

Team Name:- **INFINITY CREW**

Title:- IoT-Enabled Health Monitoring
and Muscle-Stimulation System
(PULSE GUARD)

Team Members:-

- Pranav Gaikwad(Team leader)
- Prathamesh Pagar
- Bhagwan Kote
- Prajwal Kote
- Saish Kote



Guided by Mr.Kiran Wakchaure sir



PULSE GUARD

"BECAUSE EVERY LIFE MATTERS."



❖ PROBLEM STATEMENT:-

- Elderly individuals suffer from **weak muscles** and blood circulation issues
- Traditional treatments are **bulky or expensive**
- Need for a compact, **low-cost** wearable that **stimulates muscles** and monitors vital signs
- **SDG-3 "Good Health and Well-being"**
- **SDG-9: "Industry, Innovation, and Infrastructure"**
Digital transformation and resilient health infrastructure



PULSE GUARD

"BECAUSE EVERY LIFE MATTERS.."



❖ PROBLEM SOLUTION:-

The system consists of:

1. Wearable device (like belt)
2. Mobile/desktop software
3. Cloud analytics & dashboard (better connectivity)
4. One to one connection with Doctors

**SANJIVANI
UNIVERSITY**

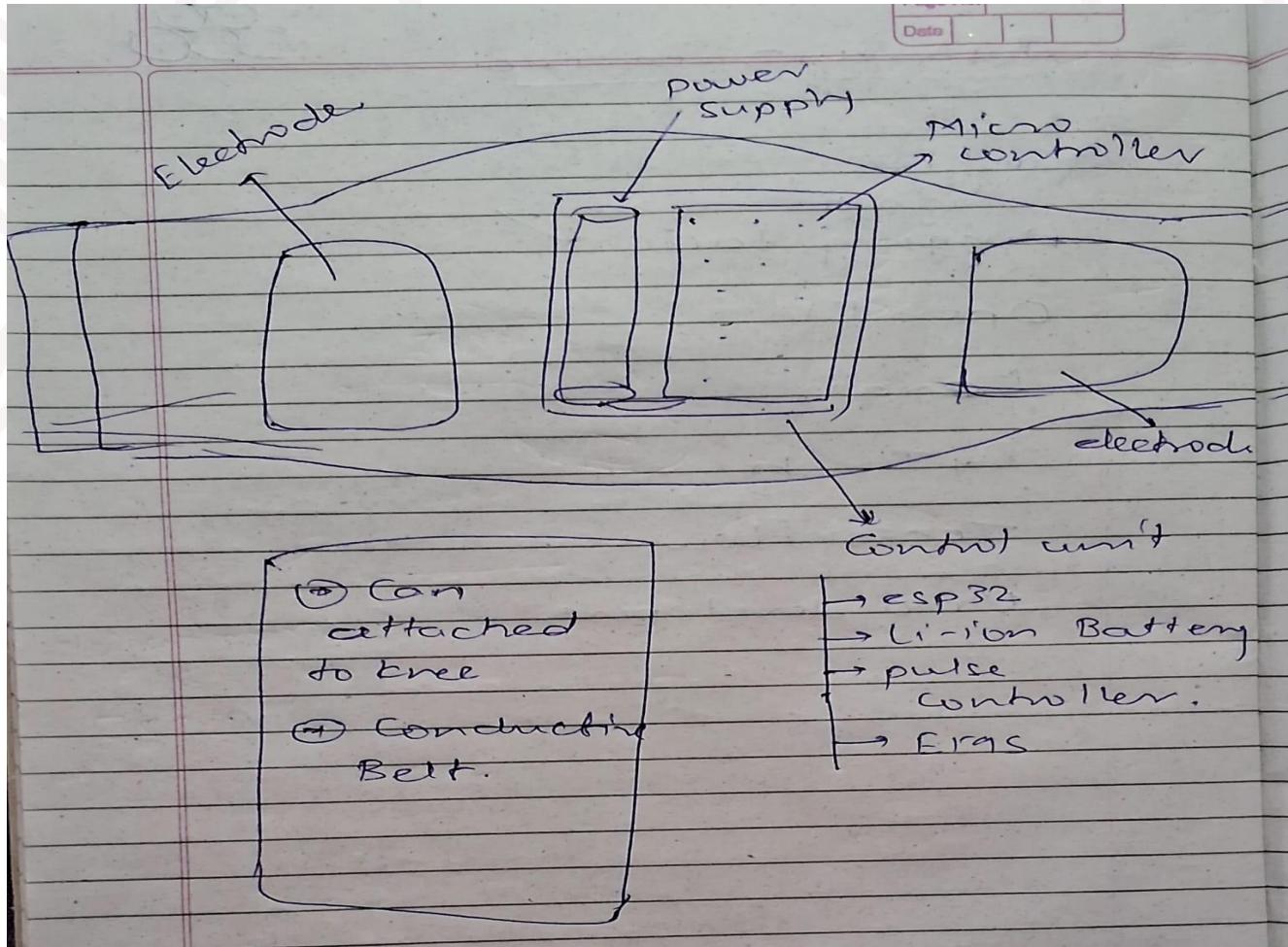


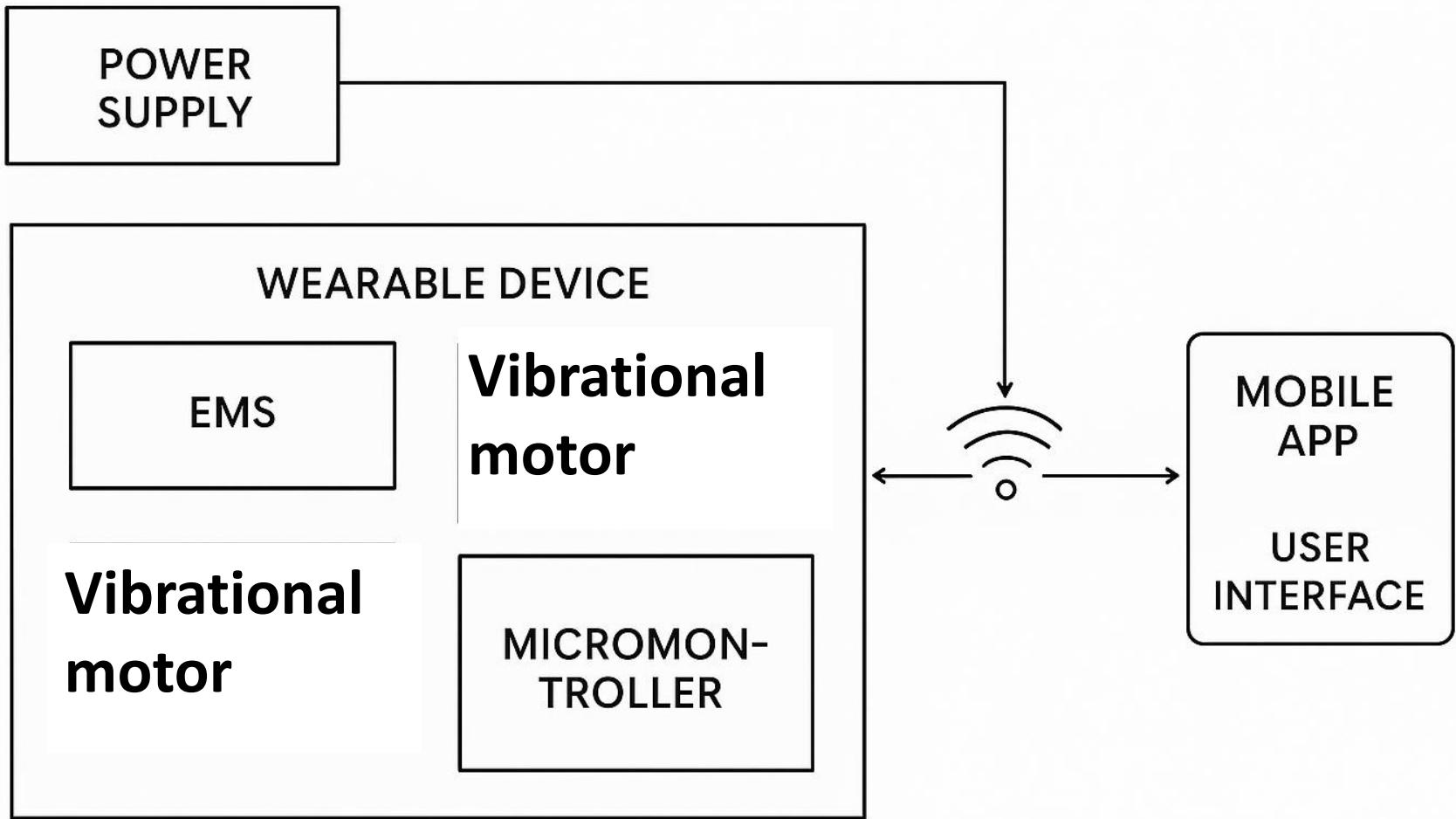
PULSE GUARD

"BECAUSE EVERY LIFE MATTERS."



❖ Tentative sketch of the project:-







PULSE GUARD

"BECAUSE EVERY LIFE MATTERS."

❖ Technology Stack:-



Hardware Components	Software & Development Stack
ESP32 Microcontroller (Dev Model) 1.Cost-effective 2.Wireless connectivity 3.Low power consumption	Firebase Studio (Web-applications + Cloud) Lovable AI (Web app)
EMS (Electrical Muscle Stimulation) Module 1.Electrode-based stimulation system Vibrational motors	IoT Protocols & Communication: (Wi-Fi for wireless data transmission)
Battery System with Charging Circuit 1.Lithium-ion battery pack (3.7V) 2.TP4056 charging module with protection	ESP32 development using Arduino IDE



PULSE GUARD

"BECAUSE EVERY LIFE MATTERS."

❖ Brainstorming Process:-



Pulse Guard

Pranav_Galkwad

IoT-Enabled
Health
Monitoring and
Muscle-
Stimulation
System

Pranav_Galkwad

Ready
made
Electrical
stimulator

Pranav_Galkwad

Belt or
polyester
material

Pranav_Galkwad

Pranav_Galkwad

This is our team
now we are going to
make


stylish
design



prathmeshpagar9211

USEFUL FOR
ELDERS AND
PARALYSE PEOPLE

Pranav_Galkwad

Electrode pads



Pranav_Galkwad

helps to
Communicate easy
between doctor or
gurdian with patient/
elder persons

Pranav_Galkwad



futuristic



prathmeshpagar9211

3.7v
2600mAh
18650

Pranav_Galkwad

li-ion
battery

prathmeshpagar9211

integrate it with
Software
+Hardware

Pranav_Galkwad

**2600mAh
and re-
chargeable**

@FIGMA



PULSE GUARD

"BECAUSE EVERY LIFE MATTERS."

Wearable Hardware Architecture:-

- **ESP32 Dev** – microcontroller with Wi-Fi and bluetooth
- **EMS kit** – muscle Detection
- **Vibrational Motor** - Muscle stimulation
- **Rechargeable Li-ion battery** – power supply
- **Belt** - Around the knee
- Belt Material: Elastic stretchable cloth
- Electrodes: Attached with conductive fabric
- Electronics: Mounted in a small pouch
- Compact and comfortable for daily use

Affinity Mapping:-



Mobile Application:-

Key features:

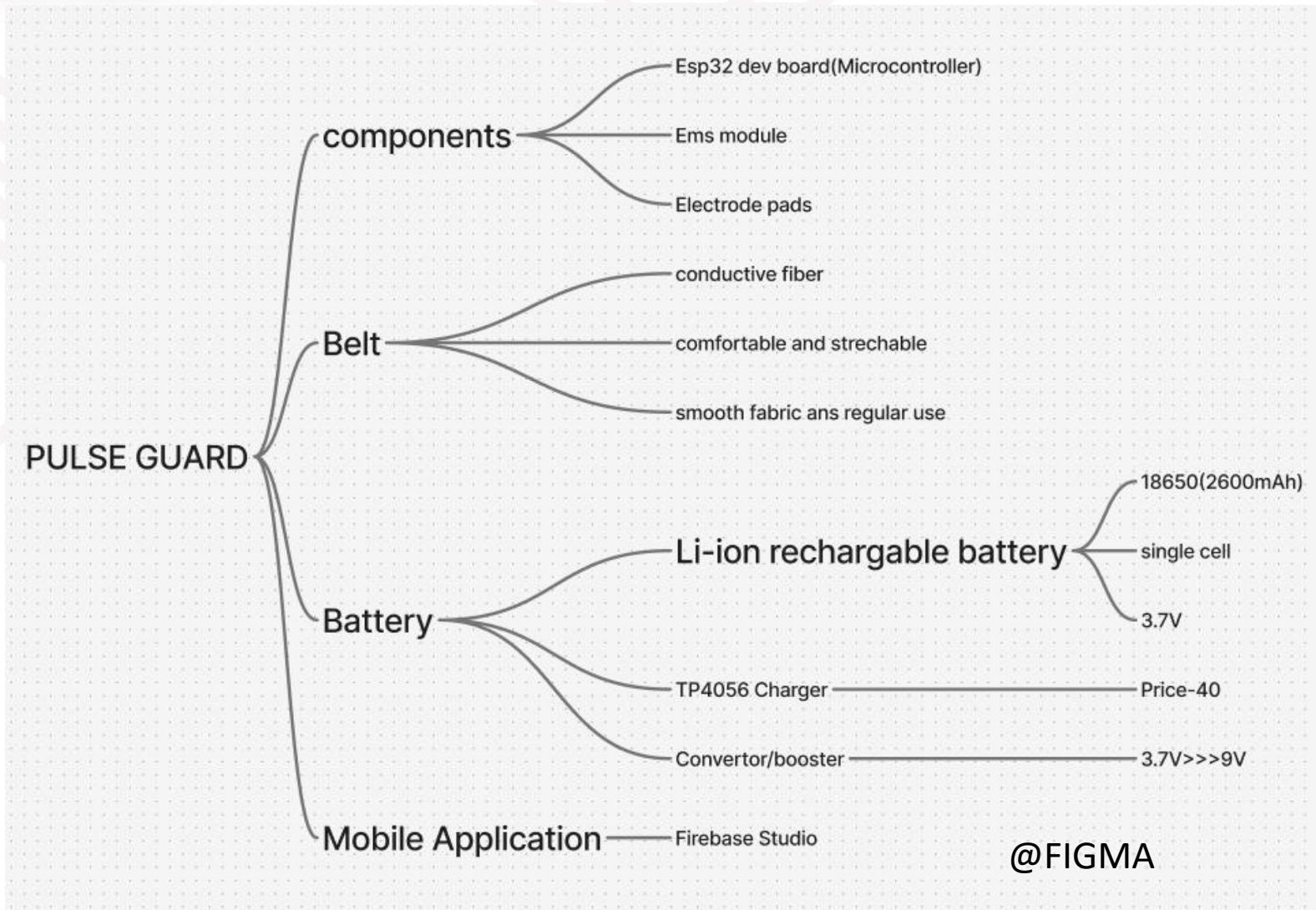
- Real-time monitoring
- Hardware can be operated
- Alerts & notifications
- Scheduling & reminders
- Data visualization
- Chat/communication with doctors or caretakers
- Simple UI



PULSE GUARD

"BECAUSE EVERY LIFE MATTERS."

❖ Mind Mapping:-



@FIGMA



PULSE GUARD

"BECAUSE EVERY LIFE MATTERS."

❖ 5W1H (Who, What, Where, When, Why, How):-



➤ Who: Who is affected by the problem?

- **Elderly people** who need regular health monitoring to stay Healthy.
- **Paralyzed patients** who require muscle stimulation
- **Gym users** and **athletes** who want muscle recovery and performance improvement

➤ When: When does this problem arise?

- **At home**, where users spend most time and need **continuous health support**
- **In gyms and rehabilitation centers** for muscle therapy and performance tracking
- **In remote or rural areas** lacking easy access to healthcare professionals

➤ What: What exactly is the issue?

- Lack of continuous, **easy-to-use health monitoring** to track
- Difficulty in doing **regular muscle stimulation exercises**
- Depend on infrequent clinic visits and manual therapy, It is less effective



PULSE GUARD

"BECAUSE EVERY LIFE MATTERS."



➤ **When: When does this problem arise?**

- Continuous therapy during recovery
- Especially important **after surgery, injury**, or in managing health issues
- During **muscle recovery phases** for gym users

➤ **Why: Why is solving this important?**

- **Early detection** of health problems can prevent hospital visits
- Regular muscle stimulation improves **muscle strength and reduces pain**
- Makes health monitoring and therapy **more accessible and user friendly**
- Increases **independence and quality of life** for elderly and disabled users

➤ **How: How will your solution address the problem?**

- Uses an EMS module to send **electrical impulses** that stimulate **muscle contractions**.
- Provides muscle activation to **help rehabilitate muscles**.
- Enables real-time monitoring and adjustment of stimulation for **effective therapy**.



PULSE GUARD

"BECAUSE EVERY LIFE MATTERS."

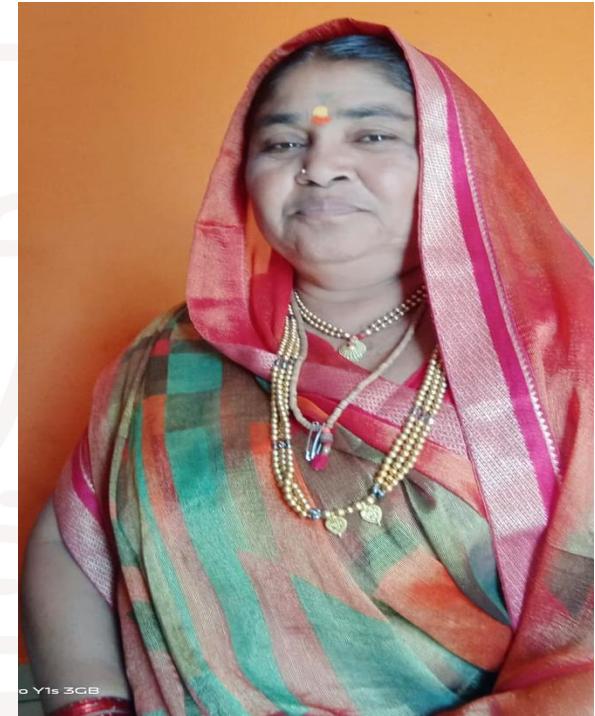


Name:Sopan Supekar
Age:66 years
Cause:Experienced Paralysis And need Daily massage

❖ Primary Research (Survey/Interviews):-



Name:Suman shinde
Age:60 years
Cause: Arthritis (संधिकृत)



Name: Surekha Gaikwad
Age: 61 years
Cause: Need daily massage and lack of time for family members





PULSE GUARD

"BECAUSE EVERY LIFE MATTERS."

❖ Secondary Research:-



1. Malini, R. ., M. . Kaur, . P. . Moniya, and M. . Sudagar. "Real-Time Health Monitoring System Using Deep Learning and IoT Integrated Electronics". Journal of Neonatal Surgery, vol. 14, no. 29S, May 2025, pp. 759-67

Key Findings: System successfully monitored ECG, heart rate in real-time

2. Karatzanos E, Gerovasili V, Zervakis D, Tripodaki ES, Apostolou K, Vasileiadis I, Papadopoulos E, Mitsiou G, Tsimpouki D, Routsi C, Nanas S. Electrical muscle stimulation: an effective form of exercise and early mobilization to preserve muscle strength in critically ill patients.

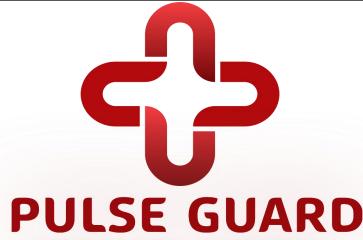
Key Findings: Muscles became significantly stronger with EMS treatment

3. Fattorini, L., Ferraresi, A., Rodio, A. et al. Motor performance changes induced by muscle vibration. Eur J Appl Physiol 98, 79–87 (2006).

Key Findings: Remote health monitoring saved money on healthcare

4. T. Nguyen, H. Lee, and J. Kim, "Low-Power Wearable Devices for Continuous Health Tracking with ESP32 Microcontrollers," in IEEE Transactions on Biomedical Circuits and Systems, vol. 16, no. 3, pp. 512–521, 2022.

Key Findings: This shows our EMS device is safe for regular healthy people to use, not just hospital patients.



❖ Application Prototype:-



EMS Therapy

Therapy Control App v1.0

EMS Therapy

Therapy Control App v1.0

Real-Time Monitoring

Therapy Control App v1.0

Professional EMS Therapy

Advanced electrical muscle stimulation for rehabilitation and pain management. Control your therapy sessions with precision and monitor progress in real-time.

Connect Device

● Device Status Not Connected

□ Battery Level 69.70442974596392% remaining

●●● Signal Strength Excellent

Therapy Session

Please connect your EMS device to begin

Connect Now

Home Control Monitor Settings

Therapy Controls

Session Time 00:00

Therapy Programs

- Recovery Gentle muscle recovery
- Strength Muscle strengthening
- Pain Relief Pain management
- Rehabilitation Physical therapy

Intensity Level 25%

Pulse Rate 50 Hz

Home Control Monitor Settings

Real-Time Monitoring

Live muscle activity and pulse data from your EMS session

● Current Activity 66%

↗ Average Response 78%

● Session Progress 65%

Muscle Activity Timeline

51:45 Muscle Activity (%) : 69
Pulse Rate : 86

Peak Activity 92%

Avg Pulse 75 Hz

Home Control Monitor Settings

Link-<https://preview--ems-reach-connect.lovable.app/>

SANJIVANI
UNIVERSITY

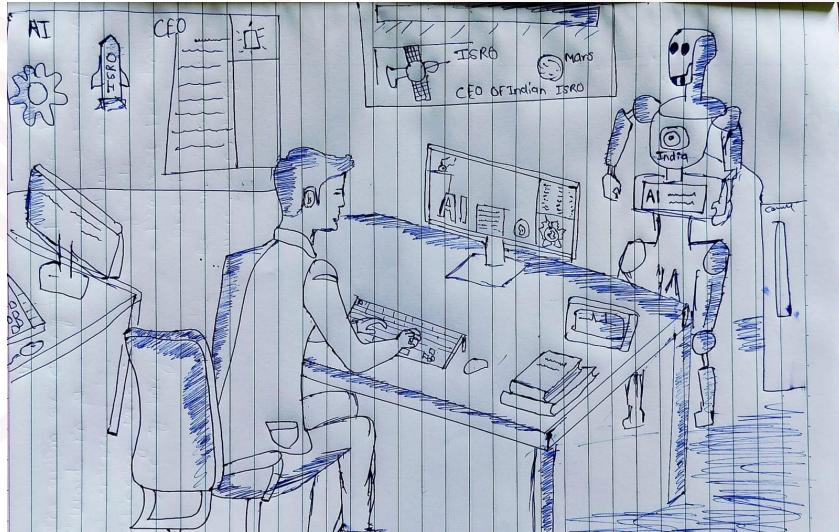


PULSE GUARD

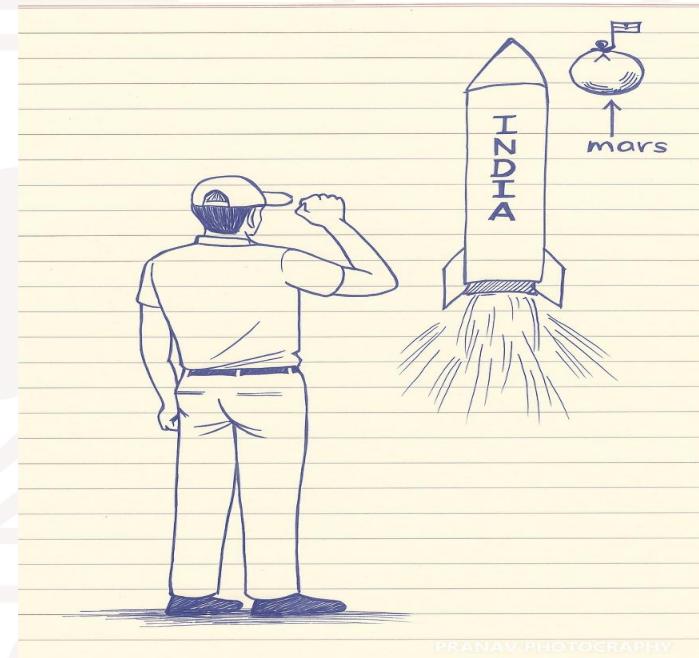
"BECAUSE EVERY LIFE MATTERS."



❖ Personal Visualization (5 Years from Now):-

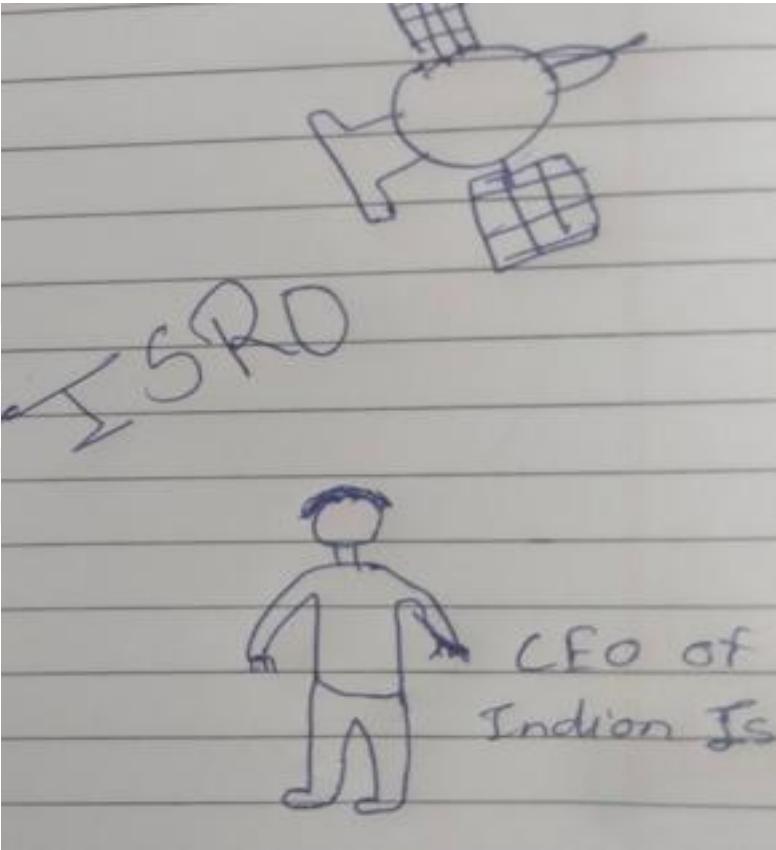


Member: Saish Kote

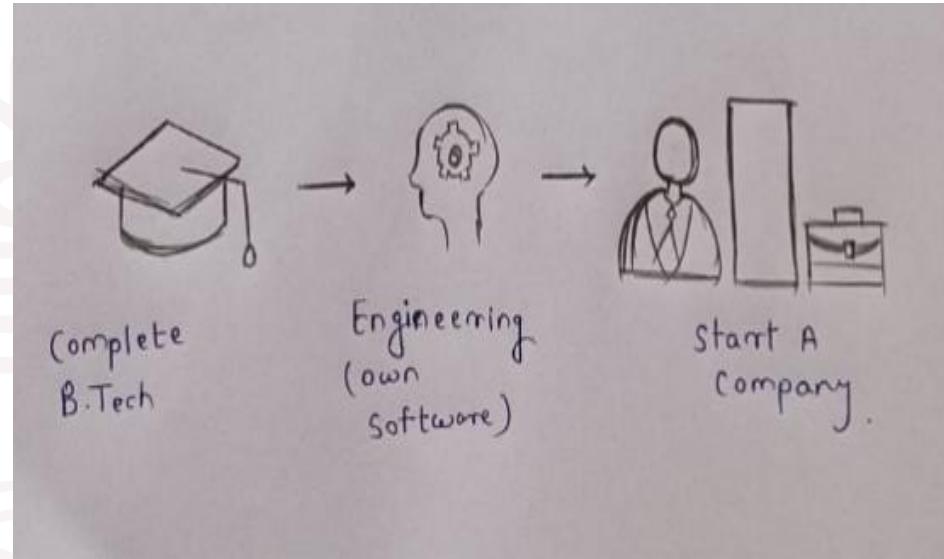


Member: Pranav Gaikwad

SANJIVANI
UNIVERSITY



Member: Bhagwan Kote



Member: Prathamesh Pagar

SANJIVANI
UNIVERSITY

❖ Personal visualisation:

Background:

Biography: My name is Pranav Gaikwad .And I am from the big village Sanvatsar .I passed out 12th and now pursuing BTech CSE(AIML) at Sanjivani University

Life Stage: Student in BTech CSE (AIML)

Daily Routine: Weak up at 6.30 am, and go for drop sister at bustop and check social media like linkedin and whatsapp and start to do fast revision on the topics which are studid yeaterday and then go to college.

Motivation:

Primary Goals: Become a Chairman at ISRO

Secondary Goals: Travel more, stay healthy and fit, build a strong professional network

Motivations: Self believe and family

Doubts / Fear:

Fears: How software industry evolve now days like speed of light in that I dont want to crush in that

Doubts: Can I happy my family? why I am doing all this?

Challenges Faced:

Challenges: time management, make friends,forgetness

Pain Points: dress up, underestimate peer group

Aspirations:

Long-term Aspirations: Make my own space industry and make humans multiplanetary

Short-term Aspirations: To speek confidentialy and lead my team properly..

Construct a Story:

In a small village, a boy dreamed of the world beyond the fields.Each morning, he wakes up early, helped his family, and watched the day begin.On the way to college, his mind fill with questions about life, science, and technology.He studied hard, revising lessons and searching for answers that books alone could not give.Though his roots were in the village, his dreams reached far beyond the Light.Every step he took was toward a future where curiosity could shape change.

Member: Bhagwan Kote

Date:

* Background:- I am Bhagwan, I come from a loving family and belong to a small number hometown. Shirdi where grew up and developed strong values completed my schooling at Sai Baba English medium School currently am passing Engineering at Sanghvi University Kafargao.

* Daily Routine:-

I wake up early at 5:00 am to make the most of my morning. Start with working on my self-esteem and mental focus, practice meditation and such as saying a Namaskar to maintain a balance between mind and body.

* Challenges faced:-

One of my main challenges has been managing my time. Avoiding distractions especially from social media during working time has been a constant struggle. With so many demands from studies and so many demands from life learning to prioritise and stay focused has been essential for my progress.

* Pain points:-

The biggest source of stress for me has been uncertainty about my career path and job placement. The competitive environment

and pressure to secure a good position in a short time.

* Primary Goal:-

My primary goal is to work as a AI Engineer and to achieve stability in life. I want to create a life where I can fulfill all the needs of my family and give back to them for their endless support.

* Secondary Goal:-

Beyond my career ambitions I dream of travelling and to explore all the points on the ~~earth~~ Indian and the other countries.

* motivation:-

My biggest motivation is to make my father proud. I want to reason a positive "where it" with pride. His belief in me and his sacrifices inspire me to work harder every day.

Persona:

Background:

• Biography:

My name is prathmesh Pagar I am from nandgaon, Nashik. I was born in Pachora after completing my 10th std I will curious about technology and business how things work currently I am pursuing my B.Tech in AIML specialization engineering at Sanjivani university.

• Life stage:

Right now, I am in early stage of my academic and professional journey. I will focused on build my engineering skills.

• Daily routine:

My daily routine usually wake up early at 7:00 am the 7:45 am complete my exercise and workout after 7:45 to 8:45 am go to bath and after bath I will go to clg 10:00 am to 5:00 pm.

• Secondary Goals

I wish to maintain good health continuing sports like badminton and lone tennis and I will play with my own family members also I can travel whole the world and different places and explore my culture and protect it.

• Motivation:

My motivation is mine because your opponent is you and you no one can beat you after you beat yourself I can say just one single line make me motivate

The most successful people don't have hacks. They have habits they never break.

• Doubts/ fear:

• Doubts

after face small doubts I will never break .after facing a doubt I will be the learner fast enough or if I am choosing the right project and path these doubt push me to Break it doubts. and improving myself.

• fear

Sometimes fear not making the right decisions at the right time or missing out an opportunities because hesitation or lack of preparation also fear not living up to the expectations.

Member: Prathamesh Pagar

SANJIVANI
UNIVERSITY



PULSE GUARD

"BECAUSE EVERY LIFE MATTERS."



❖ Persona Development(users/customer):-

- **Name:** Surekha Gaikwad
- **Age:** 61 years
- **Occupation:** Housewife
- **Background:** Lives with her family in village. Recently suffered from partial paralysis, She is dependent on others for daily care.
- **Goals:**
 - Regain some independence in daily life.
 - Reduce muscle stiffness through regular stimulation/massage.
 - Stay connected with doctors and family for health updates.
- **Frustrations:**
 - Needs daily massage but family members are not always available.
 - Forgetting medicines and exercise routines.

➤ **Needs:**

- A simple, easy-to-wear device for therapy.
- Regular reminders for medicines and exercises.
- A way to alert her doctor/family in emergencies.

➤ **How Our Solution Helps:**

- Pulse Guard wearable provides EMS-based daily muscle stimulation, reducing Strain.
- Built-in mobile app reminders ensure she never misses medicines or routines.
- IoT connectivity keeps her family and doctor updated.



Key partners	Activities Key	Value Propositions	Customer	Customer Segments
1.component suppliers 2.healthcare institutions and physiotherapists 3.Iot and cloud providers 4.research and academic institutions 5.design and manufacturing partners 6.Mobile App Developers 7.Regulatory and Certification Agencies 8.Government Health Programs & NGOs 9.Distribution and Retail Partners 10.Investors and Funding Agencies	 	<ul style="list-style-type: none"> - Health & Comfort: Provides continuous muscle stimulation and improved blood circulation for elderly users. - Smart Monitoring: Real-time tracking of vital signs (heart rate, temperature, motion) through a mobile app. - Affordable Innovation: Low-cost wearable solution compared to expensive medical massage devices or therapy sessions. - Ease of Use: Lightweight, wireless, and user-friendly — designed specifically for elderly comfort. - Remote Care: Enables family members and doctors to monitor patient health remotely. - Preventive Health Management: Reduces hospital visits and enhances quality of life for the aging population. - Sustainability & Scalability: Supports UN SDGs 		<ul style="list-style-type: none"> - Primary Customers: Elderly individuals suffering from poor blood circulation, muscle stiffness, or limited mobility who need an affordable, easy-to-use wearable device to improve comfort and monitor health. - Secondary Customers: Family caregivers seeking easy monitoring solutions Healthcare professionals and physiotherapists Hospitals, rehabilitation centers, and elderly care homes - Institutional Customers: NGOs and government health programs promoting elderly well-being 
Cost Structure <p>Esp32 micro controller-400 rupees vibration motor-120 rupees pulse sensor-800 rupees pcb board-50 rupees 2X1K Ohm Resistor -4 rupees 2XTransistor - NPN BC337-8 rupees 2XDiode Rectifier - 1A 50V-8 rupees</p> <p>Total=1400</p>			Revenue Streams <ol style="list-style-type: none"> 1. Direct Product Sales: Selling the device to customers at a markup (e.g., cost ₹1,400 → selling price ₹2,000–₹2,500) 2. Subscription or Service Fees: If the device connects to an app or cloud platform, charge users a small monthly fee (e.g., ₹100–₹500/year). 3. Maintenance and Support: Offer paid maintenance, repair, or software updates. 4. Institutional Sales / B2B Partnerships: Bulk sales to hospitals, NGOs, or government health agencies, especially if it's a healthcare or monitoring device.  	

Thank You!