

## **Design Brief**

**School: Costa Mesa High School**

**State: California**

**Division: High School**

**Team Members' Names: Sophia Catania, Lucero Islas, Lena Nguyen**

**Project Title:** Readers should have a glimpse at what the project is about and want to read more. (25 word maximum)

TaskBug is a low cost-device with an accompanying app for parents to keep track of their children's daily activities when left without parental supervision.

**Project Purpose:** In one or two sentences explain what this project intends to do. (50 word maximum)

Due to varying circumstances, children are sometimes left home alone with minimal communication from their parents. TaskBug provides families with a low-cost, portable, and effective solution, letting children 12 and under notify their parents of task completion or any alerts through our device to our app.

**Abstract:** Briefly describe the people who will benefit from the project and the challenges they face. Include any inequity that the project hopes to address. (100 Words Maximum)

As exasperated through the COVID-19 pandemic, children growing in isolated environments may experience adverse effects on their mental health and development. This occurs more so in families, especially those in lower socioeconomic levels, where the parents often work all day to take care of their families and cannot afford as much quality time with their kids. This may impair their academic achievement and socioemotional development. Children require monitoring and care, and TaskBug relieves some of the everyday challenges faced by working parents, including reminders to complete tasks and to track such activities.

**User Research:** Discuss key information about the users gathered through your research, interviews, and ongoing discussion with the user throughout the project. What did you learn about the user and the barriers they face? (200 word maximum)

As working parents, our clients cannot always be present for their children. Whether that means leaving them with other family members or caretakers, the anxiety felt by both parties can be extreme and can affect developmental factors. Found in a study by the *Society for Research in Child Development*, parents “wield considerable influence on children’s development as children progress through school.” Leaving children unsupervised can lead to greater fear, stress, loneliness, boredom and risk of involvement in accidents, victimization, and dangerous/delinquent behaviors. A study published in the *National Library of Medicine* found that it increased risk of inattentiveness/hyperactivity, conduct problems, and negatively affected interpersonal relationships. Other worries were brought up, such as proper nutrition for children, especially in low-income families. A study done by BioMedCentral found that they are associated with poor quality dietary intake, compared to higher-income individuals.

To improve behavior and reinforce good habits, we researched behavior modification. One way is positive reinforcement (the addition of rewarding stimuli to encourage wanted behavior), which we wanted to focus on to build good habits within kids and make it more enjoyable for them to complete tasks.

**User Insight:** Discuss your team’s understanding of the experiences, emotions, and motivations of the users. This insight should inform the rest of the project and help the reader have a deeper understanding of the inequity of the user. What did you learn about how the barriers affect the user? (200 word maximum)

As we’ve developed this device, parents, especially those who work full time and have to leave their children alone, have given us key insight into the users’ needs. Not all children, especially those in elementary and middle school, have access to personal cell phones whether due to lack of financial stability or parents’ mistrust. Initially, our main objective was targeting education and nutrition barriers, but through further discussion with our clients through surveys and interviews, we learned more about the adverse effects of leaving children unsupervised. Some of the main concerns were the effects it can have on mental health issues, increased risk of accidents, and developmental harm.

By creating a simplistic, kid-oriented, and easily-interactable device that can be controlled through a mobile app on the parents’ end, parents can play a more active role in their children’s development, a grave concern of parents. Starting off with a goal of completing a simple task can easily become a rewarding process, setting them up for social and academic success. While we are primarily targeting elementary school-age children, the device is customizable and can become more specialized as children grow and their needs change.

**User Needs:** Develop a specific list of the user’s needs produced from the user insight. What does the user want to help them with the barrier? (100 word maximum)

Our device needs to have the ability to be controlled remotely by parents, especially when they are away at work or for errands, in order to change priorities as they see fit during the day. The device also needs to be simple enough for young children to interact with, reducing the amount of buttons/screens/LED’s as seen fit . Since the device itself will mainly be used by children, we need a design that is safe and has protection from shocks such as dropage and water damage.

**Project Goals:** List project goals and describe how they are linked to and will adequately meet the user’s needs and address inequities and/or barriers faced by the user. What do you want the project to do to help the user? (100 word maximum)

TaskBug consists of two parts: a mobile app for parents to remotely monitor and change tasks as they see fit and a physical device designed for children to interact with and update their parents on their activities. The app can be accessible on multiple platforms, including mobile devices, tablets, laptops, and even public computers. Tasks are wholly customizable depending on the child, which translates to ease of additions of tasks onto the physical device. The plastic, shockproof shell has buttons and LED’s to indicate tasks and whether they need to be completed, which, when pressed, updates parents on accomplishment.

**Key Features of Design:** List key features, illustrating that the design will adequately meet project goals. How will the project help the user? (200 word maximum)

TaskBug is a simple, yet interactive device with an accompanying app that will allow for communication between the parent and their child, with the intended age range being 5-12. Our device consists of a NodeMCU, a low-cost open-source IoT platform, connected virtually to the Blynk app through a WiFi connection. The wifi connection connects through both private and public networks, making the app and device seamlessly connect anywhere a parent (or child) may be. Four different colored LEDs (blue, green, red, and white) and four corresponding buttons are wired through the NodeMCU in our base model of two tasks and two alerts, which can be customized by the parent based on their individual child’s needs. Once the child has finished their tasks, they communicate this to their parents by simply pressing the corresponding button to turn on the corresponding LED, which would then update on the Blynk app interface through the parent’s phone, even while parents are away from the app. We also included a MQ135 gas sensor that detects ammonia, sulfur, carbon dioxide, and other harmful gases and smoke, alerting the child by the high-pitched buzzer and turning the emergency trigger on, sending a notification to parents.

**Impact:** Discuss how design addresses inequities for the user and/or removes barriers. Input from users should be included. Does the project help the user? How? (200 word maximum)

A recent U.S. Census report shows 7 million children, between the ages of 5 to 14, are left unsupervised. According to the National Survey of America's Families (NSAF), 12% of children who come from low-income families are left unsupervised. Single parents are one of the most disadvantaged groups in the U.S., with nearly 30% of these families living under the poverty line. About 4,800 burglaries happen every day and with higher criminal rates in lower income communities, it puts our children who are left home alone at a greater risk of endangerment.

By interacting with the device, parents expressed they felt at ease knowing their children were safe at home following the instructions and precautions given by them. With the TaskBug, we are giving parents the ability to work and support their families without having to leave their children unsupervised, minimizing the worry parents have while working and bridging communication gaps between them and their children.

**Status of Project:** Describe the current status of the project, including feedback from users, and discuss potential next steps. What does the project do now? What would you like to work on in the future? (200 word maximum)

At this stage, TaskBug is both a physical device for children to report task completion through its simple design to their parents via the fully-functional app. This truly allows for connection and greater parental involvement across physical barriers.

In the future, we hope to include more features to further the scope of supervision. For example, many parents expressed that their children take some form of medication or supplements. Therefore, we could include an automatic, child-proof pill dispenser that would operate on a timer system controlled by parents. We also plan on incorporating long-term data tracking to better inform parents of their children's behaviors over time.

For children, we plan on including a screen so they can see what task they are completing/need to complete, and allow parents to send messages through the screen to make the device more interactive for children. We also want to broaden the scope of the design to make it more inclusive for a larger age, such as teenagers, that can adapt and grow with them.

**Reflection:** Show that the team has an increased understanding of human-centered design. Examples of personal growth and insights gained about designing for others and helping them overcome challenges should also be included. What did you learn during this project? (200 word maximum)

By focusing on designing for equity in terms of child care, we were personally able to connect with parents and supplement our interviews with research. We discovered the vast effects that isolation can have on child development, and the importance of the presence of parent figures in the growth of a child. Although we wanted to primarily focus on educational and nutritional needs, we decided to redirect our mission to facilitate children's self-accountability and monitored habit building. This was the main concern of several parents we interviewed, prompting us to emphasize the customizable aspect of our device for the needs of each individual child. Since TaskBug was not only developed for parents' sake, but also for children, we learned we had to delicately balance the needs of children versus the needs of parents. As students ourselves, we understand the value in parent involvement and discipline. We used our own perspectives and past experiences to be able to connect and relate to each of our users, and their feedback gave us insight on not only ways to improve our device, but the various forms in which groups of children face inequities.

**Prototype Graphic:** A single graphic with key features adequately labeled. It should be easy to understand and the reader should have a general understanding of how the prototype functions by looking at the graphic.

