



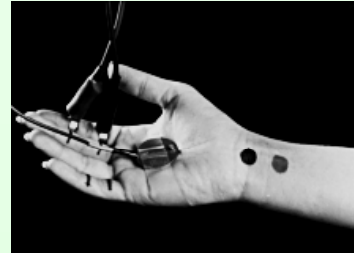
TREND FAIR 2009

Nerve Damage Detection Using Magnetic Pulses

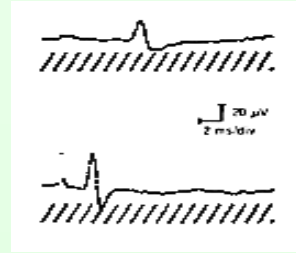
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Introduction

- The electromyogram (EMG) is the instrument currently used to detect nerve damage.
- Nerve Conduction Velocity (NCV)
 - Physical Distance between the electrode sites divided by the time it takes for the signal to be picked up by the recording electrodes.
 - Quantity used to determine nerve damage.
- Currently nerves are stimulate by electric pulses that are very painful
- Plan to check for NCV with magnetic pulses.

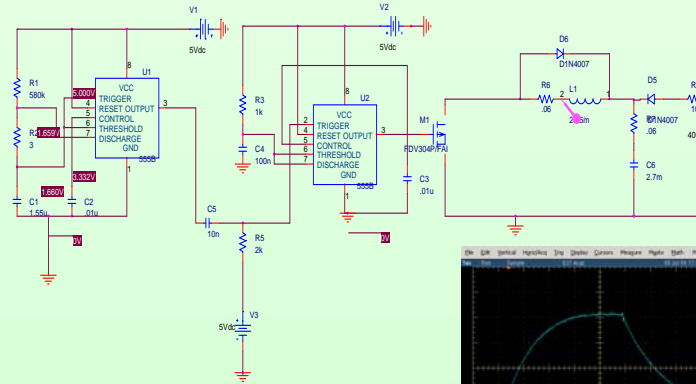


Sample EMG signals from TeleEMG

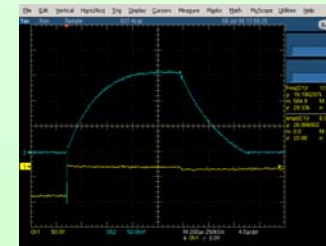


Designed, Simulated, and Built

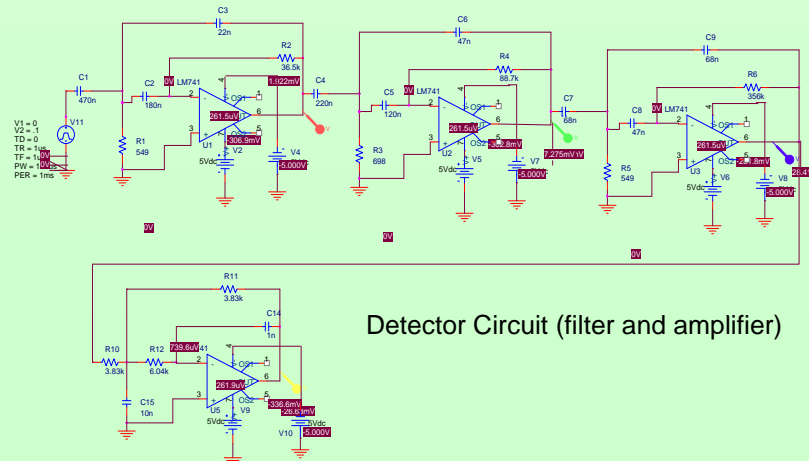
- A circuit that produced a 100us pulse every 1ms.
 - The pulse width is adjustable
 - Both a one-shot circuit and a timer circuit
- A magnet that would allow around 1kA of current through it and would produce a magnetic field of 5k Gauss.
- Connected the magnet to the pulsing circuit



Main Pulse Circuit



Current through inductor



Detector Circuit (filter and amplifier)

Results

- At this point we still are not able to detect a pulse.
- This was realized a few weeks ago so we decided to increase the energy of the inductor.
- To do this we recently altered the circuit by adding a 400V power supply
- With this improved circuit we have reached 250A with 72V
- Also from our sensing electrodes we were only picking up noise.
- To reduce this problem we are building a bandpass filter for our sensing circuit.

Future

- Continue working on stimulating the nerve and sensing the pulse.
- Develop currents to above 1kA
- Continue testing on humans
- Implement the circuit in a box to make it user friendly and safe for clinical trials

Pulse Length Vs. Peak Current

