Project Title:

Artemis Child Safety Seat

Project Concept: Provide us with a brief summary of your project.

Artemis is a "smart" car seat that helps prevent harm to children from being left in the backseat of a vehicle. Artemis will work with the vehicle’s diagnostic system to detect when a child is in an unsafe situation, and will alert the driver or nearby people to the situation. The solution consists of two basic components: the car seat component and the vehicle diagnostic component. The car seat component includes a portable, universal-fit pressure sensor that monitors the presence of a child in the seat. The vehicle diagnostic component contains an embedded computing device, running our custom software, and connector to the vehicle’s On-Board Diagnostic (OBD-II) port. Our software will respond to the state of the vehicle and car seat, and command vehicle actions such as beeping the horn, flashing the lights, and rolling down the windows to draw attention to the forgotten child.

Problem: Provide us with a detailed summary of the specific problem you are looking to solve.

This project addresses the issue of child welfare in situations where a child may suffer from heat stroke or hypothermia. Studies have shown that the majority of cases where children have been victims of these conditions are caused by forgetfulness, not neglect, on the part of the parent. Our solution aims to address the problem of parents forgetting that their child is with them and leaving the vehicle. By detecting when the driver has left the vehicle but the child safety seat is still occupied and alerting the driver, we hope that these situations can be avoided.

Opportunity: Demonstrate your knowledge of the actual opportunity associated with your project. This includes numbers and market research/data on how many people are affected by the problem you stated in Section 1. Clearly discuss any research you conducted, including:

* Data on real-life people/customers you have talked to, interviewed, and/or surveyed who are actually affected by the problem or could benefit from your proposed project solution that you stated in Section 1 (e.g. 10 doctors about a new medical device)
* Is there another organization(s) or business(es) doing something similar to your project? If so, who are they and what are they doing similarly?
* Online research, numbers, databases and articles you found that supports the need and demand for your project
* Why is your project better/different than there’s? (Competitor Analysis)

Our user base and opportunity to have an impact in the childcare market is extensive namely because Artemis focuses on child safety. Based on a study performed by the University of San Jose Department of Meteorology and Climate Science, between 1998 and 2016 there were 702 child deaths in the United States as a result of heat stroke (averaging 39 deaths per year). Over 82% of those deaths were preventable with parental/caregiver intervention.

We conducted a poll of 10 families that do not utilize a “smart” car seat. When asked why they do not utilize the device, 7 stated they did not know any type of technology existed, 2 stated they would not forget their child in their vehicle, and 1 family stated they believed it would be too expensive to use. Our intentions are to reach out to local Police and Fire Departments for community outreach to bring our product to the forefront of parents’ minds.

The United States Department of Transportation (USDOT) conducted a survey into the market of “smart” car seats. They reviewed 7 different technologies that claim to remind parents and caregivers a child has been left behind within a vehicle. These technologies primarily utilize direct sensors (a pressure pad that senses a child is in the child restraint seat) indirect sensors (a front chest clip that when clipped signifies the child is in the seat). These technologies all differ in their notification system; sending a notification to the parent/caregiver on their smartphone or an audible sound. As a result of this study, the USDOT developed several best practices of “smart” child restraint seats:

- No effect on child restraint seat crash performance

- Minimal additional action from driver/parent to operate following initial installation

- Provide feedback to user to indicate functionality

- Provide end-of- trip convenience reminder and left-behind alert

- Incorporate fail-safe features

- Robust operating capabilities – battery life, temperature range, appropriate child size

It is based on these best practices that we have developed a solution that taps into an under-utilized resource: the On Board Diagnostics (OBD) sensors within the vehicle. Please see our Solution section.

Describe the solution you are proposing to the problem you addressed in Section 1. Please support your claims.

* Clearly describe your proposed solution (e.g. low cost prosthetic limbs)
* How does this specific solution solve the problem you stated above?
* How is your solution new, innovative and/or unique?
* How will your solution be sustained over time? Please provide details and be clear. (e.g. Will you work on it after you graduate? Pass it off to someone else? How will your idea continue on in the years to come?)
* What stage of development is your project in? (Idea stage, prototyping/testing stage, raising funds stage, ready to launch stage)
* Why is your project valuable? What value does your solution provide? To who? (Value Proposition)

Our solution is a system that can communicate with a vehicle’s OBD-II port and obtain input from a child seat occupancy sensor that can be universally installed on all car seat models. This solves the problem of children being left in hot cars due to the parent forgetting that the child was in the vehicle with them by alerting the parent that the child is present when the system detects that the vehicle is occupied by only the child. This system is innovative for several reasons. The current solutions fall into three classes: mobile proximity alert technologies, smart car seats, and vehicle manufacturers. Our solution combines aspects of all three of these classes by having a system which universally integrates with modern vehicles AND car seats, and provides the alert functionality that the mobile proximity technologies implement. In addition to differentiating our solution via the combined functionality, we also aim to compete on cost. The mobile proximity alert technologies are often cost effective, or even free, via mobile applications and cheap hardware but often do not target the problem of child presence, rather they alert the parent whenever they leave the vicinity of their vehicle, whether a child is present or not. The smart car seats are specifically tailored to the issue of parents forgetting children in the vehicle, however they carry a hefty price tag. The vehicle manufacturers’ solution is to embed sensors in the vehicle and use vehicle actuators (lights, chimes, horn) as an alert mechanism, but that is in no way specific to children occupying the backseat – any object with significant weight could set off that alert.

Our solution is currently in the prototype stage. We are trying to secure DifferenceMaker funding to purchase the necessary hardware to build our prototype.

We are still working on our exit strategy. Part of our approach is to engage with local police/fire departments to evaluate how best to reach the community. We currently have identified two paths and are consulting members of the business department to decide between the two approaches. The first is to prototype this technology and market it to car seat manufacturers, while the second is to develop an operational product and compete directly in the market.

Resources: Demonstrate why you need funding from the DifferenceMaker Idea Challenge.

* How much funding do you require to implement your project?
* How much time will you and your team members commit to your project after the Idea Challenge?
* How will these DifferenceMaker funds be used to support your project?
* Please provide an estimated budget for use of DifferenceMaker funds from May 2015-2016.

At this stage, we are asking for a modest amount of funding to implement our prototype. We are requesting funding in the amount of $500. This amount covers the estimated cost of computing devices, connectors, and sensors that our prototype requires. The breakdown of cost is as follows: $70 for two RaspberryPi 0 Starter Kits, $60 for one OBD-II UART and OBD-II to DB9 cable kit, $20 for two load sensors, and $60 for a carseat for a grand total of $210 to build one prototype (this estimate does not include tax or shipping & handling). The remaining funds may be used for incidentals, such as any additional cables/connectors, battery packs, sensors, or radios we may need. We estimate that the total cost of materials for a single prototype should not exceed $250, in which case, we’d have enough funding to build two prototypes, one for development and one for operational use and research.