# Design Thinking Project Workbook

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**Don't find customers for your product but find products for your customers**

# 1. Team

**Team Name**: NeuroAI Detect

**Team Logo :**



**Team Members:**

1. Sajja Kusumitha , Team Lead , 2320030302
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# 2. Problem/Opportunity Domain

**Domain of Interest:**

The domain of interest is Healthcare and Artificial Intelligence (AI), specifically focusing on neurological disease prediction, with an emphasis on Parkinson's Disease (PD). This area combines medical research, bioinformatics, and AI-driven predictive analytics to improve early detection, diagnosis, and management of Parkinson's Disease.

**Description of the Domain:**

Parkinson's Disease (PD) is a progressive neurodegenerative disorder with no definitive early diagnostic method. Current challenges include late detection, misdiagnosis, and limited accessibility to specialists. AI offers solutions such as early prediction, personalized treatment plans, remote monitoring, and drug discovery acceleration using machine learning on medical data.

**Why did you choose this domain?**

- ➢ High Impact – Early AI-based detection can improve patient outcomes.
- ➢ Market Potential – AI in healthcare is growing, with PD diagnosis being an underserved area.
- ➢ Research Advancements – AI can enhance bioinformatics, predicting protein misfolding linked to PD.
- ➢ Accessibility – AI can make PD detection more affordable and available worldwide.

# 3. Problem/Opportunity Statement

**Problem Statement:**
Parkinson's Disease (PD) is often diagnosed too late, after irreversible neurological damage has occurred. Current diagnostic methods lack accuracy and accessibility, leading to misdiagnosis, delayed treatment, and reduced quality of life. AI-based predictive models can provide early detection, personalized treatment insights, and improved patient monitoring.

**Problem Description:**
PD is a progressive neurodegenerative disorder that affects movement and cognitive function. Its early symptoms are subtle and often mistaken for aging or other conditions, delaying proper treatment. There are no definitive biomarkers, and diagnosis primarily relies on clinical observation, making early intervention difficult.

**Context (When does the problem occur):**
- ➢ Early stages of Parkinson's Disease when symptoms are mild and non-specific.
- ➢ During misdiagnosis, when PD is confused with other movement disorders.
- ➢ In remote areas, where access to neurologists and advanced diagnostic tools is limited.

**Alternatives (What does the customer do to fix the problem):**
- ➢ Clinical Examination – Doctors assess symptoms manually, often leading to late diagnosis.
- ➢ MRI & PET Scans – Expensive and not always conclusive.
- ➢ Genetic Testing – Limited to hereditary cases and not widely used.
- ➢ Dopamine Transporter (DaT) Scan – Helps detect PD but is costly and not widely available.

**Customers (Who has the problem most often):**

➤ Patients at risk of Parkinson's Disease, especially those with early symptoms.
➤ Neurologists & healthcare professionals seeking more accurate diagnostic tools.
➤ Researchers working on neurodegenerative diseases.
➤ Healthcare providers & hospitals looking to improve PD detection and patient care.

**Emotional Impact (How does the customer feel):**

➤ Patients feel anxious, frustrated, and hopeless due to uncertainty in diagnosis.
➤ Doctors feel challenged due to the lack of reliable early diagnostic tools.
➤ Caregivers & families experience stress from delayed or incorrect diagnoses, impacting caregiving decisions.

**Quantifiable Impact (What is the measurable impact):**

➤ Up to 25% of Parkinson's cases are misdiagnosed, leading to incorrect treatments.
➤ Diagnosis often occurs 5–10 years after disease onset, reducing treatment effectiveness.
➤ Medical costs for late-stage PD management are significantly higher than early intervention.

**Alternative Shortcomings (What are the disadvantages of the alternatives):**

➤ Late detection – Symptoms-based diagnosis is reactive rather than preventive.
➤ Expensive tests – MRI and DaT scans are not affordable for all patients.
➤ Limited accessibility – Many rural areas lack specialized neurology facilities.
➤ No real-time monitoring – Current methods do not offer continuous tracking of disease progression.

# 4. Addressing SDGs

**Relevant Sustainable Development Goals (SDGs):**

➤ SDG 3: Good Health and Well-being – Ensuring healthy lives and promoting well-being for all.
➤ SDG 9: Industry, Innovation, and Infrastructure – Advancing technology in healthcare.
➤ SDG 10: Reduced Inequalities – Improving healthcare accessibility for underserved populations.

**How does your problem/opportunity address these SDGs?:**

SDG 3: Good Health and Well-being

➤ Enables early detection of Parkinson's Disease, improving treatment outcomes.

➤ Reduces misdiagnosis and delayed treatment, enhancing patient quality of life.

SDG 9: Industry, Innovation, and Infrastructure

➤ Uses AI and machine learning to enhance medical diagnostics.

➤ Promotes investment in AI-driven medical research, driving technological progress.

SDG 10: Reduced Inequalities

➤ AI-powered diagnostics can make PD detection accessible in remote and low-income areas.

➤ Reduces dependence on expensive tests, making healthcare more affordable.

# 5. Stakeholders

1. **Who are the key stakeholders involved in or affected by this project?**

➢ Patients at risk of Parkinson's
➢ Neurologists & healthcare professionals
➢ Researchers (AI & medical)
➢ Hospitals & healthcare providers
➢ Technology partners (AI developers, data scientists)
➢ Government & health authorities

2. **What roles do the stakeholders play in the success of the innovation?**

➢ Patients: Provide data & feedback
➢ Doctors: Validate AI models, adopt technology
➢ Researchers: Develop and improve algorithms
➢ Hospitals: Implement systems, provide access to patient data
➢ Tech partners: Build AI models & tools
➢ Government: Set regulations, support funding

3. **What are the main interests and concerns of each stakeholder?**

➢ Patients: Accurate, affordable diagnosis
➢ Doctors: Reliable, easy-to-use tools
➢ Researchers: Data access, innovation opportunities
➢ Hospitals: Cost-effective, scalable solutions
➢ Government: Public health impact, data privacy

4. **How much influence does each stakeholder have on the outcome of the project?**

➢ High: Doctors, researchers, tech partners
➢ Medium: Patients, hospitals
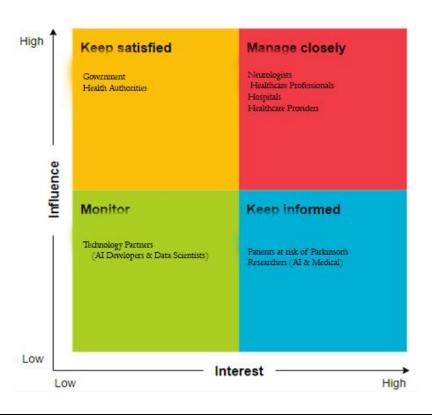➢ Low: Government (influences indirectly through policy)

5. **What is the level of engagement or support expected from each stakeholder?**

➢ High: Researchers, doctors, tech team
➢ Medium: Patients, hospitals
➢ Low: Government (mainly regulatory)

6. **Are there any conflicts of interest between stakeholders? If so, how can they be addressed?**

➤ Doctors may resist AI replacing clinical judgment
➤ Data privacy concerns between hospitals and tech teams
➤ Address by: Clear communication, data protection, showing AI as support tool (not replacement)

7. **How will you communicate and collaborate with stakeholders throughout the project?**

➤ Regular meetings with doctors & researchers
➤ Feedback sessions with patients
➤ Progress reports to hospitals & authorities
➤ Use online platforms for remote collaboration

8. **What potential risks do stakeholders bring to the project, and how can these be mitigated?**

➤ **Resistance to AI:** Train doctors, show benefits
➤ **Data Privacy Issues:** Use anonymized data & secure platforms
➤ **Low Patient Trust:** Educate patients on benefits
➤ **Limited Funding:** Seek grants, partnerships

# 6. Power Interest Matrix of Stakeholders

**Power Interest Matrix:**

## High Power, High Interest:

- **Neurologists & Healthcare Professionals** (They directly use and validate the AI tools.)

- **Hospitals & Healthcare Providers** (They will implement and fund the solution.)

## High Power, Low Interest:

- **Government & Health Authorities** (They control regulations and funding policies but may not be deeply involved in individual projects.)

## Low Power, High Interest:

- **Patients at risk of Parkinson's** (They are directly affected but have limited decision-making power.)

- **Researchers (AI & Medical)** (They are invested in improving technology but don't control implementation.)

## Low Power, Low Interest:

- **Technology Partners (AI Developers & Data Scientists)** (They contribute technically but are more project-focused, not long-term decision-makers.)

# 7. Empathetic Interviews

**Conduct Skilled interview with at least 30 citizens/Users by asking open ended questions (What, why/How etc) and list the insights as per the format below**

| I need to know (thoughts, feelings, actions) | Questions I will ask (open questions) | Insights I hope to gain |
|---|---|---|
| Thoughts | What do you know about Parkinson's Disease? | Awareness levels about PD and early symptoms |
| | How do you think technology can help in diagnosing diseases? | Perception of AI in healthcare |
| | What challenges do you think patients face when seeking diagnosis for neurological disorders? | Understanding common pain points |
| Feelings | How would you feel if an AI tool could predict your risk of Parkinson's? | Comfort level with AI in medical decisions |
| | Why do you think early diagnosis is important or not important for neurological diseases? | Emotional value of early detection |
| | How confident are you in current healthcare systems for neurological care? | Trust and confidence levels in existing system |
| Actions | What do you do if you notice early symptoms like tremors or stiffness? | Actions taken at early symptom stage |
| | How do you usually seek information about health issues? | Channels used for healthcare information |
| | How often do you visit specialists for checkups | Frequency and barriers to specialist visits |

**SKILLED INTERVIEW REPORT**

| User/Interviewee | Questions Asked | Insights Gained (NOT their exact answers) |
|---|---|---|
| Lakshmi R., Caregiver | What challenges do you face while taking care of someone with Parkinson's? | Caregivers struggle with late diagnosis and feel helpless during initial symptoms. |
| Ramesh P., Retired Teacher | How do you feel about using AI for predicting diseases? | Many older citizens are hesitant about trusting AI, fearing it might be inaccurate. |
| Sunitha K., IT Professional | What do you know about Parkinson's Disease? | Working professionals have very limited knowledge about PD unless they know someone affected. |
| Dr. Mahesh, Neurologist | What are the biggest challenges you face in diagnosing Parkinson's early? | Neurologists rely heavily on symptom progression and lack predictive tools. |
| Anil C., Patient | How did you first notice symptoms and what did you do? | Most patients ignore early symptoms like tremors, thinking it's due to age or stress. |
| Priya S., Researcher | How do you think AI can help in neuro-disease research? | Researchers see potential in AI but worry about data quality and bias. |
| Arjun M., Farmer | How do you access healthcare when you have health concerns? | Rural citizens depend heavily on general practitioners, with little access to specialists. |
| Saira B., Homemaker | How do you feel when doctors are unsure about a diagnosis? | Patients feel anxious and lose confidence when diagnosis is delayed or uncertain. |
| Naveen K., Software Engineer | How do you feel about remote health monitoring through apps? | Younger users are comfortable with apps but expect privacy and clear reports. |
| Dr. Kavitha, General Physician | What role do general physicians play in early diagnosis of Parkinson's? | General doctors often miss early PD signs due to lack of specialized training. |

## Key Insights Gained:

**Insight 1:** There is low awareness about Parkinson's Disease, especially its early symptoms, across all age groups.

**Insight 2**: Patients and caregivers feel anxious and frustrated due to delays in diagnosis and lack of clarity from doctors.

**Insight 3:** Trust in AI varies – younger users are more open to technology, while older users and rural populations are more skeptical.

**Insight 4:** Rural users face significant barriers in accessing neurologists, relying mostly on general practitioners who lack specialized knowledge.

**Insight 5:** Healthcare professionals want AI tools, but they need to be user-friendly and provide clear, reliable insights to gain acceptance.

# 8. Empathy Map

## Empathy Map Canvas

Designed By: Kusumitha

Date of Submission: 04/03/25

**Who is your Customer:**

Patients

Doctors

Idea/Innovation Title:

AI-Powered Early Detection and Monitoring System for Parkinson's Disease

SOFT ED

**1 WHO are we empathising with?**
Who is the person we want to understand?
What is the situation they are in?
What is their role in the situation?

Patients at risk of Parkinson's, caregivers, and doctors.

**2 What do they need to DO**
What do they need to do differently?
What job(s) do they want or need to get done?
What decision(s) do they need to make?
How will we know they were successful?

Your Answer: Seek early and accurate detection of Parkinson's Disease to begin treatment sooner.
Improve diagnostic accuracy to enhance patient outcomes and quality of life.

**7 What do they THINK and FEEL**

PAINS
What are their fears, frustrations, and anxieties?

GAINS
What are their wants, needs, hopes and dreams?

Your Answer: Delayed diagnosis and lack of early detection tools for Parkinson's Disease.

Your Answer: Early detection of Parkinson's Disease, leading to timely treatment and improved patient outcomes.

**3 What do they SEE**
What do they see in the marketplace?
What do they see in their immediate environment?
What do they see others saying and doing?
What are they watching and reading?

Your Answer: Frustration with delayed diagnosis, unclear symptoms, and lack of access to specialized neurological care.

Your Answer: They often think about the importance of early diagnosis and how AI could help detect Parkinson's Disease before symptoms worsen.

What other thoughts and feelings might motivate their behaviour?

**6 What do they HEAR?**
What are they hearing others say?
What are they hearing from friends?
What are they hearing from colleagues?
What are they hearing second hand?

Your Answer: Feedback from doctors, patients, and caregivers about the challenges in early detection and diagnosis of Parkinson's Disease.
Recommendations for AI tools that support early diagnosis and continuous monitoring.

**4 What do they SAY**
What have we heard them say?
What can we imagine them saying?

Your Answer: I wish I could get an early diagnosis for Parkinson's before symptoms become severe.
We need a solution that can predict the disease accurately using AI, making diagnosis faster and accessible.

**5 What do they DO**
What do they do today?
What behaviour have we observed?
What can we imagine them doing?

Your Answer: Frequently visit multiple doctors due to uncertainty in diagnosis.
Rely on expensive tests or second opinions when initial diagnosis is unclear.

*Empathy Map Canvas created by Dave Gray, xplane.com*

# 9. Empathy Map

## a. Who is your Customer?

**Customer Profile**

- Age Group: 40-80 years old (patients), 25-55 years (caregivers & healthcare providers)

- Profession: Patients (retired, elderly), caregivers (family members), neurologists, physiotherapists, researchers

- Interests: Early disease detection, personalized healthcare, improving quality of life, access to affordable technology

**Goals & Needs**

- Goal: Early detection and management of Parkinson's Disease (PD)

- Needs:

    o Accurate and non-invasive screening tool

    o Early warning system to catch symptoms before they worsen

    o Easy-to-use technology for both patients & doctors

    o Clear, actionable reports that help guide next steps

**Context of Interaction**

- Patients and caregivers would access the tool through mobile apps, hospital portals, or diagnostic centers

- Doctors would use AI reports alongside clinical evaluations

- Users rely on medical advice, online health forums, and Parkinson's communities for support and information

## b. Who are we empathizing with?

**User Characteristics**

- Patients: **Worried, hopeful, but also confused by medical jargon**

- Caregivers: **Stressed, emotionally invested, and eager for clear answers**

- Doctors: **Skeptical yet interested in AI as a support tool, not a replacement**

**Values**

- Patients: **Independence, quality of life, affordable care**

- Caregivers: **Clear diagnosis, trusted tools, support for long-term care**

- Doctors: **Evidence-based tools, clinical validation, ease of integration into workflow**

**Goals & Challenges**

- Detect Parkinson's early for **better treatment outcomes**

- Make screening accessible for **remote areas and non-specialist clinics**

- Ensure **AI predictions are explainable & reliable**

**Challenges**

- Patients fear **misdiagnosis** or unnecessary panic

- Doctors worry about **AI reliability and false positives**

- Caregivers **struggle with emotional burden & medical costs**

## c. What do they need to DO?

**Tasks & Actions**

- Patients: **Undergo regular screenings, monitor symptoms, follow medical advice**

- Caregivers: **Track symptoms, manage appointments, explore new tools**

- Doctors: **Review AI reports, validate results with clinical tests, educate patients**

**Decisions They Need to Make**

- When to **start screening**

- Whether to **trust AI results**

- How to **adjust treatment plans based on AI insights**

- Whether to **recommend AI tools to other patients**

## d. What do they SEE?

**Physical & Digital Environment**

- Patients: **Doctor's offices, health apps, medical brochures**

- Caregivers: **Online health forums, YouTube videos on Parkinson's care**

- Doctors: **Medical journals, AI research papers, competitor diagnostic tools**

**Trends & Competitors**

- Rise of **AI in healthcare diagnostics**

- Increasing interest in **remote patient monitoring tools**

- Competitor tools like **Kinetigraph (motion sensors) or voice analysis apps**

**How This Influences Them**

- Patients feel **hopeful but cautious**

- Doctors compare **accuracy and clinical value** before adopting

- Caregivers see **AI as a potential relief, but fear complexity**

## e. What do they SAY?

**Public Statements & Feedback**

- Patients: **"I just want to know what's happening to me."**

- Caregivers: **"We need something that helps us catch symptoms earlier."**

- Doctors: **"AI is promising, but I need proof it works in real patients."**

**Frustrations Expressed**

- Patients: **"It took too long to get a diagnosis."**

- Caregivers: **"Too many appointments, too much conflicting advice."**

- Doctors: **"Most AI tools are black boxes — I need to see how they work."**

## f. What do they DO?

**Observable Actions & Habits**

- Patients:

  - **Attend check-ups, follow exercise routines, join support groups**

  - **Use health tracking apps**

- Caregivers:

  - **Research symptoms online, join caregiver communities, track medication & symptoms**

- Doctors:

     o **Attend neurology conferences, read AI research, experiment with new diagnostic tools**

**Problem-Solving Approaches**

- Patients: **Try home remedies, track symptoms manually**

- Caregivers: **Cross-check symptoms online, get second opinions**

- Doctors: **Compare AI insights with their own clinical judgment**

### g. What do they HEAR?

**External Influences**

- Patients: **Family, friends who've seen similar symptoms**

- Caregivers: **Doctors, patient support groups, health podcasts**

- Doctors: **Medical journals, AI diagnostic tool marketing, peer-reviewed studies**

**Channels of Information**

- Parkinson's Foundations, Health NGOs

- Research papers, medical news platforms

- Digital health conferences

**Strong Influences on Behavior**

- **Positive testimonials from other patients** build trust

- **Published validation studies** convince doctors

- **Word-of-mouth in caregiver communities** influences adoption

### h. What do they THINK and FEEL?

**Fears & Worries**

- Patients: **"What if this is the start of something serious?"**

- Caregivers: **"How do we manage if the symptoms get worse?"**

- Doctors: **"Can I trust the AI, or is it just another tech fad?"**

**Motivations & Desires**

- Patients: **Hope for early diagnosis to slow disease progression**

- Caregivers: **Better tools to reduce their emotional and logistical burden**

- Doctors: **More efficient diagnostic tools that save time without compromising accuracy**

**Internal Thoughts**

- Patients: **"I need to stay independent as long as possible."**

- Caregivers: **"If we knew earlier, we could plan better."**

- Doctors: **"If this AI can help me catch cases earlier, it's worth a try."**

## i. Pains and Gains

**Pains (Challenges & Frustrations)**

- Late diagnosis leading to **limited treatment options**

- **High costs** of specialist visits and diagnostic tests

- Patients fear being treated like **a diagnosis, not a person**

**Gains (Desired Benefits)**

- Affordable, **easy-to-use screening tool**

- **Earlier detection = more effective treatment**

- **Better quality of life for patients**

- **Actionable insights for caregivers & doctors**

# 10. Persona of Stakeholders

## Stakeholder Name:

**Primary:** Patients (Parkinson's at-risk individuals)
**Secondary:** Caregivers (family members)
**Tertiary:** Neurologists & General Practitioners (Healthcare Providers)

## Demographics:

### Patients

- **Age:** 40-80 years old

- **Gender:** All genders

- **Income:** Middle-income to upper-income groups (with some tech-savvy users in urban areas)

- **Location:** Primarily urban & semi-urban, but expanding to rural populations with mobile diagnostic outreach

### Caregivers

- **Age:** 25-55 years old

- **Gender:** Mostly family members (spouses, children)

- **Income:** Middle-income families

- **Location:** Urban & semi-urban areas

### Doctors

- **Age:** 30-60 years old

- **Gender:** All genders

- **Income:** Upper middle class (specialists)

- **Location:** Urban hospitals, specialized neurology centers, telemedicine platforms

## Goals

### Patients:

- Detect Parkinson's early so they can start treatment sooner.

- Maintain independence and quality of life for as long as possible.

- Reduce the emotional and financial burden of late-stage care.

**Caregivers:**

- Gain clarity on symptoms without excessive tests.

- Reduce the anxiety of "not knowing" until symptoms worsen.

- Find reliable, affordable screening that fits into their caregiving routine.

**Doctors:**

- Support their clinical diagnosis with objective, AI-based data.

- Identify Parkinson's at earlier stages, even before clear motor symptoms appear.

- Improve diagnostic efficiency, especially in high-patient-load environments.

## Challenges

**Patients:**

- Fear of **misdiagnosis** or unnecessary panic.

- **Limited awareness** about Parkinson's symptoms in early stages.

- **High cost and limited access** to neurological specialists.

**Caregivers:**

- Juggling **work, personal life, and caregiving duties**.

- Lack of **clear, reliable tools** to assess early symptoms.

- Emotional stress from watching their loved one decline.

**Doctors:**

- Reliance on **subjective assessments** like movement analysis.

- Lack of **time** to do extensive testing in busy clinics.

- **Skepticism** about new AI tools that lack real-world validation.

## Aspiration

**Patients:**

- Live as independently as possible for as long as possible.

- Stay **informed and proactive** about their health.

- **Trust technology** that supports better health decisions.

**Caregivers:**

- Help loved ones live **comfortably and with dignity**.

- Access affordable and easy-to-use tools for **early symptom tracking**.

- Become **empowered partners** in medical decision-making.

**Doctors:**

- Become **leaders in AI-assisted diagnosis**.

- Improve early detection rates and **treatment outcomes**.

- Use cutting-edge tools to enhance their **clinical credibility**.

## Needs

**Patients:**

- Non-invasive, affordable screening tools.

- **Clear, simple reports** they can understand.

- Tools that **work remotely**, reducing clinic visits.

**Caregivers:**

- **User-friendly technology** that fits into daily routines.

- Educational support to understand **AI reports and medical terms**.

- Alerts and reminders for **follow-up actions**.

**Doctors:**

- Clinically validated, **explainable AI models**.

- Seamless integration into **existing diagnostic workflows**.

- Data that enhances, rather than replaces, clinical judgment.

## Pain Points

**Patients:**

- Delayed diagnosis leading to **missed early treatment windows**.

- **Over-reliance on expensive tests** like MRIs and DaTscans.

- **Fear and uncertainty** about symptoms worsening without answers.

**Caregivers:**

- Lack of **trustworthy early detection tools**.

- Emotional burden of **watching symptoms worsen without knowing why**.

- Confusing or contradictory medical advice.

**Doctors:**

- **Lack of time** for thorough neurological evaluations.

- Subjective variability in **traditional clinical assessments**.

- Concerns about **AI errors or bias**, especially in non-standard cases.

## Storytelling

**Meet Anil, a 57-year-old retired teacher living in a tier-2 city.**
Over the past year, Anil's family noticed small changes — his hands trembled slightly when holding a cup, and his walk seemed slower. Anil dismissed it as aging, but his daughter, Priya, worried that it might be something more serious.

Priya works in an IT company, juggling her job and caring for her parents. Taking Anil to a neurologist in the city meant losing workdays and expensive consultations. She discovered **NeuroAI Detect**, an AI-powered screening tool that could analyze voice, movement, and hand tremors using a smartphone app.

With just a 5-minute test at home, Priya got a clear report showing **early signs of Parkinson's risk**. Armed with this data, they visited a neurologist who confirmed the findings and started treatment right away. Early diagnosis gave Anil **a better chance at managing symptoms**, and Priya felt empowered by catching it early without endless uncertainty.

For Anil, **it wasn't just a test — it was a new sense of control over his future.**

# 11. Look for Common Themes, Behaviors, Needs, and Pain Points among the Users

Analyse the data from your affinity diagram to uncover recurring patterns among your users, helping you better understand their expectations and challenges.

**Common Themes:**

These are recurring ideas and issues that came up across patients, caregivers, and doctors in your research.

1. Early Detection Anxiety – Users consistently worry about not detecting Parkinson's early enough, when treatment would be most effective.

2. Trust in Technology – Both patients and doctors expressed cautious optimism about AI-based detection, but trust must be built through transparency and validation.

3. Accessibility & Convenience – Users want simple, home-based tests that reduce the need for repeated hospital visits.

4. Education Gap – There's a lack of awareness about early symptoms and the importance of proactive screening.

5. Emotional and Financial Burden – All stakeholders highlighted how Parkinson's diagnosis and management is emotionally taxing and expensive, especially in later stages.

6. Desire for Clarity & Simplicity – Users value clear, easy-to-understand results, avoiding overly technical medical jargon.

**Common Behaviors:**

These are observed **actions and habits** across the user groups.

1. **Symptom Monitoring at Home** – Both patients and caregivers **track subtle symptoms** (tremors, slowness) but are unsure whether they indicate Parkinson's.

2. **Online Research** – Many users **turn to Google or YouTube** for self-diagnosis before visiting a doctor.

3. **Delayed Doctor Visits** – Due to **uncertainty and fear**, many patients delay visiting specialists until symptoms significantly worsen.

4. **Cross-Checking Multiple Sources** – Doctors and caregivers often **compare different tools, expert opinions, and online sources** before trusting a diagnosis.

5. **Emotional Sharing & Seeking Validation** – Caregivers often **discuss symptoms with friends/family or online communities** for reassurance.

**Common Needs:**

These are **critical requirements or desires** shared across the stakeholders.

1. **Reliable, Objective Screening** – All stakeholders want a **scientifically backed, data-driven tool** that reduces subjective guesswork.

2. **Non-Invasive, Simple Process** – Users want **quick, painless, and easy-to-administer tests**, especially for elderly patients.

3. **Early Warning System** – Both caregivers and doctors want a **tool that flags early risks**, even before motor symptoms become obvious.

4. **Clear Guidance & Next Steps** – Users need **step-by-step follow-up actions** after getting AI screening results.

5. **Trust & Transparency** – All groups demand **explainable AI results**—patients want to understand the "why" behind results, and doctors need to trust the data.

**Common Pain Points:**

These are **recurring frustrations and barriers** experienced by the user groups.

1. **Late Diagnosis** – Many patients are **diagnosed only after clear symptoms appear**, limiting treatment options.

2. **Confusion Due to Overlapping Symptoms** – Tremors, stiffness, or slowness can be caused by **other conditions**, leading to **misdiagnosis or unnecessary stress**.

3. **Overloaded Healthcare System** – Neurologists are often **overbooked**, leaving little time for detailed early-stage assessments.

4. **Skepticism Toward AI** – Both patients and doctors fear **false positives or false negatives** from AI predictions.

5. **Emotional Toll on Caregivers** – Caregivers face **stress, anxiety, and burnout** when managing uncertain symptoms over long periods.

6. **Fragmented Data Sources** – Users get **conflicting advice** from online articles, YouTube videos, doctors, and personal networks, leading to **confusion and indecision**.

# 12. Define Needs and Insights of Your Users

## User Needs:

These are the core requirements that users (patients, caregivers, doctors) have in relation to early Parkinson's detection using your AI solution. Needs can be functional, emotional, and societal.

| Category | User Needs |
|---|---|
| **Functional Needs** | - An easy-to-use, at-home screening tool that can assess Parkinson's risk early. <br> - A non-invasive, fast process that doesn't require hospital visits. <br> - Clear, understandable results that guide next steps (consult a neurologist, lifestyle changes, etc.). <br> - Accuracy and reliability to avoid unnecessary panic or missed diagnosis. <br> - Integration with medical records so doctors can easily review the AI results. |
| **Emotional Needs** | - Peace of mind through early detection, even if symptoms are mild or unclear. <br> - Trust and confidence in the technology's accuracy and transparency. <br> - Empathy and reassurance from the system (framing results sensitively, not alarmingly). <br> - A sense of control over their health, empowering them to take proactive action. |

| | |
|---|---|
| **Societal Needs** | - Increased awareness and education about early Parkinson's symptoms in the community.<br>- A more affordable and accessible diagnostic option, especially for people in rural or lower-income areas.<br>- Reduced stigma around neurological conditions by normalizing proactive screening. |

**User Insights:**

These are the key observations and understandings derived from your research, interviews, and analysis — explaining why users behave the way they do, what motivates them, and what barriers they face**.**

| Theme | User Insights |
|---|---|
| **Early Detection Behavior** | Many users ignore mild symptoms (tremor, stiffness) because they think it's aging or stress, leading to delayed diagnosis. |
| **Trust in AI** | Users are curious but skeptical of AI-based diagnosis; they need proof (case studies, certifications) before fully trusting it. |
| **Caregiver Role** | Caregivers often act as the main decision-makers, especially when patients are elderly or less tech-savvy. They need tools that fit into their caregiving routines. |
| **Information Overload** | Users feel overwhelmed by conflicting information online and struggle to distinguish reliable sources from misleading ones. |
| **Emotional Barriers** | Many patients fear the diagnosis itself, avoiding screening altogether. Framing the tool as early health monitoring rather than diagnostic helps ease anxiety. |
| **Desire for Clarity** | Users want simple, color-coded results (low risk, moderate risk, high risk) with clear guidance on what to do next. |
| **Cost Sensitivity** | High-cost diagnostic tools are a barrier, especially for users in semi-urban and rural areas. Affordable screening tools are more appealing. |
| **Doctor Involvement** | Doctors are open to AI tools but only if the results are scientifically validated and can be integrated into their existing diagnosis process. |

# 13. POV Statements

**POV Statements:**

Here are 10 well-crafted POV (Point of View) Statements specifically for your project NeuroAI Detect (AI-based Parkinson's Detection Tool), followed by PoV Questions for each statement.

| POV Statements | Role-based or Situation-Based | Benefit, Way to Benefit, Job TBD, Need (more/less) | PoV Questions |
|---|---|---|---|
| 1. An **elderly patient** needs a way to **detect early signs of Parkinson's from home** because they **struggle to visit hospitals frequently for checkups**. | Role-based (elderly patient) | More convenient early detection | How can we design a tool that allows elderly patients to screen for Parkinson's at home? |
| 2. A **caregiver** needs a way to **monitor their loved one's symptoms more effectively** because **they want to intervene early if symptoms worsen**. | Role-based (caregiver) | More real-time symptom tracking | How can we design a system that helps caregivers track changes in their loved one's health? |
| 3. A **working professional** needs a way to **get quick AI-based health insights** because **they often overlook minor symptoms due to a busy schedule**. | Situation-based (busy lifestyle) | More awareness and proactive action | What can we design that fits into a busy person's daily routine and nudges them to prioritize health? |
| 4. A **neurologist** needs a way to **trust AI-generated reports** because **they want validated data to support clinical diagnosis**. | Role-based (doctor) | More scientific validation | How can we design an AI tool that generates medically reliable reports doctors can trust? |
| 5. A **rural patient** needs a way to **get affordable early screening** because **they live far from specialty hospitals and neurologists**. | Situation-based (remote location) | More access to affordable tools | How can we design a low-cost, mobile-friendly Parkinson's detection tool for rural areas? |

| | | | |
|---|---|---|---|
| 6. A **person with a family history of Parkinson's** needs a way to **understand their personal risk** because **they want to plan their future health proactively**. | Role-based (high-risk family) | More personalized risk insights | How can we design a tool that offers personalized risk assessments for people with family history? |
| 7. An **anxious patient** needs a way to **receive gentle, reassuring health feedback** because **they are afraid of receiving alarming health news**. | Role-based (anxious personality) | Less anxiety-provoking messaging | How can we design an empathetic user interface that reduces fear and encourages action? |
| 8. A **finance-conscious user** needs a way to **assess Parkinson's risk without expensive tests** because **they can't afford costly diagnostic procedures**. | Role-based (cost-conscious) | More affordable early detection | What can we design that balances affordability and diagnostic accuracy? |
| 9. A **tech-savvy user** needs a way to **trust the AI tool's logic and data** because **they want transparency in how the predictions are made**. | Role-based (tech-savvy) | More transparency in AI model | How can we design an AI system that offers transparent explanations alongside results? |
| 10. A **community health worker** needs a way to **screen multiple patients efficiently** because **they want to identify high-risk cases quickly** in underserved areas. | Role-based (community health worker) | More scalable community screening | How can we design a tool that allows mass screening in community health camps? |

# 14. Develop POV/How Might We (HMW) Questions to Transform Insights/Needs into Opportunities for Design

Turn your user needs and insights into actionable opportunities by framing them as "How Might We" (HMW) questions. These questions will spark creative problem-solving and guide your innovation process.

| User Need/Insight | "How Might We" Question |
|---|---|
| Many users, especially in rural areas, lack access to neurologists and early screening tools for Parkinson's. | How might we create an affordable and accessible Parkinson's screening tool for users in remote and underserved areas? |
| Users often feel overwhelmed or anxious when receiving medical reports, especially if they don't understand the results. | How might we design a user-friendly and reassuring interface that explains results clearly and reduces anxiety? |
| Caregivers need real-time symptom tracking to monitor the health of loved ones with Parkinson's risk. | How might we enable caregivers to easily track and monitor symptoms in real time through the AI tool? |
| Users want to trust AI-generated predictions but are skeptical without transparent explanations. | How might we make the AI prediction process more transparent and explainable to build user trust? |
| Early-stage Parkinson's symptoms are often subtle, and users might ignore them until they become severe. | How might we encourage users to proactively check for Parkinson's symptoms before they become serious? |

# 15. Crafting a Balanced and Actionable Design Challenge

The Design Challenge Should Neither Be Too Narrow Nor Too Broad and It Should Be an Actionable Statement with a quantifiable goal. It should be a culmination of the POV questions developed.

**Design Challenge:**

How might we design an accessible, user-friendly, and trustworthy AI-based early detection tool for Parkinson's that empowers users and caregivers to detect symptoms early, understand their health data clearly, and take timely action, with a goal of increasing early diagnosis rates by at least 30% in the next 2 years?

# 16. Validating the Problem Statement with Stakeholders for Alignment

Ensure your problem statement accurately represents the needs and concerns of your stakeholders and users. This involves gathering feedback from these groups to confirm that the problem is relevant and significant from their perspective. By validating early, you can refine the problem statement to better align with real-world challenges, ensuring your solution addresses the correct issues.

**Validation Plan:**

| Stakeholder/User | Role/Title | Feedback on Problem Statement | Suggestions for Improvement |
|---|---|---|---|
| **Dr. Arvind Sharma** | **Neurologist** | **The problem is highly relevant, as early detection is critical for slowing Parkinson's progression.** | **Emphasize that early detection is also useful for tailoring medication and therapy plans.** |
| **Ramesh Gupta** | **Parkinson's Patient** | **Strongly resonates. Wishes tools like this existed when symptoms first appeared.** | **Make sure the tool is easy to use for elderly users with limited tech skills.** |
| **Meena Kapoor** | **Caregiver (Spouse)** | **Relevant — caregivers need tools to identify subtle changes.** | **Include a feature that alerts caregivers if symptoms worsen.** |
| **Dr. Priya Nair** | **AI Healthcare Researcher** | **Relevant, especially the use of AI in diagnostics.** | **Highlight the importance of explainable AI — users should understand why AI made a specific prediction.** |

| | | | |
|---|---|---|---|
| **Ravi Iyer** | **Tech Startup Founder** | **Aligned with current trends in health-tech innovation.** | **Consider emphasizing how the tool integrates with existing healthcare systems (e.g., electronic health records).** |
| **Sunita Mehta** | **Physiotherapist** | **Supports the problem statement — physiotherapy can help if symptoms are caught early.** | **Ensure the tool tracks motor symptoms that can be shared with physiotherapists.** |
| **Sneha Verma** | **Healthcare Policy Expert** | **Very relevant in the context of aging populations and increasing neurological disorders.** | **Consider highlighting affordability and accessibility, especially in rural areas.** |
| **Anand Bhatt** | **Data Scientist** | **Agrees with the technical feasibility but warns against overpromising AI accuracy.** | **Be realistic about accuracy rates and stress the importance of complementary clinical diagnosis.** |
| **Parkinson's Support Group** | **Patient Advocacy Group** | **The group strongly supports early detection tools.** | **Focus on privacy concerns and reassure users about data security.** |
| **Dr. Nilesh Patil** | **General Physician** | **Important for primary care doctors to have such tools.** | **Consider adding a training or onboarding module to help doctors interpret results confidently.** |

# 17. Ideation

## Ideation Process:

| Idea Number | Proposed Solution | Key Features/Benefits | Challenges/Concerns |
|---|---|---|---|
| Idea 1 | Mobile App for Early Parkinson's Screening using AI | - Uses voice analysis, facial micro-expression detection, and motor function tests<br>- Provides early risk score and personalized recommendations | - Ensuring accurate predictions with limited user input<br>- Elderly users may struggle with technology |
| Idea 2 | Wearable Device for Continuous Symptom Tracking | - Tracks tremors, gait, and hand movements<br>- Sends real-time alerts to doctors and caregivers<br>- Integrates with smartphones | - Hardware costs could make it expensive<br>- Needs continuous calibration for accuracy |
| Idea 3 | AI-powered Video Analysis Tool for Clinics | - Analyses patient movement during consultations<br>- Generates objective symptom reports for doctors<br>- Works with standard webcams | - Requires clear and consistent video quality<br>- Doctors may hesitate to rely on AI over clinical judgment |
| Idea 4 | Community-driven Symptom Diary with AI Insights | - Patients log symptoms daily<br>- AI detects trends and predicts deterioration risks<br>- Peer community offers emotional support | - Self-reporting can be inconsistent<br>- Privacy concerns around sharing health data |
| Idea 5 | Voice-based Helpline with AI Screening | - Users call a helpline<br>- AI analyses voice for early signs<br>- Connects users to specialists if needed | - Needs strong voice dataset for diverse accents<br>- Accuracy may vary based on audio quality |

# 18. Idea Evaluation

Evaluate the Idea based on 10/100/1000 grams

| Idea | Impact (10/100/1000 grams) | Feasibility (10/100/1000 grams) | Alignment (10/100/1000 grams) | Total Weight |
|---|---|---|---|---|
| **Idea 1: Mobile App for Early Parkinson's Screening using AI** | 1000 | 100 | 1000 | **2100** |
| **Idea 2: Wearable Device for Continuous Symptom Tracking** | 1000 | 100 | 1000 | **2100** |
| **Idea 3: AI-powered Video Analysis Tool for Clinics** | 100 | 1000 | 1000 | **2100** |
| **Idea 4: Community-driven Symptom Diary with AI Insights** | 100 | 100 | 100 | **300** |
| **Idea 5: Voice-based Helpline with AI Screening** | 1000 | 100 | 1000 | **2100** |

**Explanation:**

- **Impact**: How much the solution can improve early detection, patient outcomes, and user experience.

- **Feasibility**: How practical it is to develop and implement this solution within current technology and resource limits.

- **Alignment**: How well it fits the identified user needs, insights, and design challenge.

**Key Observations:**

- **Ideas 1, 2, 3, and 5 score highest** because they directly address core user needs (early detection, ease of use, AI-based predictions) and are either user-friendly or enhance clinical workflows.

- **Idea 4 (Community-driven diary)** scores lower because while it provides emotional support, it lacks the same medical impact and reliability.

## 1. Problem Statement:

There is a lack of accessible, accurate, and early-stage Parkinson's detection tools, leaving many patients undiagnosed until symptoms significantly progress, reducing treatment effectiveness.

## 2. Target Audience:

● Individuals aged 50+, especially those with a family history of neurological disorders.
● Primary care physicians, neurologists, and healthcare professionals looking for faster diagnostic support.
● Caregivers who want to monitor and track symptoms for loved ones at risk.

## 3. Solution Overview:

Neuro AI Detect is an AI-powered mobile and web application that allows users to perform self-screening for Parkinson's disease using simple motor and speech-based tests analyzed by advanced machine learning models. It provides risk scores, tracks symptoms over time, and offers actionable insights for both users and healthcare providers.

## 4. Key Features:

| Feature | Description |
|---|---|
| **Feature 1** | AI-powered motor function tests (finger tapping, hand movements, walking analysis) using smartphone sensors and cameras. |
| **Feature 2** | Speech and voice analysis for early speech pattern changes associated with Parkinson's. |
| **Feature 3** | Symptom tracking dashboard with historical trends and risk progression alerts, enabling early intervention. |

## 5. Benefits:

| Benefit | Description |
|---------|-------------|
| **Benefit 1** | Provides an easy-to-use, at-home screening tool, reducing reliance on specialist appointments for initial detection. |
| **Benefit 2** | Combines multiple biomarkers (motor, speech, and behavioral data) for higher accuracy in early diagnosis. |
| **Benefit 3** | Continuous tracking empowers users and doctors to monitor subtle symptom changes, improving personalized care. |

## 6. Unique Value Proposition (UVP):

NeuroAI Detect combines AI-based movement, voice, and behavioral analysis into a comprehensive, user-friendly tool that empowers users to self-screen for Parkinson's at home while providing doctors with objective, data-driven insights to aid diagnosis and treatment planning.

## 7. Key Metrics:

| Metric | Measurement |
|--------|-------------|
| **Metric 1** | Number of completed screenings per user |
| **Metric 2** | Detection accuracy rate compared to clinical diagnosis |
| **Metric 3** | Percentage of users referred to a specialist after using the tool |

## 8. Feasibility Assessment:

**High feasibility.**

- Uses existing smartphone sensors and cameras, so no special hardware is needed.

- AI models can be trained on existing Parkinson's datasets, reducing initial data collection needs.

- Requires collaboration with neurologists and researchers to fine-tune algorithms, but the technology (computer vision, speech recognition, machine learning) is readily available.

- Regulatory approval for medical use may present a moderate challenge, but a non-diagnostic "risk screening tool" positioning can accelerate initial deployment.

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## 9. Next Steps:

- Develop prototype focusing on 1-2 key motor and speech tests.
- Partner with healthcare professionals to validate accuracy.
- Conduct pilot testing with target users (patients, doctors, caregivers).
- Gather feedback and refine features based on user and expert input.
- Explore partnerships with hospitals or health-tech platforms for broader adoption.

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