Amprotector
by team
Audiophiles

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For Concerts, Clubs, and other loud events
• Microprocessor measures power.
• Power amplifier gain is controlled from op-amp circuit.
### Technological Challenges

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| **DSP vs uP & Digital Potentiometer** | • **DSP** = more complicated compression algorithms, but expensive and little team expertise  
• uP reads in amp output and adjusts digital potentiometer accordingly; still allows for some simpler algorithms to enable gradual signal attenuation |
| **Voltage limit on uP**            | • Atmel requires incoming signal < 5 volts, much smaller than signal from amp output  
• Must employ analog step-down circuitry to bring signal into a safe operating range |
| **uP’s Interpretation of audio signal** | • Need to employ compression algorithm commands with microprocessor; must be in digital form  
• To obtain a steady analog signal level to be fed into the uP’s A/D converter: bridge rectifier and attenuator with capacitors |
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Attenuation Flow Chart

Original Design

After Final Testing Adjustments
Digital Board
Analog Board
Whole System
Possible Improvements and Extensions

• Include option for user to input amplifier ratings as well
• Take long-term overheating damage into account
  – Would require keeping a history of amplitude data over time in order to time-average the power being fed to the speaker (in addition to the instantaneous signal level)

• Could add second mode of operation as a general-purpose limiter and/or compressor (up-compression would require a change in attenuation circuitry)
  – User would input compression ratio desired, attack time, hard- or soft-knee compression, upper limit of output desired, etc.
Updated Gantt Chart