

Smart IoT- Based Marma Foot Therapy System

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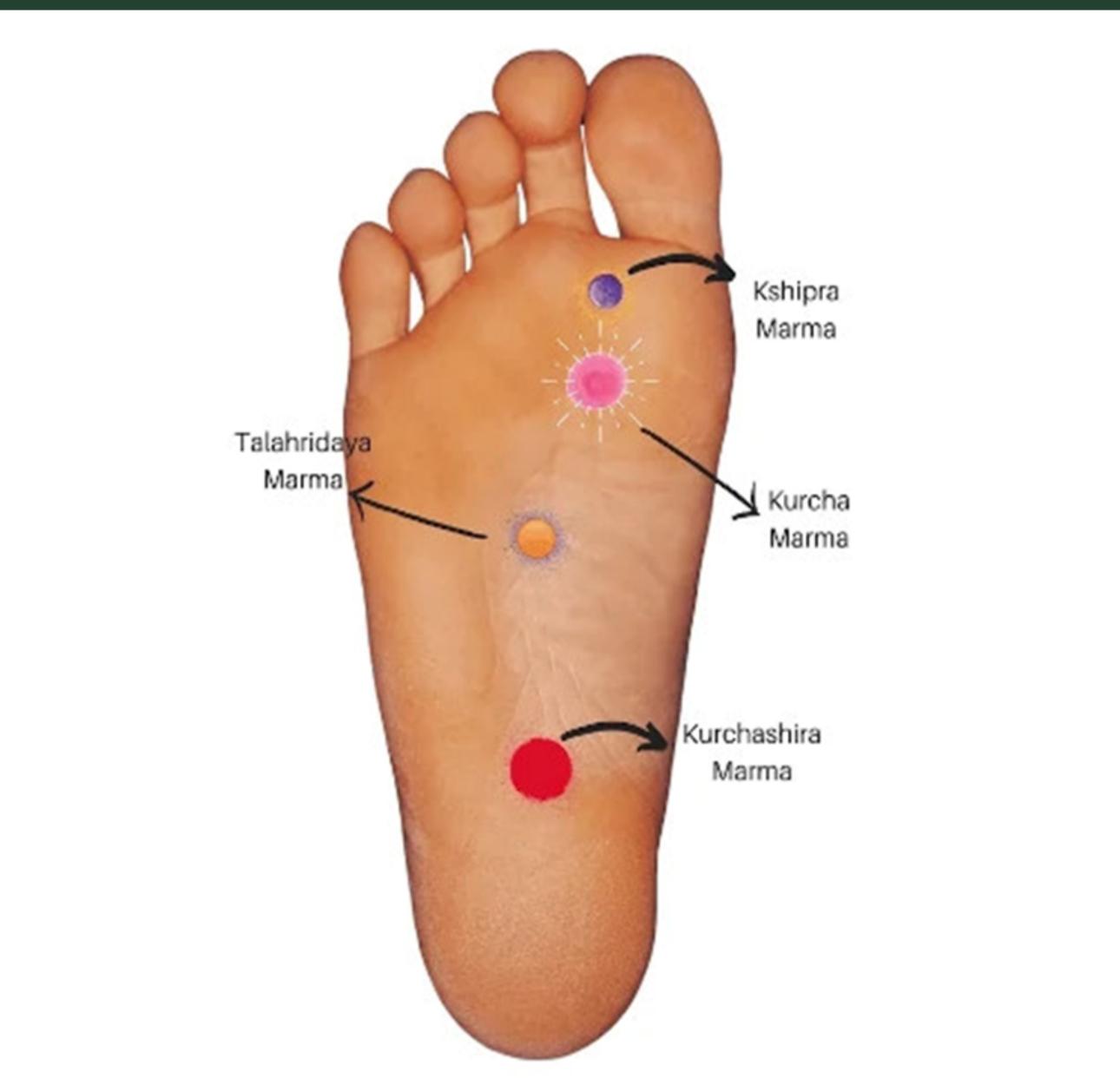
Introduction

📌 Overview of the Project

- Marma therapy is an ancient healing technique for pain relief, circulation improvement, and stress reduction.
- The traditional approach lacks accessibility, requiring skilled practitioners.
- This project integrates IoT, AI, and a web-based system to automate therapy, enhance accuracy, and improve user experience.
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📌 Why This Project?

- Provides an affordable, technology-driven alternative to traditional therapy.





PROBLEM STATEMENT

- **The question that originally laid the foundation for this project is, "Does the limited accessibility and precision of traditional Marma therapy restrict its potential benefits for individuals suffering from foot pain, poor circulation, and stress?"**
- **To find a suitable and technology-driven solution to this question, a comprehensive study is being conducted by combining Design Science Research Methodology with a shadow approach, focusing on integrating AI, IoT, and user-doctor interactive systems into a smart, cost-effective Marma foot therapy platform.**

Aim & Objectives

Aim:

To develop an IoT-based Smart Foot Therapy System that aligns the foot using AI and applies Marma therapy via real-time vibration stimulation, controlled through a web application.

Objectives:

- ✓ Develop a web-based system for therapy control and doctor-patient interaction.
- ✓ Implement AI-powered foot alignment for precision therapy.
- ✓ Use ESP32 and vibration motors for IoT-based therapy activation.
- ✓ Enable real-time therapy monitoring and feedback collection.
- ✓ Ensure a cost-effective and user-friendly solution.

Literature Review

Marma Therapy & Traditional Healing

- Used in Ayurveda for stress relief, pain reduction, and circulation improvement.
- Studies show stimulating Marma points enhances nerve function.

IoT in Healthcare

- IoT improves real-time patient monitoring and remote therapy management.
- Smart wearable devices are revolutionizing therapy and rehabilitation.

AI-Based Alignment & Smart Therapy

- AI improves accuracy in body alignment and therapy applications.
- AI-powered gesture recognition, foot scanning, and alignment detection enhance usability.

Existing Therapeutic Footwear & Smart Devices

- Current smart footwear solutions lack real-time Marma therapy integration.
- No existing system combines AI, IoT, and therapy automation.

Problem and Solutions

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Problem Statement

- Traditional Marma therapy is not widely accessible due to the need for skilled practitioners.
- Existing smart footwear solutions do not provide precise Marma therapy automation.
- No real-time AI-driven foot alignment system exists for therapy accuracy.
- Lack of remote doctor-patient interaction in current solutions.

Proposed Solutions

- AI-Powered Foot Alignment: Uses pre-trained AI models to detect Marma zones.
- IoT-Based Therapy System: ESP32 controls vibration motors to apply therapy.
- Web Application for User-Doctor Interaction: Allows real-time monitoring & instructions.
- Smart Therapy Activation: Users get precise therapy based on AI alignment feedback.

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Proposed Solution

Web-Based AI-Integrated Therapy System

- *Users upload a foot image → AI detects alignment zones (4 rectangular frames).*
- *Users align their foot with the system (Red for wrong, Green for correct).*
- *Therapy starts when alignment is correct and the user confirms.*

Doctor Interaction for Personalized Therapy

- *Doctors can monitor patient sessions and adjust therapy settings remotely.*
- *Doctors can give therapy instructions and session durations for each patient.*

ESP32-Based IoT Hardware for Therapy

- *ESP32 controls vibration motors based on AI-aligned Marma zones.*
- *Therapy activates in real-time through the web app.*

Methodology

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Web Application Development

- Built using React.js or Next.js for UI.
- Uses Firebase for backend storage.
- Bluetooth/Wi-Fi communication with ESP32.

AI-Based Foot Alignment System

- Pre-trained AI model detects foot Marma points from uploaded photos.
- Generates four rectangular alignment frames for therapy zones.
- Foot placement color indicator: Green ✓ (Correct), Red ✗ (Wrong).

IoT-Based Therapy System

- ESP32 receives alignment confirmation and activates vibration motors.
- Therapy session runs based on pre-set duration & intensity.

Doctor-Patient Interaction

- Doctors monitor patients and provide real-time therapy guidance.
- Therapy adjustments based on patient response.

Requirements

Hardware Requirements:

- ✓ *ESP32 – Microcontroller for IoT therapy control.*
- ✓ *Vibration Motors – For therapy stimulation.*
- ✓ *Wooden Frame with Sensors – For foot placement & alignment.*

Software Requirements:

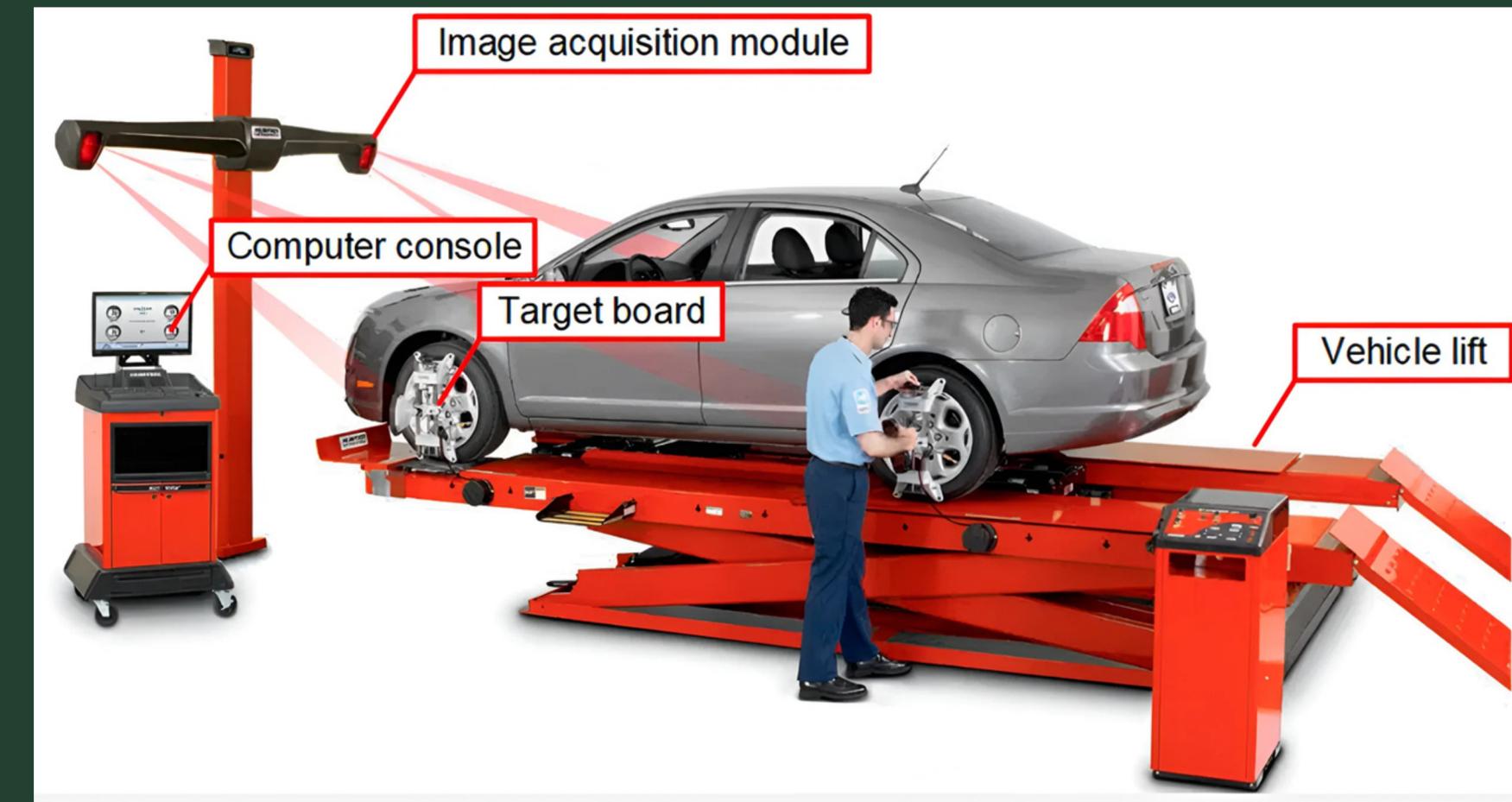
- ✓ *Web App: React.js / Next.js, Firebase for database.*
- ✓ *AI Model: Pre-trained model for foot alignment detection.*
- ✓ *IoT Connectivity: Bluetooth/Wi-Fi for ESP32 & web app communication.*

Functional Requirements:

- ✓ *AI-powered foot alignment detection.*
- ✓ *Real-time therapy activation via IoT.*
- ✓ *Doctor-patient remote interaction.*

Non-Functional Requirements:

- ✓ User-friendly interface & accessibility.
- ✓ Secure data handling & cloud storage.
- ✓ Low-cost & energy-efficient design.



PROGRESS OVERVIEW

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- **Reviewed Existing Marma Therapy Technologies** – Studied traditional Marma therapy practices and existing smart wearable solutions to understand therapy principles, accessibility challenges, and technological gaps.
- **Evaluated Web-Based and IoT Solutions** – Analyzed similar health monitoring web apps and IoT frameworks to identify key features for user-doctor interaction, AI integration, and therapy control.
- **Selected Core Components and Tools** – Chose suitable components including ESP32 microcontroller, vibration motors, AI-based foot alignment model, and web technologies for a cost-effective, scalable system.
- **Started Implementation** – Initiated hardware design of the wooden foot frame and began development of the web application, outlining the user and doctor flows and integration with IoT devices.

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UPCOMING WORK

- **Develop Full Control Logic for Therapy Sessions** – **Implement full system logic for user-doctor communication, AI-based foot alignment, therapy activation, and IoT device control.**
- **Complete Hardware Assembly and Integration** – **Build and assemble the wooden foot frame, integrate ESP32 microcontroller, vibration motors, and connect to the web application.**
- **Test & Calibrate the System** – **Conduct alignment accuracy testing, therapy timing validation, IoT connectivity tests, and refine the system based on performance results.**
- **Prepare Final Documentation** – **Compile all designs, system architecture, testing results, user feedback, and analysis into the final project report, thesis, and research publications.**



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A close-up photograph of a person's hands. The person is wearing a light-colored long-sleeved shirt. They are holding a paintbrush with a dark handle and a light-colored bristle tip. The brush is positioned diagonally, pointing towards the bottom right. The background is a soft-focus green, suggesting a painter's palette or a piece of artwork.

Thank you!

Together, we can build a greener, cleaner future.