Development of a Portable PEMF Therapy Device

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Introduction

Arthritis causes chronic pain, limiting mobility and quality of life.
Pulsed Electromagnetic Field (PEMF) therapy is a non-invasive method that helps reduce pain and inflammation.

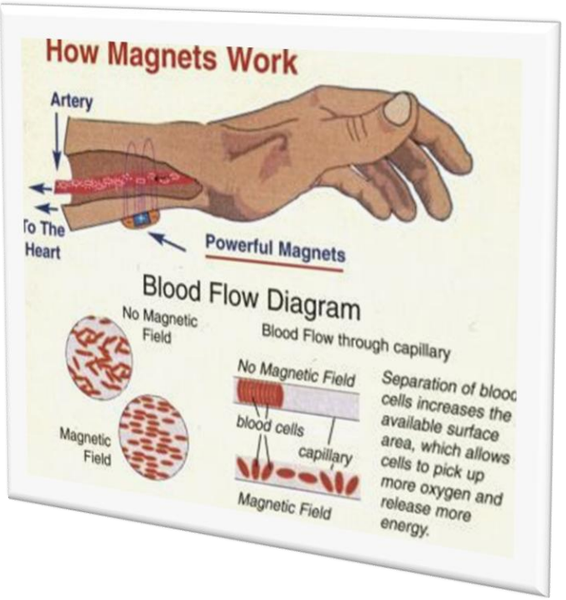
Purpose:

- Develop a **portable, compact, and user-friendly** PEMF device for arthritis pain relief.
- Provide an **affordable and accessible** solution for daily pain management.

Objective:

- Design a **lightweight and adjustable** PEMF device.
- Ensure **ease of use** for patients of all ages.
- Offer **effective pain relief** without medication or side effects.

Working Principle of PEMF Therapy



1.Electromagnetic Field Generation

•The device generates pulsed electromagnetic fields (PEMF) that penetrate deep into body tissues.
•These fields induce small electrical currents within cells, stimulating biochemical and physiological processes.

2.Cellular Stimulation & Healing

•Enhances ion exchange: Restores cellular balance, improving energy production (ATP synthesis).
•Increases blood flow: Promotes oxygen delivery and nutrient absorption for faster healing.
•Reduces inflammation: Modulates inflammatory responses, easing joint stiffness and swelling.
•Accelerates tissue regeneration: Encourages the repair of damaged cartilage, muscles, and bones.

3.Scientific Validation

•NASA research confirms 1-4 Gauss as the optimal intensity for cell regeneration and bone healing.
•Studies show PEMF therapy reduces pain by blocking pain signals and increasing endorphin production.

4.Non-Invasive & Drug-Free Therapy

•Offers safe and painless arthritis relief without side effects.
•Can be used daily for long-term pain management and mobility improvement.

Proposed Device Overview

1.Controlled PEMF Signal Generation

•Produces precise and adjustable pulsed electromagnetic fields for effective pain relief.
•Ensures optimal intensity (1-4 Gauss) for safe and efficient therapy.

2.Portable & User-Friendly Design

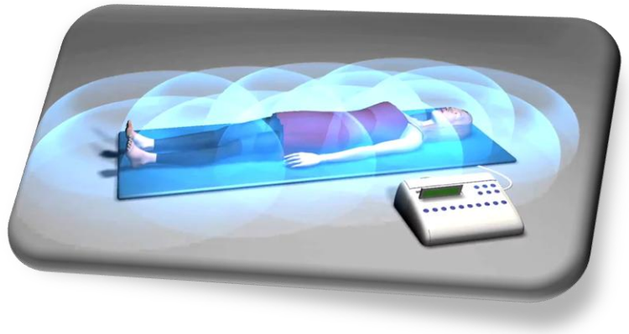
•Compact, lightweight, and easy to carry for home or travel use.
•Simple interface with one-touch operation for convenience.

3.Adjustable Intensity & Frequency

•Customizable settings to suit individual pain levels and treatment needs.
•Offers multiple frequency options for targeted therapy.

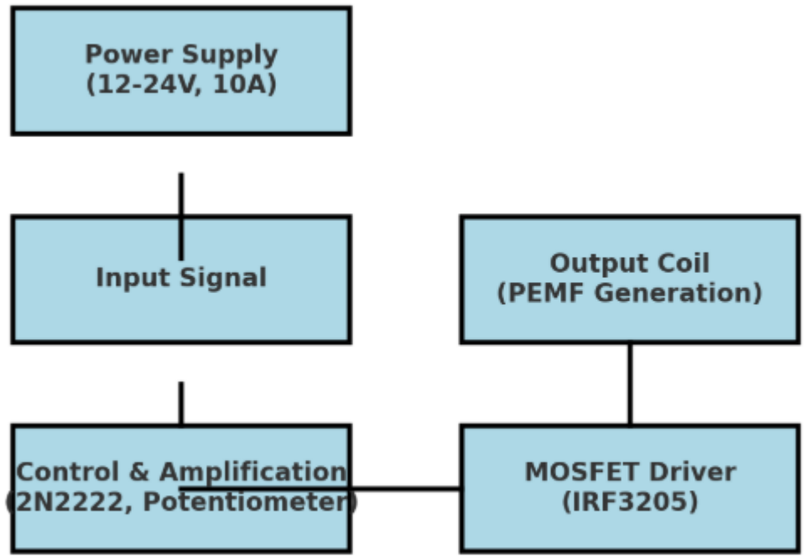
4.Medical Applications

•Helps manage arthritis, joint pain, muscle stiffness, and inflammation.
•Potential use in post-surgical recovery, bone healing, and sports injuries.



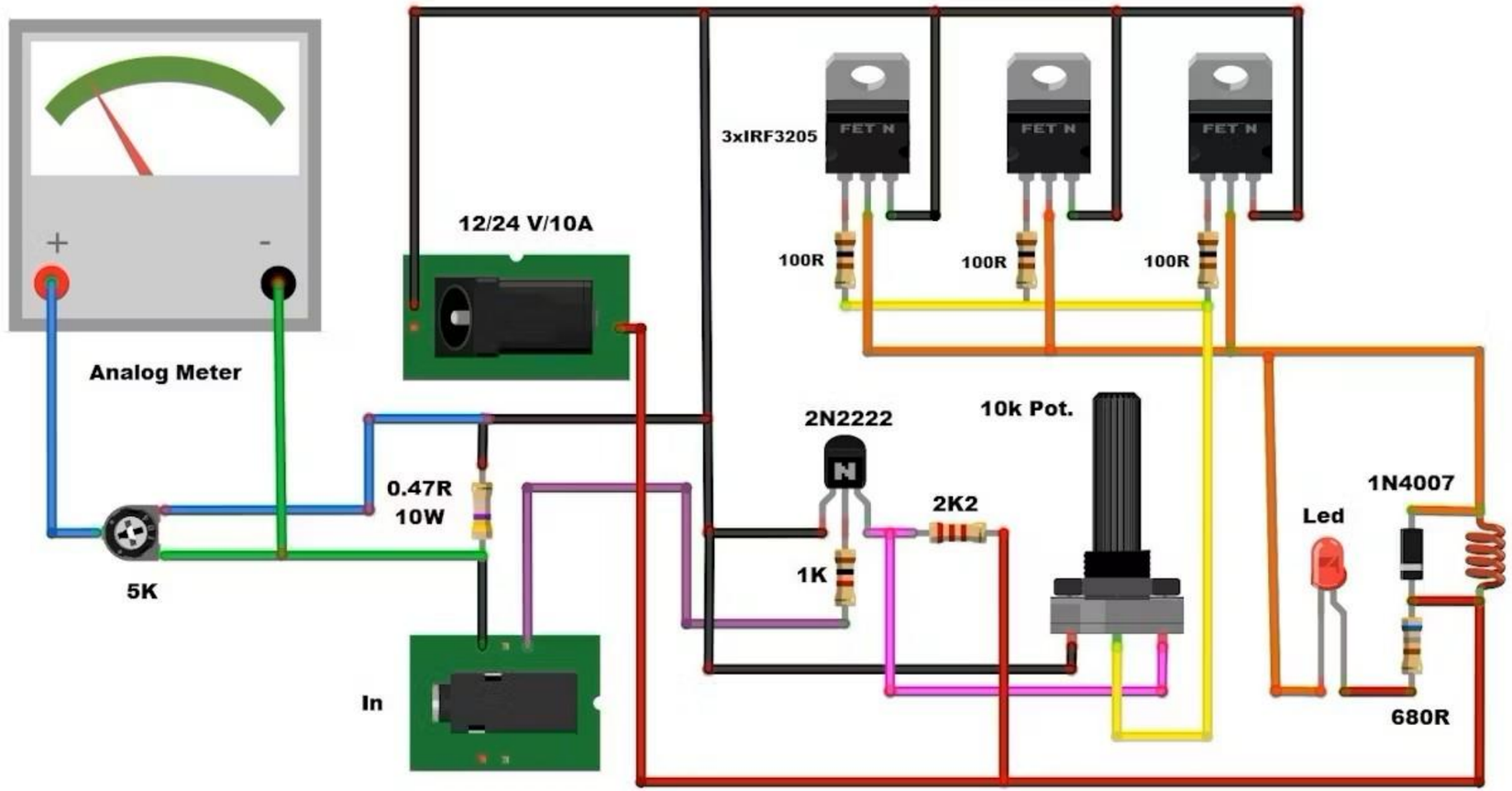
Block Diagram:-

Power source
- Signal generator (PC, mobile app, or recorded audio)
- Signal amplifier
- Output coil for electromagnetic radiation
- Optional feedback mechanism (magnetometer or ammeter)



Circuit Diagram :-

Visual representation of the circuit with components and their connections.



Component List for PEMF Device :-

Active Components :-

•IRF3205 MOSFET ×3 → Handles high current switching.

•2N2222 NPN Transistor ×1 → Controls MOSFET switching.

•Rotary Potentiometer (10KΩ) ×1 → Adjusts intensity.

•1N4007 Diode ×1 → Protects against voltage spikes.

Passive Components :-

Resistors:

- •100Ω ×3 → Limits gate current for MOSFETs.
- •2.21kΩ ×1 → Biasing resistor for transistor.
- •1kΩ ×1 → Controls base current for transistor.

Coil (Radiation Coil) → Generates pulsed electromagnetic field.

Other Essentials:

•Power Supply → 12-24V DC (Battery/Adapter).
•Soldering Iron & Solder Wire → For circuit assembly.
•PCB or Breadboard → For circuit prototyping.
•Connecting Wires & Casing (PVC Board) → For connections and enclosure.

Working Process of the PEMF Device :-

1.Signal Input

- The input signal is generated from a PC, mobile device, or an external PEMF generator.
- This signal determines the pulse frequency and intensity.

2.Signal Amplification

- The 2N2222 transistor acts as a switch, controlling the MOSFETs.
- IRF3205 MOSFETs amplify the signal to deliver sufficient current to the coil.
- The potentiometer allows adjustment of intensity as per user needs.

3.Coil Emission

- The amplified signal is sent to the radiation coil.
- The coil converts this electrical energy into a pulsed electromagnetic field (PEMF).

4.Therapy Application

- The PEMF waves penetrate body tissues, stimulating cellular repair and reducing pain.
- This non-invasive therapy helps reduce inflammation, improve blood circulation, and enhance healing.

Expected Results & Benefits :-

✅ Portable & Affordable

•Compact design makes it easy to use anywhere.
•Cost-effective alternative to expensive commercial PEMF devices.

✅ Customizable Therapy Settings

•Adjustable intensity and frequency to suit individual needs.
•User-friendly controls for personalized pain relief.

✅ Effective Pain Management

•Helps reduce arthritis pain, inflammation, and stiffness.
•Promotes faster healing and improved mobility without medication.

Conclusion & Future Scope :-

✅ Conclusion:

•The proposed portable PEMF device offers an affordable, non-invasive solution for arthritis pain relief.
•It provides customizable therapy settings, ensuring effective and user-friendly treatment.
•The device has the potential to improve quality of life for arthritis patients by reducing pain and inflammation.

✅ Future Scope:

•Adding a Feedback Meter: Real-time monitoring of therapy intensity and effectiveness.
•Smartphone App Integration: Wireless control via a mobile app for convenience.
•Enhanced Coil Designs: Improved efficiency and better penetration for optimized therapy results.

THANK YOU