
Periodic Leg Movement Exercise Device

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Periodic Leg Movements during Sleep (PLMS) disrupt restful sleep



Who does PLMS affect?

- Prevalence: **3.9%** with sleep complaints in ages 15-100²
- **80-90%** of people with restless leg syndrome (RLS) have **>10 PLMs** per hour²
- Common in people who have multiple sclerosis, transverse myelitis, and spinal cord injuries³

²Hornyak, et al. *Sleep Med. Rev.* 10(3): 2006

³Brown, et al. *Sleep.* 23(5): 2000

Current Treatments - Pharmacological^{3,4}

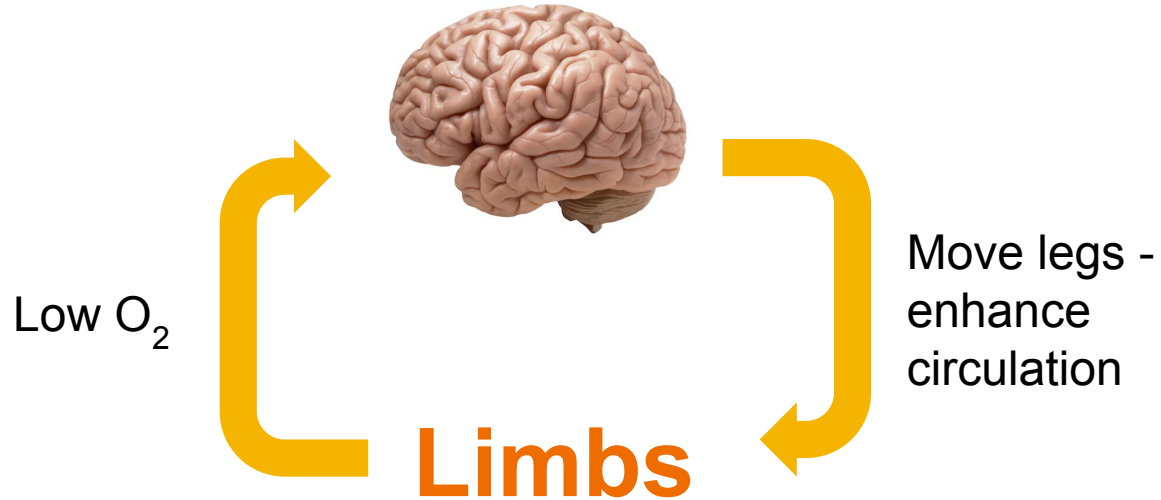
- Baclofen (GABA-b receptor agonist)
- Dopaminergic agents
- Clonazepam
- Valproate



³Brown, et al. *Sleep*. 23(5): 2000

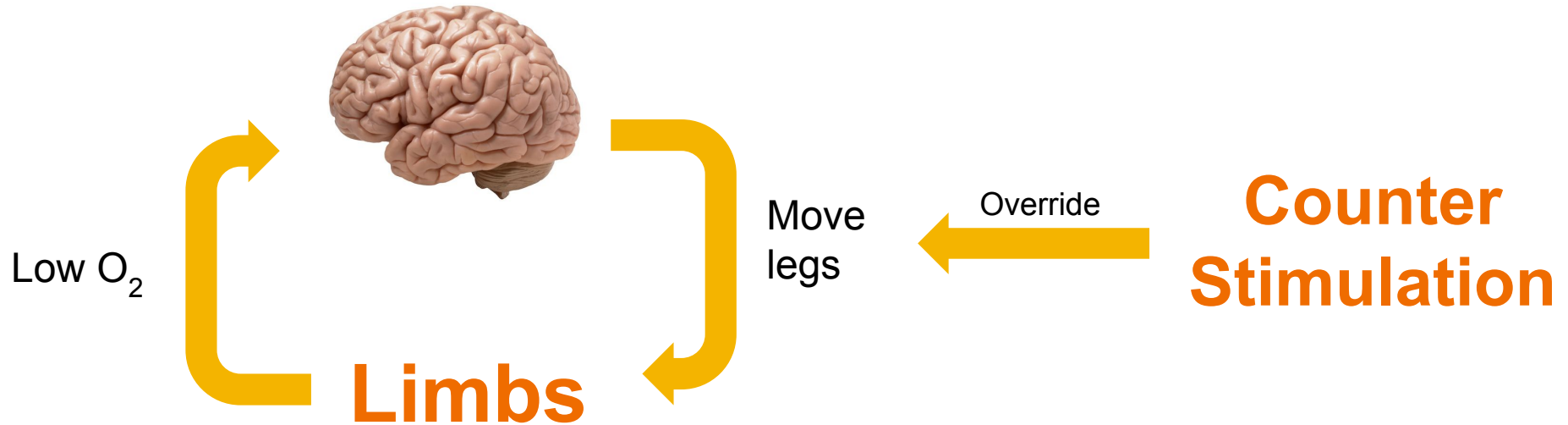
⁴Aurora, et al. *Sleep* 35(8): 2012

Counter Stimulation - “Vascular Hypothesis”⁵



⁵Ulrike, Mitchell. *Therapeutics and Clinical Risk Management*, 11(3): 2015.

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Current Treatments - Devices

- none approved for PLMS specifically
- Relaxis for RLS
- pneumatic compression
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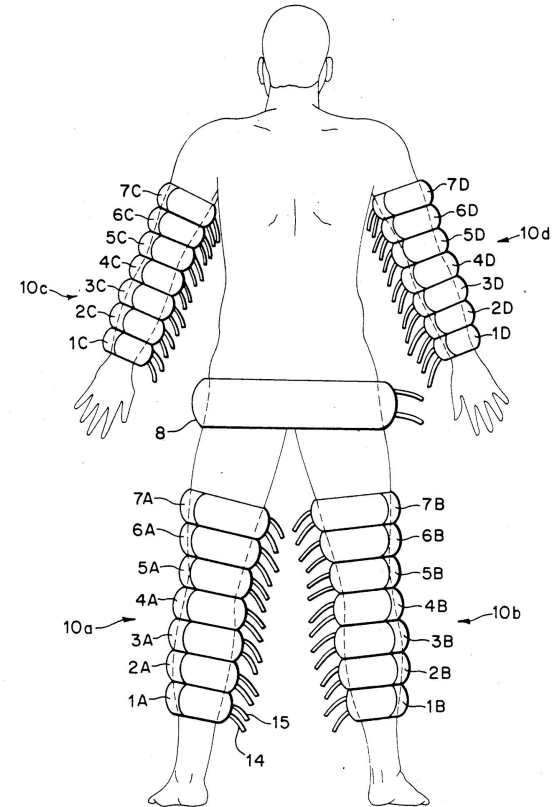
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FIG. 1A



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There is a **need** for a device to **lessen** the frequency and severity of nighttime **periodic leg movements** experienced by individuals with multiple sclerosis or transverse myelitis, in order to allow them to **comfortably sleep** through the night.

Project Scope

We propose to deliver on the last day of class, a safe device that:

- Gently moves legs back and forth during sleep without waking the user
- Decreases the number of PLMs during sleep
- Has an interface that allows for customization of the movement program

Design Specifications

- Frequency of motion: up to 0.5 Hz
- Displacement: up to 0.6 m
- Costs < \$1000
- Easy to install
 - No daily assembly/disassembly
 - Compatible with standard full-size bed
 - 1 person can set it up while sitting in a wheelchair
 - Weighs < 10 kg
- Adjustable to individual
 - Any leg length and any leg circumference up to 70 cm
- 60 Hz/120 V-240 V power cord
- Operating time: adjustable, but at least 12 hours

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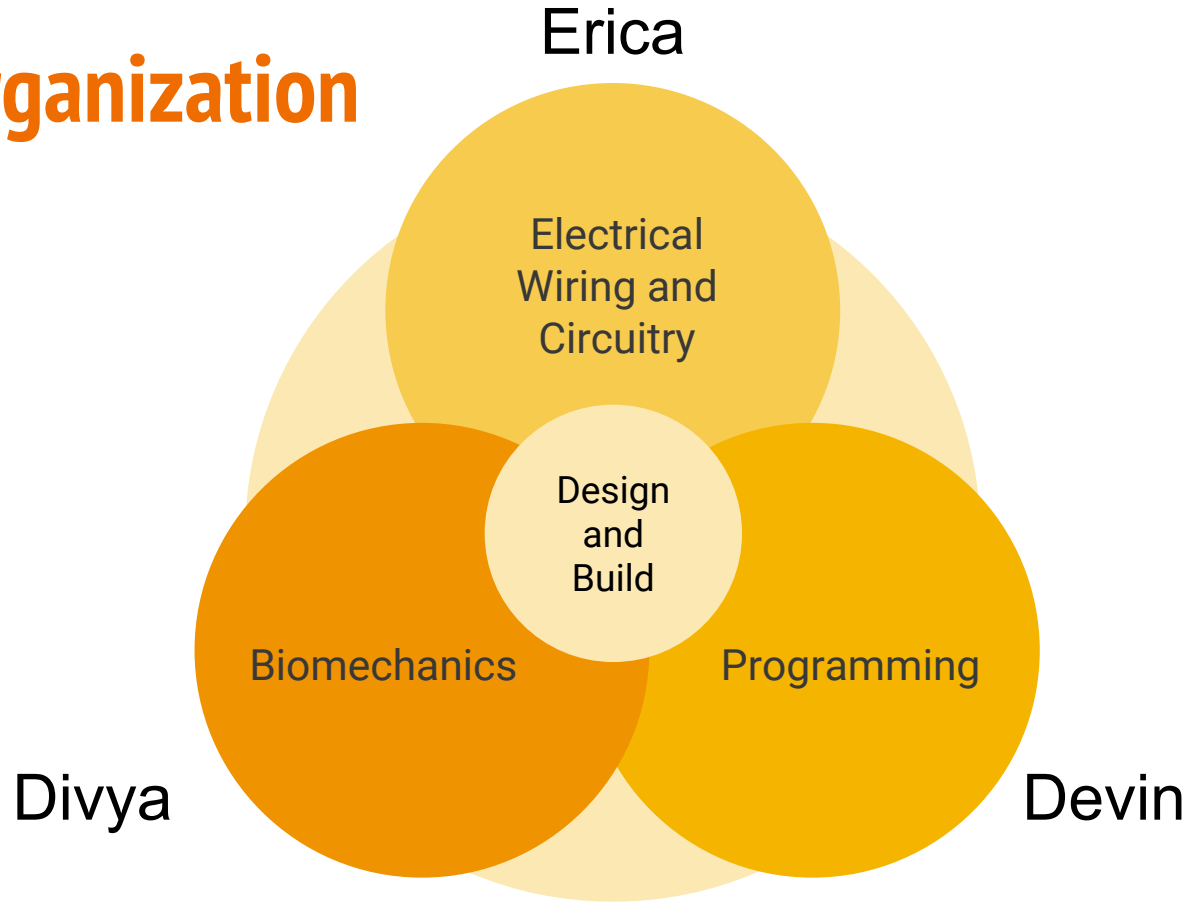
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Design Schedule

Week:	1/2	3/4	5/6	7/8	9/ 10	11/ 12	13/1 4	15/1 6	17/ 18	19/ 20	21/ 22	23/ 24	25/ 26	27/ 28	29/ 30	31/ 32	33/ 34
Literature Search	■	■	■														
Product Sketches				■	■	■	■	■									
Prototype								■	■	■	■	■	■	■			
Verification and Validation															■		
Finalize															■	■	■

Team Organization



References

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