

METU CENG491 2015 FALL

START-UP DOCUMENT

UID : G02P52

Group Name : *Team Rocket*

Project Name : *Non-contact Baby Monitoring System*

1. System Architecture

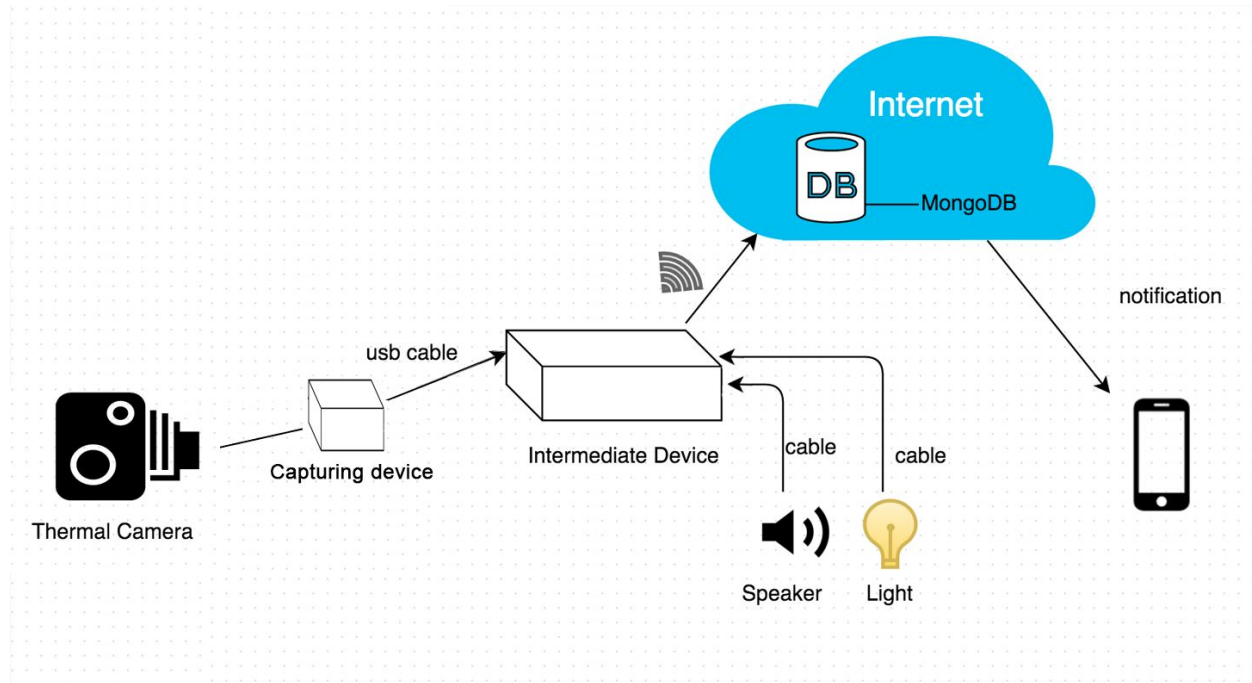


Figure 1 : Component diagram of the overall system

Description of the components:

Thermal Camera : The thermal camera is the component that provides data to us. We analyze the images from the thermal camera. The camera is OPGAL's GILBOA which is a high-performance uncooled camera based on VOx or ASi microbolometer in a variety of FPA and pixel size. The resolution of the camera is 640x480. The pixel size is 25 μm . We can get the body temperature of babies easily. Additionally, we obtain the sleep cycle, respiration rate and heart rate information just analyzing thermal images.

Capture Device : The thermal camera provides analog video output. That's why we use a capture device that is a video-to-USB converter. The device is DFG/USB2PRO.

- Composite video inputs: 1
- Y/C inputs: 1
- Bus: USB 2.0
- Video Format : PAL/NTSC, RS-170/CCIR

Intermediate Device : We use Raspberry Pi 2 Model B as an intermediate device. It is the second generation Raspberry Pi. It has an ARMv7 processor, it can run the full range of ARM GNU/Linux distributions, including Snappy Ubuntu Core, as well as Microsoft Windows 10. We will connect speakers and light to it.

Internet : The communication between Raspberry Pi and mobile is made through the Internet. We store the data related to the analysis of baby's sleep on cloud so the Internet is one of the key component of our system.

Database : We planned to use MongoDB which is suitable to use with Raspberry Pi. It is noSQL database and it supports dynamic queries on documents using a document-based query language that's nearly as powerful as SQL. It is easy to scale and it uses internal memory for storing the working set, enabling faster access of data.

Speaker and Light : Speaker and light are used depending on baby's sleep. We play music and use light to make babies' sleep better by creating a favorable environment. We haven't decided to use which speaker and light.

Mobile device : We provide this project including its mobile application. We are planning to develop an application for both ios and android.

Description Of User Interaction Model:

In this project, users interact with the system using by mobile application only. They can observe vital signs mentioned in the project. User-friendly interface will be designed to facilitate the using of application for people who are not familiar with technology.

The system notify user when extreme changes happen via mobile application again. Threshold for changes can be determined by users. Furthermore, users can get statistics that are formerly saved in database for each baby.

Overall system with all components can be executed by “switching on” concept only. In other words, users do not have to have detailed technical information about other components to execute system(how intermediate device sends data etc.)

Intermediate device(i.e. Raspberry Pie 2 Model B) process all data autonomously. Users do not have to how intermediate device works and what it is.

Speaker and light components are also do need intervention of users. They get command from Raspberry Pie directly when required.

As a result, system is closed to user intervention. The system interacts with users and serves data using by mobile application only.

2. Tentative Time Plan

TaskID	Short Name	Description
T1	Thermal camera	Completing the installation of the thermal camera and learning it's software.
T2	Dataset	Capturing a dataset using thermal camera to work on.
T3	Image Enhancement	Application of image enhancement techniques as preprocessing steps to ease the next operations.
T4	Body Temperature	Determining the body temperature of the baby.
T5	Sleep Cycle	Determining the sleeping habits of the baby.
T6	Respiration Rate	Determining the respiration rate of the baby.
T7	Heart Rate	Determining the heart rate of the baby.

	Iteration1	Iteration2	Iteration3
T1	■		
T2		■	
T3		■	
T4		■	
T5		■	■
T6		■	■
T7		■	■

3. Deliverables

Deliverable	Description	When? (Sprint#)
D1	Capturing dataset, and preprocessed images that are gained using image enhancement techniques and suitable to use in the next steps of the project.	Sprint - I
D2	A working algorithm that calculates the body temperature of the baby accurately.	Sprint - II
D3	Some implementation for determining the sleep cycle of the baby and it's heart and respiration rate as far as possible.	Sprint - III

4. Workload Distribution

	Sprint - I	Sprint - II	Sprint - III
Cansu YILMAZ	T1, T2	T3, D1	T6, D3
Damla Ezgi AKÇORA	T1, T2	T3, D1	T6,D3
Demet Sude SAPLIK	T1, T2	T3, D1	T5, D2
İlker BOZCAN	T1, T2	T3, D1	T4, D3