Visvesvaraya Technological University, Belagavi – 590018

PROJECT PROPOSAL
ON

BABYSPHERE 2.0: A cloud-based smart monitoring device for your loved one

Submitted in partial fulfillment of the requirements for the degree

BACHELOR OF ENGINEERING
in
COMPUTER SCIENCE & ENGINEERING

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ST JOSEPH ENGINEERING COLLEGE
An Autonomous Institution

(Affiliated to VTU Belagavi, Recognized by AICTE, Accredited by NBA)

Vamanjoor, Mangaluru - 575028, Karnataka

2024-25

Project Title

BABYSPHERE 2.0: A cloud-based smart monitoring device for your loved one

Type of Project

Product based project (Software along with Hardware)

Background for the the project

In recent years, the rise in sudden infant death syndrome (SIDS) and other health concerns related to newborns has highlighted the need for continuous and accurate monitoring of babies. Many parents face the challenge of balancing their busy schedules while ensuring their child's safety, especially when they are not physically present. Traditional monitoring devices often lack intelligent features that can detect critical signs, such as body temperature or unsafe sleeping positions. With advancements in cloud technology and computer vision, there is an opportunity to develop smart monitoring systems that provide real-time alerts and actionable insights. The 'BABYSPHERE 2.0' project aims to address these issues by creating a cloud-based system capable of monitoring baby body temperature, room conditions, and movements using computer vision, helping parents prevent potential dangers like SIDS through timely alerts.

Objectives

The objectives of the proposed project work are:

1. To develop a cloud-based monitoring platform that collects and manages baby and room temperature data.

2. To provide real-time alerts to parents regarding abnormal temperature readings.

3. To integrate computer vision technology to detect unsafe sleeping positions and notify parents.

4. To create a user-friendly interface that allows parents to easily monitor and receive notifications.

5. To deliver actionable notifications through SMS, email, or app alerts in a timely manner.

Software / Hardware Requirements

Software Requirements

1. React Native development framework to build the mobile app for cross-platform support.

2. Firebase cloud platform for real-time database management, data storage, and authentication.

3. TensorFlow Lite or OpenCV libraries for implementing computer vision algorithms[4] on mobile devices to detect unsafe sleeping positions[3][2].

4. Mobile-optimized signal processing algorithms[5] to analyze camera data for non-contact heart rate monitoring[6][1].

5. Node.js or similar backend technologies for handling API requests and interactions with cloud services.

6. Firebase Cloud Messaging or similar services for sending push notifications related to temperature changes, movement detection, or abnormal heart rate.

7. WebSockets or Firebase Realtime Database to enable real-time data updates in the app for temperature, movement, and heart rate monitoring.

8. Firebase Authentication to manage user accounts and secure access to baby monitoring data.

References

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[2] Ayaka Okuno, Takaaki Ishikawa, and Hiroshi Watanabe. "Rollover Detection of Infants Using Posture Estimation Model". In: *2020 IEEE 9th Global Conference on Consumer Electronics (GCCE)*. 2020, pp. 490–493. DOI: `10.1109/GCCE50665.2020.9292052`.

[3] Neethu Raghavan and S. Ullas. "Infant movement detection and constant monitoring using wireless sensors". In: *2017 International Conference on Wireless Communications, Signal Processing and Networking (WiSPNET)*. 2017, pp. 2109–2114. DOI: `10.1109/WiSPNET.2017.8300133`.

[4] Gurpreet Singh et al. "Smart Infant Monitoring System Using Computer Vision and AI". In: *2023 IEEE International Conference on Electro Information Technology (eIT)*. 2023, pp. 1–6. DOI: `10.1109/eIT57321.2023.10187295`.

[5] Chuanxiang Tang, Jiwu Lu, and Jie Liu. "Non-contact Heart Rate Monitoring by Combining Convolutional Neural Network Skin Detection and Remote Photoplethysmography via a Low-Cost Camera". In: *2018 IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPRW)*. 2018, pp. 1390–13906. DOI: `10.1109/CVPRW.2018.00178`.

[6] Duc Nhan Tran, Hyukzae Lee, and Changick Kim. "A robust real time system for remote heart rate measurement via camera". In: *2015 IEEE International Conference on Multimedia and Expo (ICME)*. 2015, pp. 1–6. DOI: `10.1109/ICME.2015.7177484`.