



## Introduction

At Baby Rock, the current project is a Smart Baby Cradle System. The Smart Baby Cradle is a baby-care system that will provide a safe cradle for baby and allow wireless remoting to monitoring and comfort the baby. Parents can use a smartphone app (Android application) to control the system, including rocking the bed, speaking to baby, turning on the toy and seeing the baby. The main components of the project are Micro-controller (Arduino Mega), Wi-Fi module shield, router, webcam, stepper motor, microphone and mobile toy. This document will discuss the progress of the project to date and state any issues or current schedule slippage regarding the design.

## Schedule

The following is our original schedule:

- Jan 5 – Jan 12: one week to brainstorm and decide our final project topic
- Jan 12 – Jan 20: decide what components that we need (High Level)
- Jan 20 – Jan 27: do research to analyze our component requirements, such as what type of component we need, what voltage power the component need for running and whether the components are compatible...
- Jan 27 – Feb 5: make orders based on our budget and funding (we are at the middle point of this and the next process)
- Feb 15 – end of Feb: do the components connection and data communication testing. For example, we have to make sure that the Wi-Fi shield is connected to the microcontroller correctly and the microcontroller can talk to the device through Wi-Fi successfully.
- Mar 1 – mid of Mar: mechanical design
- Mid of Mar – end of Mar: phone application design and test

Right now, our project is in mechanical design and data communication testing. It is a little bit behind our original schedule due to some unexpected issues which will be described more clearly in remediation section in this written progress report.

## Financial

The total funding, we received is \$300.

*Table 1 expenditures to date*

Components	Budgeted	Actual ( to date )	Remaining
Baby Cradle	\$95	\$25	\$70
Stepper Motor	\$105	\$38	\$67
Micro-controller	\$34	\$68	\$-34
Camera	\$32	\$43	\$-11
Microphone	\$19	N/A	\$19
Speaker	\$6	\$6	\$0
Wi-Fi Module	\$76	\$15	\$61



Mobile Toy	\$10	N/A	\$10
Casing and Others	\$75	\$15.7	\$59.3
Total	\$452	\$210.7	\$239.3

## progress

### 1. Mechanical Design

In order to attach the stepper motor to the cradle bed through belt transmission, the shaft has to be extended to achieve more space for assembly. Hence, a long piece of stick was already reduced with sand paper to its proper size. This shaft had been glued to the bed to become one whole set to receive rotation torque from motor leading the entire bed's rock.

Furthermore, a base has been created to hold all electronic component such as microcontroller, module shield, which all of them could not be touched by children since the base is hidden beside the bed. A piece of thin square wood raw material was bought from Home Depot and cut as measured by electric saw as we demanded.  $\frac{3}{4}$  inch nails and glue were also used to attach this base perfectly to the two cradle feet stably.

### 2. Motor

The motor has been tested with the raspberry pi. We are able to control how many steps the motor take through a motor controller that is controlled by the raspberry pi, as well as the Arduino Mega. The gears for the motor's have been made. We are using a 10 to 1 gear ratio to rock the cradle. We need to get a belt that fits in between these gears and attach it to the Cradle.

A standalone start-up app needs to be made for the raspberry pi so that the android app can access it. Communication between the raspberry pi and android phone still needs to be established.

### 3. Data communication

The Arduino micro-controller can talk to camera, microphone and speaker by cables. We tested the data transmission between the Arduino Mega and other electronic components separately.

For webcam, we have tested the video signal and set it up with accepted video resolution and delay. All video streaming data can be sent to the controller though serial port. The controller can send those data to the Wi-Fi server shield for further transmission to the smart phone.

In addition, we set up the Wi-Fi server module for the Arduino Mage board. We tested the Wi-Fi connection between the server shield and the phone. The phone can find the Wi-Fi station and join in.



Our next step is to combine all components together and do integrity test. We need to test if the phone can receive the data from webcam, microphone and speaker though the Wi-Fi environment.

#### 4. Phone application

Phone application development will be our main task in the future. We need to program the application including a video signal decoder in order to translate the digital signal to visible video.

We are going to use Android Studio as our development tool.

### Remediation

We had to deviate from the planned schedule a bit because of the delay in time receiving the parts due to them being ordered overseas. So we started to the project later than anticipated. We also determined that the Arduino Uno will not work for multiple modules, and we ended purchasing an Arduino Mega.

Everything is in development simultaneously and we are aiming to finish the project as soon as possible, giving us enough time to thoroughly test the project before the demo.

### Conclusion

Our company, Baby Rock promise to provide a safe cradle with high quality for baby and allow wireless remoting to monitoring and comfort the baby. The Smart Baby Cradle is the baby-care system to offer the solution to all the problems.

The working progress of our project is on track and undergoing quite well on all fields, mechanical design, motor design, data communication, software application development, simultaneously by all four of our engineers. Therefore, the project could be successfully finished in a high quality standard as our schedule indicated.