

# PROJECT EMAR SOCIAL ROBOT DESIGN CHALLENGE: DIRECTED RESEARCH GROUP(DRG)

## **Project EMAR**

Project EMAR is a National Science Foundation funded project and an interdisciplinary endeavor to investigate and effectively measure teen stress. The focus of the Ecological Momentary Assessment Robot or EMAR is to exist in high schools with the purpose of understanding and managing teen stress. The project is made up of a cross-campus team of researchers from the University of Washington, based out of the Tacoma and Seattle campuses. The project leads are Dr. Elin Björling, an HCDE stress researcher studying adolescents, and Dr. Emma Rose, UW Tacoma Assistant Professor of Writing Studies and UX research. For more information: <http://blogs.uw.edu/emar/>

## **DRG Objective**

To provide outreach education and support to groups consisting of high school teens as they develop a deeper understanding of and navigate the HCD processes: develop prototypes, evaluate the emerging designs with users, and iterate based on feedback. This will culminate on March 24th 2018, where these groups will take part in a Social Robot Design Challenge showcase at the Seattle UW campus and they will present their designs to the public as well as a panel of experts from the industry. At this showcase the DRG team will collect data for the upcoming quarter where the team will focus on qualitative data analysis in their efforts to design a social robot for teens. This data will help the Project EMAR team make decisions about how the robot will move, what it will say, and what it might look like. By having teens design a robot for themselves the team will be able to gain insight on what choices the teens made and why. For more information: <http://depts.washington.edu/designme/>

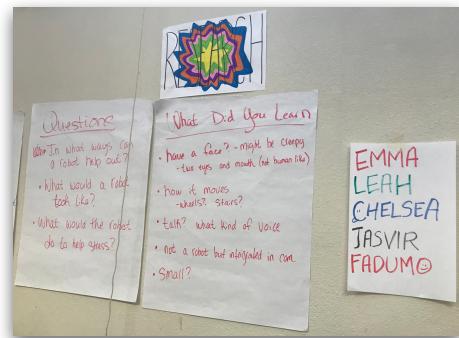
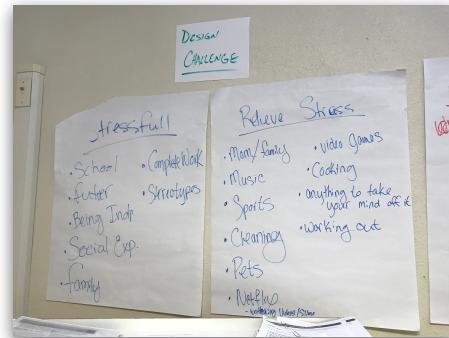
## **Project Outline**

Leah and four DRG teammates facilitated the design challenge through weekly outreach workshops at Oakland Alternative High School in Tacoma, Wa. In preparation for the weekly workshops Leah developed PowerPoint presentations on various HCD topics to be covered, and each week she would steer the team to focus on a different step in the process, to ensure a holistic view of the HCD process. The processes are broken down below.

- User Research: Focus on researching what participants and other Oakland students would look for in a stress relieving robot
  - Ideation: Brainstorm many different ideas that will focus on the features and constraints of the robots
  - Prototyping: Bringing designs and ideas to life
  - Testing: External prototype testing and feedback reception
  - Iteration: Make necessary adjustments based off of insight provided from testing
  - Design Challenge Showcase: Collect data from the student participants
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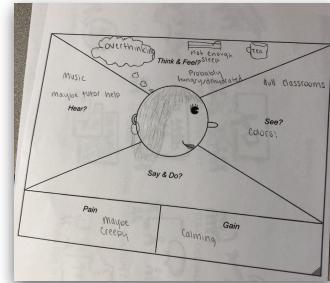
## User Research

An icebreaker activity was initiated with the Oakland high school students asking them to share some of their loves for current technology as well as what were some of their frustrations. This activity opened the door for discussion on the overall topic of human centered design, but also narrowed down the conversation to the area of user research and why it is important to get quality research from a designated target group before setting out on a design. The students then watched a short video on research techniques before forming into their teams to begin the research phase. During this time Leah noticed that many students were unsure of the task on how to come up with research questions for the design of a social robot, in fact most students had moved on to something else such as listening to music, surfing on their phone, or just plainly taking a nap. The DRG team gathered for a discussion on this issue and a decision was made to switch gears from their plan. To gain some momentum it was decided that the students would brainstorm as a whole, where more ideas could be generated and there would be a greater chance for enthusiasm to build. While her teammates mentored ideas out of the students, Leah documented them on the white board paper so that they were visible to everyone. The questions the team asked were; "What stresses you out as a teen?", "How do you, as a teen, cope with stress?" and "What do you do to reduce stress?" The students came up with a wide variety of answers on how they deal with stress. A few of the popular answers were watching Netflix, listening to music, or just have someone to listen to them. Now that the students had a better understanding of the problem, the team went on to explain the steps on how do we use a social robot to solve this problem. The DRG team then had the students brainstorm some questions they might ask their fellow Oakland classmates on the topic. After the students had some time to formulate their research questions the DRG team went around and had the groups share out loud, and once again Leah transcribed them onto the white board paper to ensure a visual reminder of the research questions for the remainder of the semester. The team left the students with a task to design a feedback wall to place in a public space of the school for even more user research that could be used in the further phases of the process.



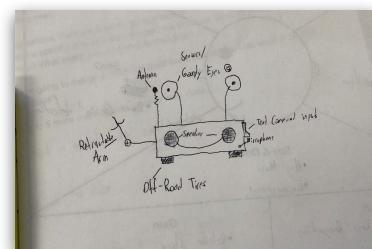
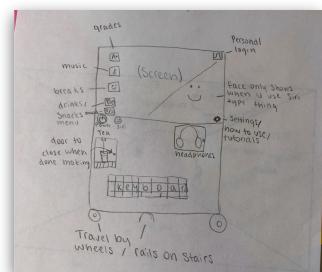
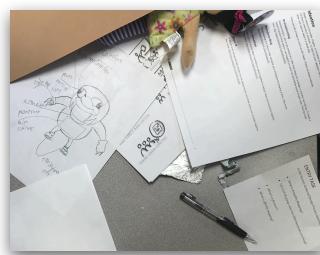
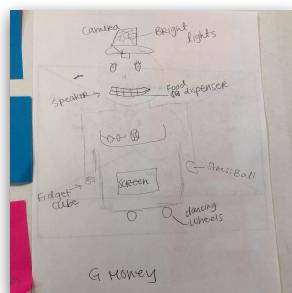
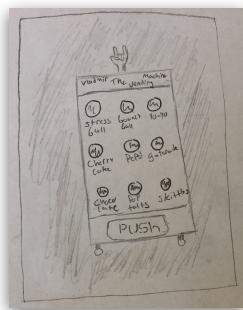
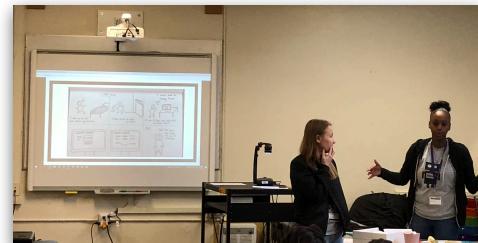
## Ideation

For this workshop Leah put together a set of PowerPoint slides that would highlight the Ideation section of the HCD process. A short video explaining what Ideation meant was played and a description of how the teens would use this step in the process of designing their social robot was briefed. The first exercise the teens took part in was empathy mapping; a way of brainstorming ideas and getting deeper insight into what the users might be seeing and feeling. The team used an empathy map that was originally created by Dave Gray and is popular with the agile community, a small example of one of the student's empathy maps is displayed to the right. The team also had the students make an affinity diagram, which is a method that helped the teens to organize their data into



groups or themes based on their relationships. The students grouped their robot features and constraints into columns and posted them in the classroom seen in the next two photos. The team also touched on two ways of sketching, either drawing your robot and its features or by storyboarding a scenario that your

robot would be in. Most of the Oakland students decided on drawing their robots with features. As Leah walked around the class room she noticed a recurring theme between the various robots; music, games, food, drinks, and grade monitoring were some of the popular stress relievers that the students wanted to integrate in their designs. Below are just a few of the student robot designs that were shared with the team.



## Prototyping

For the prototyping workshop the team once again utilized a PowerPoint presentation with a short video, but also included a few examples of different robot prototypes to help the students visualize the process and maximize their own time to prototype. The students formed back into their groups and began bringing their sketches to life. Although the team planned to only take one workshop day to carry out the prototyping phase they quickly realized it was not enough so Leah and the DRG team took advantage of the small window of time remaining before class ended for the day. They made sure that the students understood the purpose of their robot prototypes and briefly explaining the next step in the process, usability testing, and how they would test their robots on other high school students to manage stress. At this point the students expressed that they were getting concerned about what the other six schools were doing and that their robots would not be good enough. The DRG team tried to put them at ease by explaining that all the schools were bringing something special to the table, including them, and not to worry what everyone else is doing. Another day of prototyping had to be added and both Chelsea and Leah had to sit down with different groups to urge them along and get them back on track. The first robot pictured, "Super Cute", was the group Leah had been working with, and she assisted by dropping in bits and pieces of knowledge or materials to keep the creativity going. This tactic seemed to work well with her group. Below are a few of the other students in action creating their prototypes.



## Testing

Before testing, the team planned to have the students come up with three scenarios that their classmates would encounter in their school. This activity would be a crucial step for their usability tests. Though sounding fairly straight forward, the team realized quickly that this assigned task was not going as planned. They decided to switch gears again and Leah decided to sit down with the group that created "Knuckles", pictured to the right. There were three students in the group on this particular day. One student was still working on the baby monitor feature that they would eventually use with the "Wizard of Oz" technique to simulate the robot being able to hear, talk and play music. Another student was working on something unrelated and the third student sat and listened while Leah reiterated the activity instructions. Getting no feedback Leah threw out a few scenarios for the team to ponder, knowing that a classroom was going to be in shortly to test their robot prototypes. One of



these scenarios involved a student that loves music but is feeling stressed, which stirred the question of how to get Knuckles to play music and /or recognize the need to play music. She also made sure the group had a facilitator and a note taker assigned before the usability tests began. During this time the other classmates were interacting with each others groups robots, and the DRG team even got in on the action by testing the robot called "Happy" who was designed to take selfies similar to a photo booth, and even included props to use. As the workshop concluded, the team asked each group to share some feedback they received about their robot from the other classmates and what they learned from it. This

information would be crucial for the next step in the HCD process. Unfortunately, this was the teams last day with the Oakland students. Leaving the last step in the hands of Mr. Sibbers, the team was confident the Oakland students would finish and be ready for the showcase. Bill Sibbers, pictured to the right proudly showing off his classes robot prototypes. Robot names from left to right, Super Cute, Knuckles, Happy, Petunia, and Vladimir the Vending Machine.



## **Iteration**

The DRG team left the students with a set of instructions for the next step in the design process, iteration. They were to take the data from their usability tests and make adjustment to improve their prototype. Specifically, the DRG team asked the students to, as a group revise their notes from the usability testing session and identify at least three features that can be improved on their robot. When they have identified these features they will be able to make the necessary changes to their robot prototype.

## **Design Challenge Showcase**

The design challenge showcase will be set up like a science fair, during this time the student teams, one from each of the seven participating Seattle and Tacoma high schools will present their robots. The students will be asked questions about their robot prototype and will also discuss what they have learned from their experience with the design challenge in regards to teen stress and the design process. Leah will be in charge of the Oakland table and will be available to the students with any help or questions they might need or have. While the students are presenting, the DRG team will be documenting the data collected from the robot teams.

## **Final Thoughts**

The love for human centered design was what drew Leah to this project. In the end, the outreach education with the local high school ended up being the highlight for her. One significant takeaway from this project was while having a solid plan going into a workshop was a must, more importantly being able to read and adapt to the students was a necessity. Learning where that fine line between being patient and coaxing the teens to share their ideas was challenging. But most of the teens were receptive when team members would sit down with them to help out. With Oakland being an alternative high school in downtown Tacoma, teaching HCD was at times difficult as the class struggled with attendance. There would be new groups of students' in and out over the weeks, so having a set student team from the beginning it would have made teaching run smoother. Overall, the small group of students that were engaged throughout this process made the outreach education worth the struggle. Being able to see the students progress from the first meeting until the last, under all of the circumstances that these teens face was inspiring.

## **Up Next**

For the next quarter, outlined below Leah will be involved in the DRG data analysis from the showcase.

- Reading articles from scholarly and industry sources about how to approach qualitative data analysis.
  - Prepare data by transcribing videos collected during the design challenge showcase.
  - Collaboratively code the prototypes/designs and design rationales from the showcase to create memos.
  - Write up a list of recommendations/considerations for the robot design team.
  - Support project management of the design challenge and DRG.
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