ABC: A Better Crib

Team 11, Calvin University, Grand Rapids, Michigan

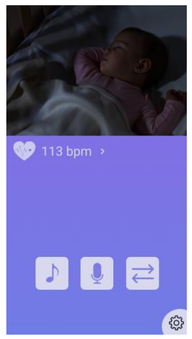
Overview

ABC reimagines a baby crib with four goals: safety, affordability, accessibility, and sustainability. As a smart-crib, ABC is an app-controlled system that helps a baby sleep and ensures safety through in-app monitoring. ABC is designed inexpensively as well as for wheelchair users and those with mobility issues to be accessible to more users. ABC is also sustainably designed as a Greenguard Gold Crib and BIFMA Level 1 product.

Mobile Application

The mobile app allows the user to interface with the crib and is designed to be:

- User-friendly
- Secure
- Aesthetically pleasing



The app uses visuals as much as possible. For example, color is used to warn the user if the baby's heartrate is too high.

User passwords are stored in a database using the secure Argon2 hash, and control of the crib's features is limited to those authorized by the primary user.

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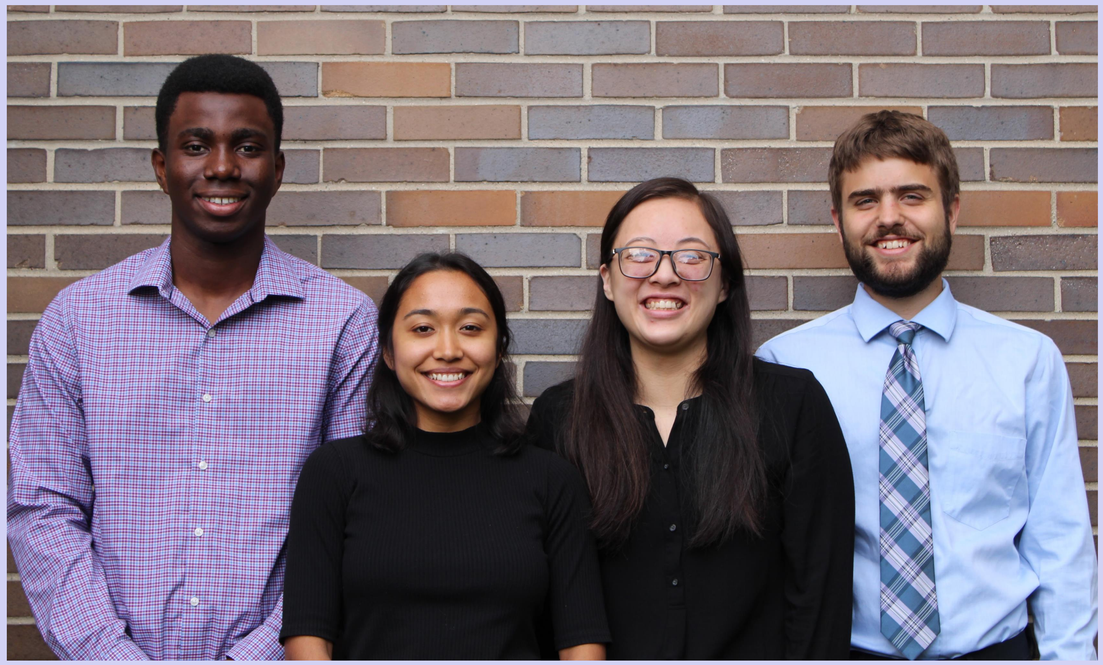
Family, friends - our inspiration and encouragement

Our Team



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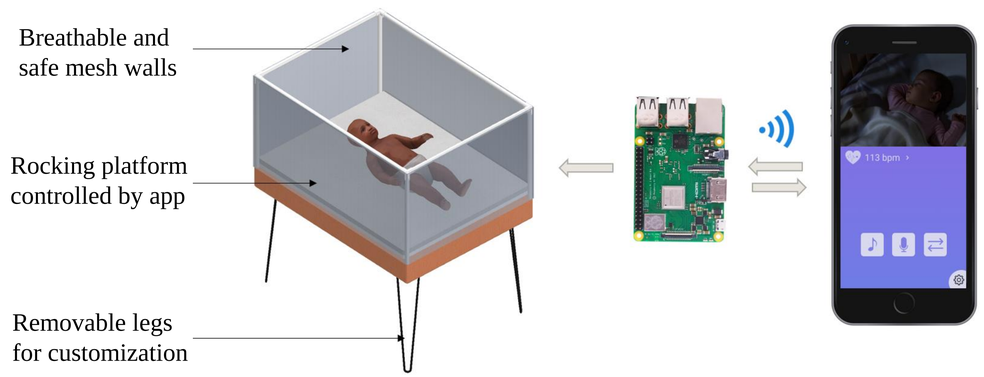
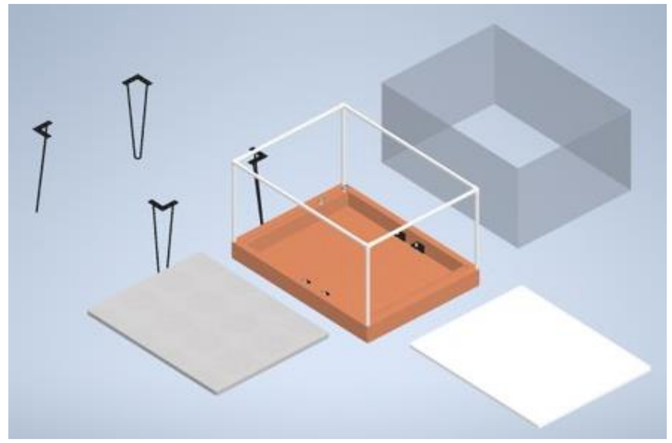
Our Design



ABC uses mesh walls to eliminate hazards with traditional crib-bars and hairpin legs for customizable crib-height. The crib's electronic features, like the rocking platform, are controlled with the mobile app through a Raspberry Pi over a Wi-Fi connection. App-monitored features include a rocker and speaker to help the baby sleep, an infrared camera and microphone for live video and audio feeds, and a heartrate monitoring system.

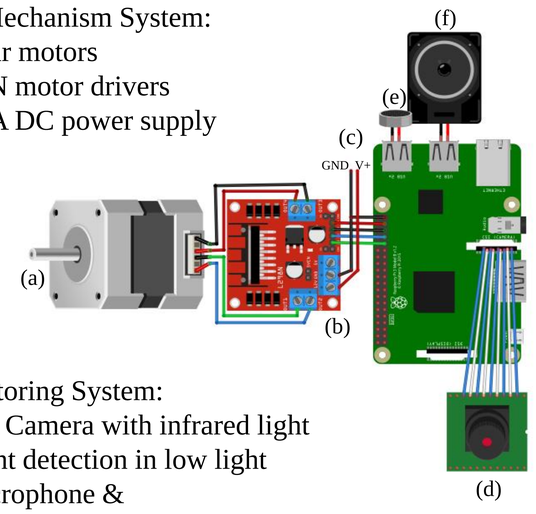
Mechanical Features



The crib is sturdy and lightweight, with a plastic frame supporting the mesh walls. The mattress rests snuggly between the mesh and on a wooden plate, designed to smoothly rock a baby to sleep, which rests on the wooden base in which the electronics are safely housed. The steel hairpin legs are designed to be easily exchanged to accommodate users with various physical limitations.

Electronic Systems

Rocking Mechanism System:
a) 2 Bipolar motors
b) 2 L298N motor drivers
c) 12V 10A DC power supply



Baby Monitoring System:
d) Pi NOIR Camera with infrared light movement detection in low light
e) USB microphone &
f) USB speaker for two-way communication