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Proposal for the development of Lumi Monitor

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https://github.com/kylev1999/LumiMonitor

Executive Summary

As a student in the Computer Engineering Technology program, I will be integrating the knowledge and skills I have learned from our program into this Internet of Things themed capstone project. This proposal requests the approval to build the hardware portion that will connect to a database as well as to a mobile device application. The internet connected hardware will include a custom PCB with the following sensors and actuators Light Sensor, Sound Sensor, Motion Sensor, Temperature Sensor?. The database will store Login Information, Time that child has cried,Amount of sleep, Time child has been fed, Sound recordings. The mobile device functionality will include Listen to sound coming from the Lumi, Change the colour of the LED/cycle through colours. Play songs, Turn on/off Lumi. View data on amount of sleep, feeding, etc. and adjust sensors. and will be further detailed in the mobile application proposal. I will be collaborating with the following company/department Humber College School Of Media Studies and Information Technology. In the winter semester I plan to form a group with the following students, who are also building similar hardware this term and working on the mobile application with me Harsimran Saini and Gino Seridon. The hardware will be completed in CENG 317 Hardware Production Techniques independently and the application will be completed in CENG 319 Software Project. These will be integrated together in the subsequent term in CENG 355 Computer Systems Project as a member of a 2 or 3 student group.

Background

The problem solved by this project is The Lumi Monitor will allow parents to monitor their baby with one device though the convenience of their smartphone. The app will allow parents to see if their baby is awake with the use of motion sensors, adjust the light of the Lumi depending on if the baby is awake or not and can listen if their child is making any noise or crying.. A bit of background about this topic is A light sensor will detect the light level of a room and dim or increase the brightness of the LED. The LED will be a multicolour or RGB LED, the colour of the LED can be chosen through the app, as well as if the LED should cycle through different colours. The LED brightness can also be changed through the app. The parent can listen to the child though the app using a microphone. The parent can play songs though the app using speakers on the Lumi monitor. The volume can be adjusted on the app. Various data will be stored in the app such as the amount of time that the child has cried, amount of sleep, times that the child has been fed, etc..

Existing products on the market include [1]. I have searched for prior art via Humber's IEEE subscription selecting "My Subscribed Content"[2] and have found and read [3] which provides insight into similar efforts.

In the Computer Engineering Technology program we have learned about the following topics from the respective relevant courses:

- Java Docs from CENG 212 Programming Techniques In Java,
- Construction of circuits from CENG 215 Digital And Interfacing Systems,
- Rapid application development and Gantt charts from CENG 216 Intro to Software Engineering,
- Micro computing from CENG 252 Embedded Systems,
- SQL from CENG 254 Database With Java,

- Web access of databases from CENG 256 Internet Scripting; and,
- Wireless protocols such as 802.11 from TECH152 Telecom Networks.

This knowledge and skill set will enable me to build the subsystems and integrate them together as my capstone project.

Methodology

This proposal is assigned in the first week of class and is due at the beginning of class in the second week of the fall semester. My coursework will focus on the first two of the 3 phases of this project:

Phase 1 Hardware build.
Phase 2 System integration.
Phase 3 Demonstration to future employers.

Phase 1 Hardware build

The hardware build will be completed in the fall term. It will fit within the CENG Project maximum dimensions of 12 13/16" x 6" x 2 7/8" (32.5cm x 15.25cm x 7.25cm) which represents the space below the tray in the parts kit. The highest AC voltage that will be used is 16Vrms from a wall adaptor from which +/- 15V or as high as 45 VDC can be obtained. Maximum power consumption will be 20 Watts.

Phase 2 System integration

The system integration will be completed in the fall term.

Phase 3 Demonstration to future employers

This project will showcase the knowledge and skills that I have learned to potential employers.

The brief description below provides rough effort and non-labour estimates respectively for each phase. A Gantt chart will be added by week 3 to provide more project schedule details and a more complete budget will be added by week 4. It is important to start tasks as soon as possible to be able to meet deadlines.
RGB LED(s), microphone, speaker, motion sensor, light sensor, raspberry pi, arduino

Concluding remarks

This proposal presents a plan for providing an IoT solution for Allow parents to monitor their baby's well being with one device through an app. The app will allow various adjustments the Lumi monitor, they can listen and see if the child is awake, and play music to relax the baby.. This is an opportunity to integrate the knowledge and skills developed in our program to create a collaborative IoT capstone project demonstrating my ability to learn how to support projects such as the initiative described by [3]. I request approval of this project.

References

[1] Ehara, R. (2015, January 6). Listnr: Your Listening Assistant. Retrieved from https://www.kickstarter.com/projects/797220287/listnr-your-listening-assistant

[2] Institute of Electrical and Electronics Engineers. (2015, August 28). IEEE Xplore Digital Library [Online]. Available: https://ieeexplore.ieee.org/search/advsearch.jsp

[3] M. P. Joshi and D. C. Mehetre, "IoT Based Smart Cradle System with an Android App for Baby Monitoring," 2017 International Conference on Computing, Communication, Control and Automation (ICCUBEA), Pune, 2017, pp. 1-4.

doi: 10.1109/ICCUBEA.2017.8463676

URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8463676&isnumber=8463637