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Review I
Project Phase – I (ECL502)

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Batch No.	4	Semester	6
Branch	ECE	Supervisor(s)	Dr. Ankur Thakur

1. **Title of the Project:**

   CradleEye: Enhanced Baby Monitoring with IoT Integration

2. **Introduction**

   The CradleEye: Enhanced Baby Monitoring with IoT Integration project aims to revolutionize infant care by integrating advanced IoT technology into a comprehensive monitoring system. Unlike traditional baby monitors, this system utilizes an ESP8266 microcontroller to process data from a MAX4466 microphone amplifier for real-time cry detection, a moisture sensor for diaper wetness alerts, and an optional camera for movement detection. By sending immediate notifications to parents' smartphones, the system ensures timely interventions, enhancing both baby safety and parental peace of mind. This project addresses the limitations of conventional monitors by providing a more responsive and intelligent solution for modern parenting.

3. **Problem Definition**

   3.1 Background

   In contemporary parenting, especially for working parents, ensuring the well-being of an infant while managing daily responsibilities poses significant challenges. Traditional baby monitors, which rely on basic audio and video feeds, often fall short in providing real-time, actionable alerts that can prompt immediate parental intervention. These limitations can lead to delayed responses to critical situations, such as a baby crying or needing a diaper change.

   3.2 Challenges

   1. **Real-Time Monitoring:** Conventional baby monitors lack the capability to provide instant notifications based on specific triggers like a baby's cry or diaper wetness. This can result in delayed responses, which might affect the baby's comfort and safety.

   2. **Limited Functionality:** Existing systems often provide either audio or video monitoring but fail to integrate multiple sensors that could offer a more comprehensive view of the baby's needs. For instance, detecting diaper wetness or providing customizable lullabies are not features found in most traditional monitors.

   3. **Parental Accessibility:** Working parents need a reliable method to monitor their baby's status remotely, ensuring they are promptly alerted even when they are away from home.

Many current systems do not offer seamless integration with mobile devices, limiting their effectiveness.

4. **Cost and Complexity:** Advanced baby monitoring systems that offer comprehensive features are often expensive and complex to set up, making them less accessible to a wider audience.

4. **Objectives**

The **"CradleEye"** project addresses these challenges by developing an IoT-based baby monitoring system that offers:

- **Real-Time Cry Detection:** Accurate and immediate alerts when the baby is crying, utilizing a MAX4466 microphone amplifier and ESP8266 microcontroller.
- **Moisture Sensing:** Notifications for diaper wetness, ensuring timely changes and maintaining baby comfort.
- **Remote Monitoring:** Integration with mobile apps to provide parents with real-time updates and notifications, regardless of their location.
- **User-Friendly Interface**: An intuitive interface that allows parents to manage and monitor their baby's status easily, even from afar.

By integrating these features, the project aims to provide a more responsive, comprehensive, and accessible solution for modern infant monitoring needs.

5. **Skillset additionally required to solve/address the problem**
   a. Sensor Integration
   b. C/C++ Programming
   c. IoT Communication Protocols
   d. Sound Signal Processing
   e. Real-Time Data Visualization
   f. Communication and Integration

6. **Timeline to achieve the skillset:** 20 weeks
7. **Block schematic/algorithm/coding/testing metrics/experiments/result graphs/technical papers**
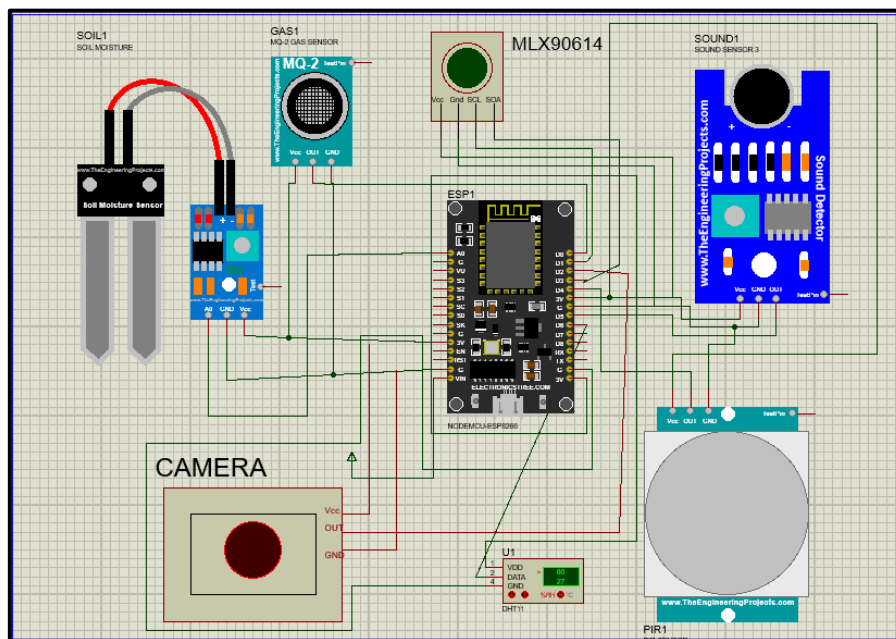
8. **Expected Challenges**
   a. Hardware Integration
   b. Sensor Calibration
   c. Communication Protocols
   d. User Interface Design
   e. Real-Time Processing
   f. Testing and Validation

9. **References**

- Hussain, T., Muhammad, K., Khan, S., Ullah, A., Lee, M.Y. and Baik, S.W., 2019. Intelligent baby behavior monitoring using embedded vision in IoT for smart healthcare centers. Journal of Artificial Intelligence and Systems, 1(1), pp.110-124.
- Joseph, S., Kumar, A. and Babu, M.H., 2021, March. IOT based baby monitoring system smart cradle. In 2021 7th International Conference on Advanced Computing and Communication Systems (ICACCS) (Vol. 1, pp. 748-751). IEEE.
- Duman, Ü. and Aydin, E., 2020, September. IOT based baby cradle system with real time data tracking. In 2020 5th International Conference on Computer Science and Engineering (UBMK) (pp. 274-279). IEEE.
- Pratap, N.L., Anuroop, K., Devi, P.N., Sandeep, A. and Nalajala, S., 2021, January. IoT based smart cradle for baby monitoring system. In 2021 6th International Conference on Inventive Computation Technologies (ICICT) (pp. 1298-1303). IEEE.
- Sontakke, D., Kand, A., Sawant, S. and Annamalai, M., 2024. IOT Based Baby Monitoring System for Smart Cradle. International Research Journal of Innovations in Engineering and Technology, 8(3), p.232.

Name and Signature of Students   **Name and Signature of Supervisor**