SRISHTI’25

SAINTGITS COLLEGE OF ENGINEERING (Autonomous)
PRESENTS

- **Problem Statements Title :** Smart Thermoregulation Bracelet
- **Theme :** Wearable Health Devices
- **Category – Software/Hardware :** Hardware/Software
- **Team Name :** Smart Priders
- **University Name :** Anna University (Kongunadu College of Engineering and Technology)

PROPOSED SOLUTION

General Occurrence of Brain Tumors

- Wearable devices are widely used for tracking health, but they often miss critical conditions like strokes.
- Detecting small changes in body temperature, such as a 2% drop, can help prevent strokes with early action.

Problems

- Most wearables cannot detect small temperature drops or provide real-time alerts for stroke risks.
- They also lack of proper connection to healthcare systems for quick medical responses.

Solution

- The Smart Thermoregulation Bracelet uses accurate sensors to monitor temperature changes, detects a 2% drop linked to stroke, and sends instant alerts.
- It also regulates body temperature and shares data with healthcare providers for timely intervention.

TECHNICAL STRATEGY

Hardware Components:

- **Sensors :-** PTC thermistors and MLX90614 for accurate temperature monitoring.
- **Thermal Regulation :-** Peltier module (TEC1-12706) with a heat sink and fan.
- **Microcontroller :-** ARM Cortex or ESP32 for data processing and control.
- **Power :-** Rechargeable Li-Po battery with Battery Management System (BMS).
- **Connectivity :-** BLE(Bluetooth Low Energy) module for communication.

Software Components:

- **Languages :-** Python for AI and C/C++ for microcontroller programming.
- **Frameworks :-** TensorFlow Lite for AI and FreeRTOS for system control.
- **Mobile App :-** BLE SDKs for alerts and data visualization.

FEASIBILITY

Technical Feasibility:

- Sensors, microcontrollers, and thermal modules are readily available and integrable.

Developmental Feasibility:

- AI, embedded systems, and app development are achievable within a clear timeline.

VIABILITY

Market Viability:

- High market demand for health monitoring wearables ensures value.

Cost Viability:

- Affordable components make the device cost-effective and accessible.

IMPACTS

Improved Stroke Prevention:

- Early detection of small temperature drops reduces stroke risks by enabling timely intervention.

Enhanced Remote Healthcare:

- Seamless data sharing allows healthcare providers to monitor patients in real-time and provide faster responses.

BENEFITS

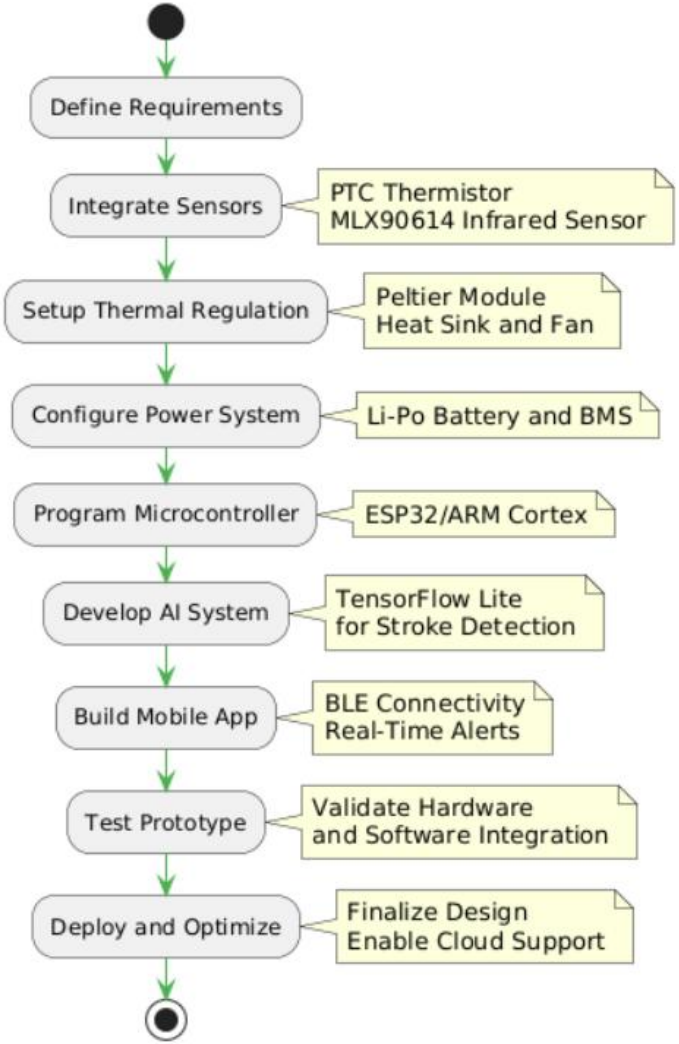
User Comfort:

- Thermal regulation ensures users remain comfortable in varying environmental conditions.

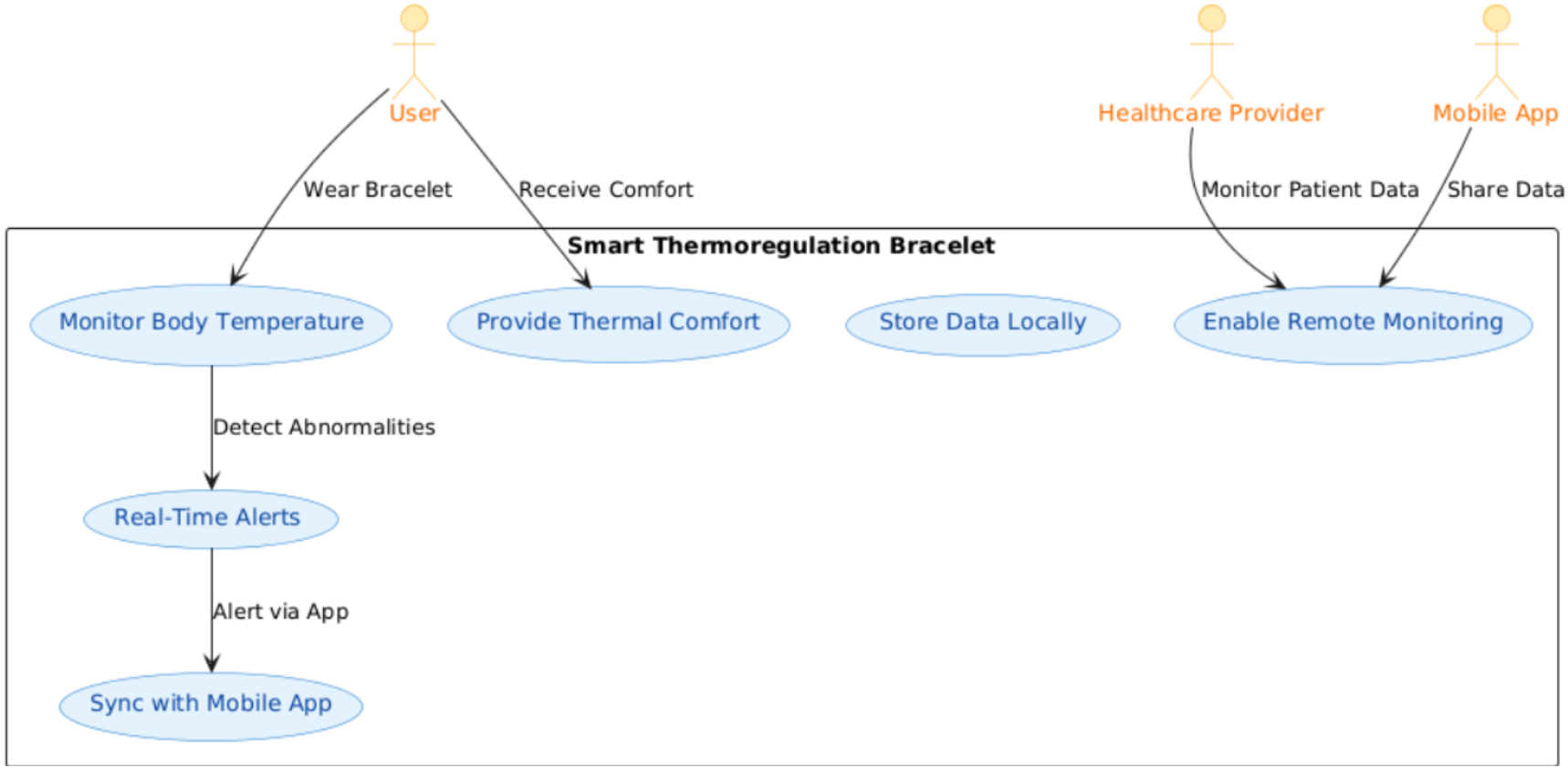
Versatile Use Cases:

- Suitable for outdoor workers, athletes, and individuals with chronic conditions, expanding its applicability.

FLOW OF IMPLEMENTATION



ARCHITECTURE DIAGRAM



EXPECTED RESULT

- The **Smart Thermoregulation Bracelet** monitors temperature, shows stroke risk, provides alerts, and offers cooling/heating.
- It connects to an app for easy health tracking and is comfortable for daily use.

REFERENCES

- Chen, Sheng-Tao, Lin, Shih-Sung, Lan, Chien-Wu, and Hsu, Hao-Yen. "Design and Development of a Wearable Device for Heat Stroke Detection." 2018. Sensors. <<<Link>>>
- Javed, Sadia, Ghazala, Samia, and Faseeha, Ummay. "Perspectives of Heat Stroke Shield: An IoT-based Solution for the Detection and Preliminary Treatment of Heat Stroke." 2020. Engineering, Technology & Applied Science Research. <<<Link>>>
- Keshavarz Valian, N., and Foroughinia, S. "The Role of Telemedicine in the Management of COVID-19: Evidence from Iran." 2021. International Journal of Travel Medicine and Global Health. <<<Link>>>

REFERENCES

- Lazaro, Marc, Lazaro, Antonio, Villarino, Ramon, and Girbau, David. "Smart Face Mask with an Integrated Heat Flux Sensor for Fast and Remote People's Healthcare Monitoring." 2021. Sensors. <<<Link>>>
- Xue, Qiuyue (Shirley), Liu, Yujia, Breda, Joseph, Springston, Mastafa, Iyer, Vikram, and Patel, Shwetak. "Thermal Earring: Low-power Wireless Earring for Longitudinal Earlobe Temperature Sensing." 2023. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies. <<<Link>>>
- Sattar, Maria, Lee, Yoon Jae, Kim, Hyeonseok, Adams, Michael, Guess, Matthew, et al. "Flexible Thermoelectric Wearable Architecture for Wireless Continuous Physiological Monitoring." 2024. ACS Applied Materials & Interfaces. <<<Link>>>