution of Hybrid controllers