

Analog Computer

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1 Requirements

1. The device shall have an operating voltage of $\pm 10V$
2. The device shall operate at room temperature ($20^{\circ}C$)
3. The device shall consist of discrete modules for each linear and nonlinear operation (sum, multiplier, integrator, etc.)
4. The modules shall pass signals via $3.5mm$ TRS jacks
5. The device shall use potentiometers to adjust coefficients when necessary
6. The signals from the device shall be connected to an ADC for digital plotting.
7. The digital plotting shall not be done in real-time, but after the device sends the data to USB.
8. Each module shall be $10cm \times 6cm$
9. The input card shall be a power supply
10. The output card shall connect to the probes, ADC and a USB port.
11. There shall be a potentiometer card to attenuate up to 4 signals.
12.
 - (a) The summer shall be capable of summing 4 input signals
 - (b) The integrator shall be capable of integrating the sum of 4 signals
 - (c) The inverter shall be capable of inverting 6 signals.
 - (d) The buffer card shall be able to buffer 6 signals.
 - (e) The output card shall be able to transmit 4 signals
 - (f) the input card shall be able to transmit 4 signals.
13. The device must be capable of solving nonlinear differential equations.

2 Milestones

1. Design schematics and preliminary PCB layouts (09/10 - 09/24)
 - 4 modules, summer/integrator, inverter, multiplier, attenuate
 - 4 section rack back-plane, power input, controls, signal source, outputs
 - rack CAD model
2. Prototyping, testing and troubleshooting (09/24 - 10/01) \$300-\$400
 - 1x each module
 - Rack backplane PCB
 - Initial software development
3. Initial software design, finalize PCB design (10/01 - 10/15) \$50 - \$100
 - 1x inverter, 2x summer/integrator, 2x multiplier, 1x inverter
 - Finalize rack design
 - Software plan finalization
4. Finalize software, total integration (10/15 - 10/29) \$50 - \$100
 - Final assembly
 - Software finishing touches
 - Testing unit