

1. PROBLEM STATEMENT

The KidGuard is a senior design project to ensure the safety of children in hot cars. Extra safety measures are needed to alleviate parental pressure.

1.1. Need Statement

A car seat's functionality can be beyond protecting a child from vehicular accidents. Hot cars can threaten babies and toddlers alike during the day. According to CNN, since 1998, more than 818 children have died from pediatric vehicular heatstroke, and more than 38 die each year on average from being left in a hot vehicle in the United States [1]. Watchful Dad [2] describes valuable ways to remember that a child is in the car, but they can only help so far, as routines can always be broken by something unexpected. Monitors can detect a child in the car. However, a monitor that merges multiple functions like temperature monitoring and cooling into one device would reduce item management. A seat that fulfills all requirements would cut down on devices and smartphone applications to safeguard children.

1.2. Objective Statement

The KidGuard is a car seat add-on that attaches to a child's car seat, making parents feel more at ease. The device uses a weight detection system and a thermometer. The weight detection senses if a child is in the car seat, and the thermometer monitors the vehicle conditions. The KidGuard communicates with an app on the parent's/guardian's smartphone. The app alerts the user that the car seat is still in use and the inside of the car has reached an unsafe temperature. The user can monitor their child's well-being for peace of mind.

1.3. Background and Related Work

The KidGuard core features are to detect the baby in the car seat and sense the vehicle's temperature. National Highway Traffic Safety Administration, NHTSA, states heatstroke occurs at 104 degrees and death at 107 degrees [3]. Furthermore, an app transmits the readings to a guardian's phone if the child is alone in the car. Competing safety systems include alarms that remind consumers to retrieve their child, a mirror on the baby seat to watch the baby and apps that act as reminders. The limitations are that some people enter the store momentarily and must realize the car's temperature. These implementations are reminders to get the child from the car, and the KidGuard is an emergency alert to display the danger to the child. The only similarity is that KidGuard has an app, but these apps serve different purposes. Car seats also try to ensure safety with other smart features that cost hundreds of dollars. Whereas, the KidGuard is affordable and attaches to any car seat. For example, Doona SensAlert is a patented technology that fits on most car seats and helps prevent heat stroke fatalities. This product retails for \$99[4], and it detects if the child is in the car whenever the guardian leaves. This device only detects the baby instead of the temperature.

1.4 References

[1] S. Andrew and A. Willingham, “More than 38 kids die in hot cars every year, and July is the deadliest month,” CNN, <https://www.cnn.com/2019/07/30/us/hot-car-deaths-child-charts-graphs-2019-trnd/index.html> (accessed Feb. 8, 2024).

[3] Watchful Dad, “How to never forget your baby in the car,” Watchful Dad, <https://www.watchfuldad.com/never-forget-your-baby-in-the-car/#:~:text=How%20to%20Never%20Forget%20Your%20Baby%20in%20the,Driving%20With%20Your%20Baby%20...%206%20Conclusion%20> (accessed Feb. 8, 2024).

[3] “Heatstroke,” NHTSA, <https://www.nhtsa.gov/campaign/heatstroke#:~:text=When%20a%20child%20is%20left,body%20temperature%20reaches%20107%20degrees.> (accessed Feb. 8, 2024).

[4] L. Levy, “Doona’s car seat alarm can help prevent hot car deaths,” Parents, <https://www.parents.com/doona-sensalert-alarm-7501291> (accessed Feb. 8, 2024).