SMART INDIA HACKATHON 2025

- Problem Statement ID – SIH25131
- Problem Statement Title- Student Innovation
- Theme- MedTech/BioTech/Healthcare
- PS Category- Software
- Team ID-NSIIC-SIH25-0097
- Team Name- Vision Crafters

Vision Crafters

Cogni-Lens

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Problem Addressed:

People suffering from cognitive impairment disorders such as Alzheimer's Disease, Frontotemporal Dementia (FTD), Schizophrenia (where memory, recognition, orientation, judgment can be affected) may face key issues:

Recognition difficulties: Patients often forget faces of familiar people (family, caretakers), have trouble remembering names, roles (who is who).

Disorientation, wandering, safety risks: They may leave home without notice, get lost, wander in unsafe conditions.

Routine adherence / daily tasks: Forgetting small but important routine actions (e.g. medication), inability to follow schedules.

Lack of supervision / communication: Guardians (family or caretakers) and medical professionals may not have real-time visibility into what the patient is doing, whether they are safe, their vital signs etc.

Proposed Solution:

Smart Glasses

- Camera(s), with facial recognition of people around the patient through AR.
- reminders (e.g. "this is your daughter", "this is caregiver", etc.).

Smart Watch worn by the patient

- Detects motion.
- Measures basic vital parameters (e.g.bp, heart rate).
- Possibly fall detection, SOS signals.
- Location Tracking

Mobile App / Platform for guardians and doctors

- Real-time communication: messaging / voice / video among patient, doctor, guardian.
- Alerts: abnormal vital signs, wandering / leaving safe zones, emergencies.

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TECHNICAL APPROACH

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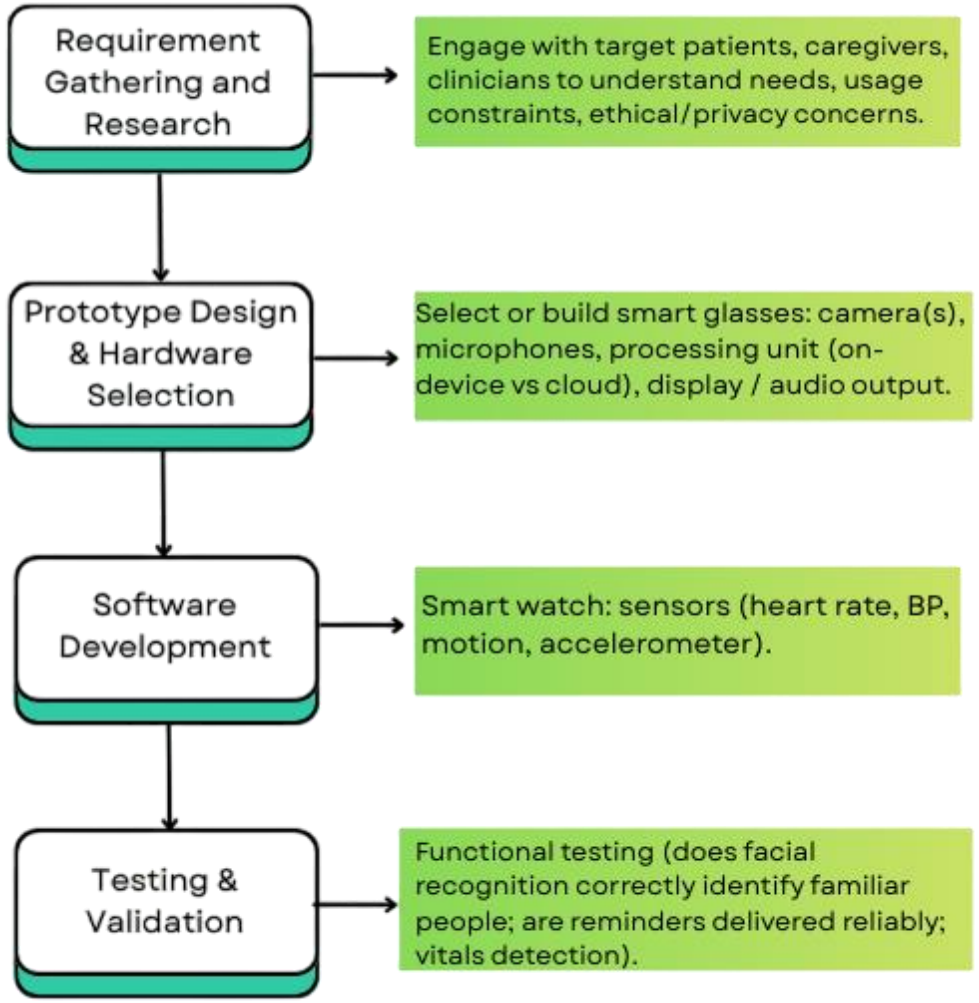
Process of Implementation



Component	Possible Technology / Tools
Smart Glasses Hardware	Camera (RGB / IR), microphone, speakers or bone-conduction audio, display or audio output only, battery, GPS or GNSS, WiFi / BT / LTE/5G, AR Display
Smart Watch	Sensors: accelerometer, gyroscope, blood pressure (via optical or cuffless methods), perhaps SpO_2, temperature; microcontroller, wireless comms.
AI	Facial recognition models (pretrained or custom), object recognition, anomaly detection (for motion, location). Use frameworks like TensorFlow Lite, PyTorch Mobile, ONNX.
Mobile App	Platforms: Android, iOS. Possibly cross-platform tools (React Native, Flutter). UI/UX for patients (simple, large buttons, voice prompts) and for caregivers/doctors (dashboard, alerts).
Cloud	The deployment of the App and the storage of the facial datas would be stored on the cloud making it simple and easier for storing and accessing the datas.

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FEASIBILITY AND VIABILITY

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Challenges and risks:

Challenge / Risk	Description	Mitigation Strategies
Accuracy of Recognition	False positives / negatives in face recognition; incorrect prompts may cause distress.	Use high-quality models; customize to each patient (train on faces of their family and frequent people); allow correction feedback loops; fallback if uncertain (ask patient); rigorous testing.
Hardware Limitations	Battery life, weight, comfort, durability; watch sensors may have limitations (BP measurements often less accurate).	Use low-power hardware; optimize models; trade off features vs battery; frequent user testing; quality hardware; calibration.
Connectivity / Network Issues	In areas of poor connectivity (rural, indoors), delays or lack of data transfer.	Use offline modes; buffer data; use local processing; drop to minimal functionality when offline.
Cost & Scalability	High costs of sensors, custom hardware; cost of maintenance; affordability for patients.	Use off-the-shelf hardware where possible; modular design; economies of scale; explore subsidies / insurance; tiered service models.
Regulatory / Legal	Medical device approvals; privacy laws; liability.	Early legal consultation; ensure compliance; certification; clear disclaimers; possibly classifying as assistive rather than medical.
Security Risks	Vulnerabilities, hacking, unauthorized access to sensitive data.	Secure software engineering practices; encryption; regular security audits; updates and patches.

Strategies for overcoming these challenges:

Accuracy Improvement: Use transfer learning, personalization.

- Use multiple modalities (face + voice + location) to reduce false recognition.
- Regular retraining / feedback.

User Acceptance: Involve patients, caregivers from early design (co-design).

- Keep hardware light, unobtrusive.
- Simple user interface; voice feedback.

Feasibility:

Cost feasibility: Costs will depend on hardware quality, scale of production. Prototype cost may be high; but with scale and judicious component choice cost can be reduced.

Operational feasibility: Need to ensure support for maintenance, user support, training caregivers/patients. Also battery charging, cleaning, durability.

Market feasibility: Given the growing prevalence of Alzheimer's/dementia globally and growing aging populations, there is clear demand.

Regulatory / legal feasibility: Requires care in jurisdictions where medical devices, privacy/consent laws are strict.

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IMPACT AND BENEFITS

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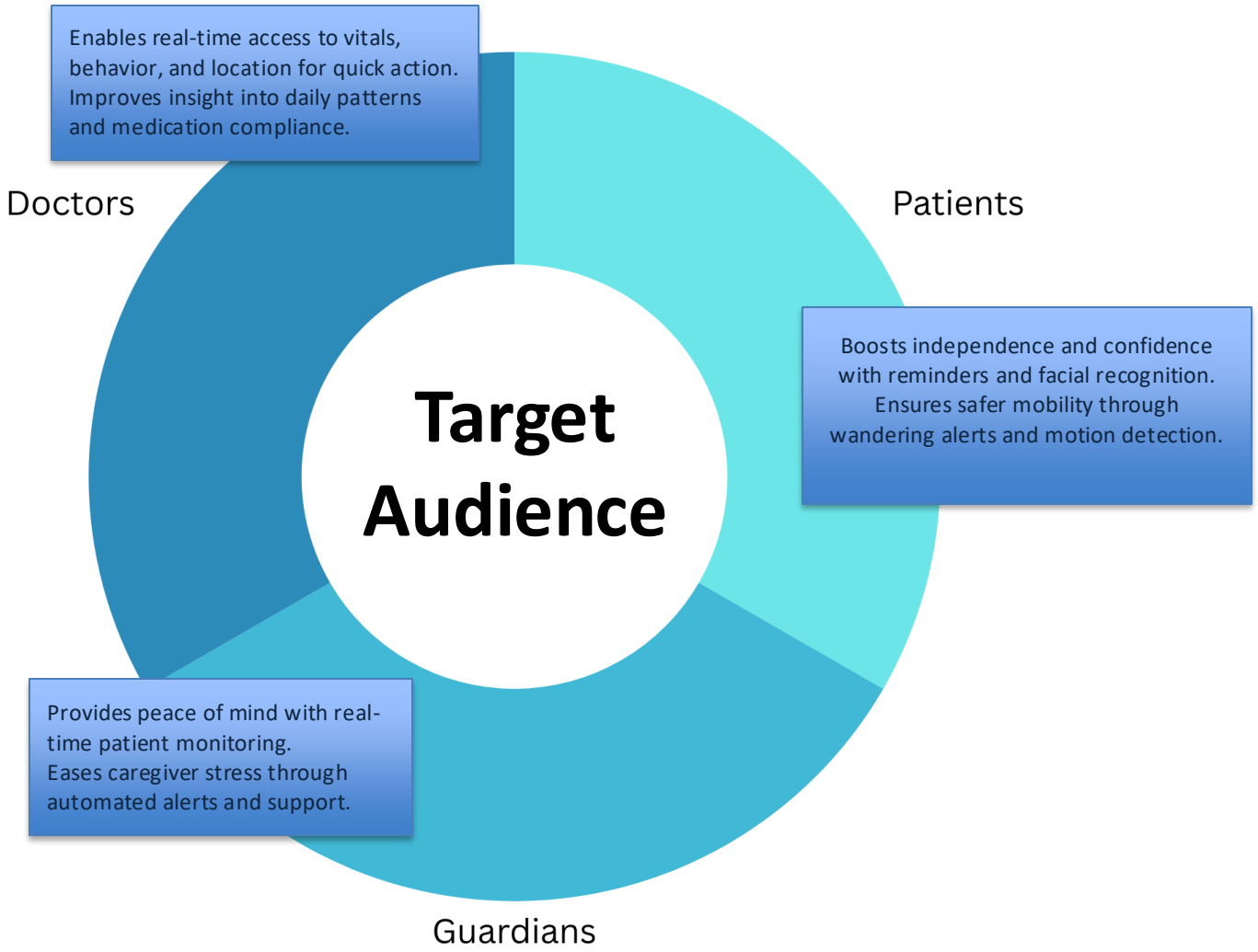

Benefits

Social
Enhanced Quality of Life
Reduced Caregiver Burden

Economic
Healthcare Cost Reduction
Efficient Use of Care Resources

Environmental
Reduction in Travel Emissions
Efficient Healthcare Delivery

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RESEARCH AND REFERENCES

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- https://www.jamda.com/article/S1525-8610%2825%2900348-2/
- https://pmc.ncbi.nlm.nih.gov/articles/PMC9054450/
- https://www.researchgate.net/publication/339403960_Smart_Assistive_Glasses_for_Alzheimer%27s_Patients
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