

Reimagining Mobility with Interactive Audio Application, TingTing

Nancy Yang
UC Berkeley
Berkeley, CA
nancy_yang@berkeley.edu

Yifei Liu
UC Berkeley
Berkeley, CA
yifei.liu@berkeley.edu

ABSTRACT

We present *TingTing*, an interactive audio application aiming to enhance safe driving for parents while encouraging peripheral interaction with the child passengers. It focuses on the well-being of the family in commute both physically and emotionally. Our main feature contains 1) personalized radio-like audio content suggestion, 2) interactive stories that initiate conversation with kids, and 3) geolocation-based game to engage child passengers during the trip.

Author Keywords

voice user interfaces; voice interaction; parent; driving; children; content exploration; interactive; geolocation, storytelling

ACM Classification Keywords

Human-centered computing — Human Computer Interaction — Interaction techniques — Auditory Feedback

INTRODUCTION

A 2017 survey of over 1,000 parents showed that 51% of parents spend over 5 hours a week driving with their children and over a third of those spend more than 10 hours[1].

As the children grow older, they start to develop awareness and curiosity around their surrounding. Kids ask questions about things they encounter in everyday life. In the driving context, parents can be occupied with navigation while trying to have conversations with their kids. Children also have other unexpected needs like dropped toys that would require parent drivers' attention. According to the survey conducted by Safe Kids Worldwide with over 2,300 parents, 64% of the parents said they have turned around to tend to their child's needs while driving[2]. In addition, parents often have other mental and physical concerns like stress from work or sleep deprivation that influence their

driving. All of the different factors from stress to keeping children occupied and behave lead to distraction in driving.

Macy et al. found that “distracted driving activities are common among drivers of child passengers.” Distraction driving is considered dangerous for individual drivers and public health[4]. National Highway Traffic Safety Administration (NHTSA) estimated that distracted driving causes 8,000 crashes every day. Nearly 10% of new parents driving with baby on board have been in a crash, which is three times higher than general driving population and about as high as teenage drivers[2]. Moreover, 77% of the parents are more afraid of getting in an accident when driving with a baby. [3]

Macy et al. categorized various in-car distractions into four categories: 1) Non-driving-related such as eating and drinking, 2) Cell-phone-related such as texting, calling, 3) Child-related such as giving food to children, pick up dropped toys, and 4) Direction-related such as using electronic navigation system. They believed that “child passenger safety may be improved by preventing crash events through the reduction or elimination of distractions among drivers of child passengers[4].”

We designed TingTing to empower parents with more delightful and concentrated driving experience while the children can interact with kid-friendly audio content. “Ting” stands for listening in Mandarin. It is an interactive mobile application with voice user interface as the primary control and machine learning capability for relevant content suggestion catered to each individual.

In addition to having kid-friendly content, we also make it interactive. As more and more smart speakers like Alexa and Google Home become prevalent in house setting, NPR researched showed that 45% of smart speaker owners have children in their household. Among the smart speaker owners with children, about 60% indicated that the reason for having a smart speaker was to entertain children and 80% agreed that smart speaker had made entertaining kids easier in the house[5].

Why Audio?

Kids develop listening comprehension and oral expression skills before they can read and write. Listening to audio leaves out a lot of direct visual information like video will provide and makes listeners fill in the blank with their own imagination. The need to focus on audio content and respond to it can make listeners more engaged. [8]

Audio content can bond families together. Families can experience “communal listening,” by listening to content that will be interested for all age ranges of the family. Even if the youngest family member can not understand everything, the listening experience of a well-narrated story is helpful to cultivate listening comprehension skills. For example, audiobooks can be considered as a bridge to enjoy advanced content like literature that is beyond younger listeners’ reading level. [7]

Audio can reduce interface overloading. In our user interviews, parents mentioned that they are concerned about screen time for various reasons. Looking at screens in a moving vehicles for too long might cause carsick. Some interviewees are particularly concerned about their kids looking at screen in low lighting environment, which applies to driving at night time.

Last but not least, having hands-free control is optimal for both drivers and passengers. By providing young children the power to interact with TingTing via voice control could empower children to participate in addition to helping the driving parent stay focused. Parents still have control and screening of the content by listening together in the peripheral setting without the need to use their phones to make changes.

INTERACTION

TingTing is a children-centered product that engages kids with all the elements around them in the driving context. Parent will help their kids set-up profiles and TingTing can recommend content for the children later on. In the vehicles, kids can directly interact with TingTing via voice control and have conversations. Parents could participate in the conversations when they are available. In the driving context, TingTing will gather geolocation data and share trip information in an interactive game mode with the children in car. We will further discuss the three different use cases of TingTing.

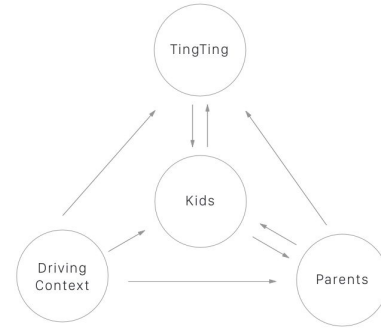


Figure 1. Relationship between the participants and TingTing.

Parent and TingTing: Content Suggestion

One of our main goals is to provide a better experience to listen to kid-friendly podcasts and audiobooks. As parents are often in time-constraint and expose to other distraction factors, we want to make the in-car use of the app simple. We design the app’s onboarding based on this goal. When users download TingTing, the onboarding process has two steps to assist parents to create profiles for their children. The first step is to understand how many kids they have and how old they are individually. When the parents have more than one child, having all their kids’ profile setup can help us better suggest different content for each individual and things that will be more suitable for all ages when multiple children are on board.

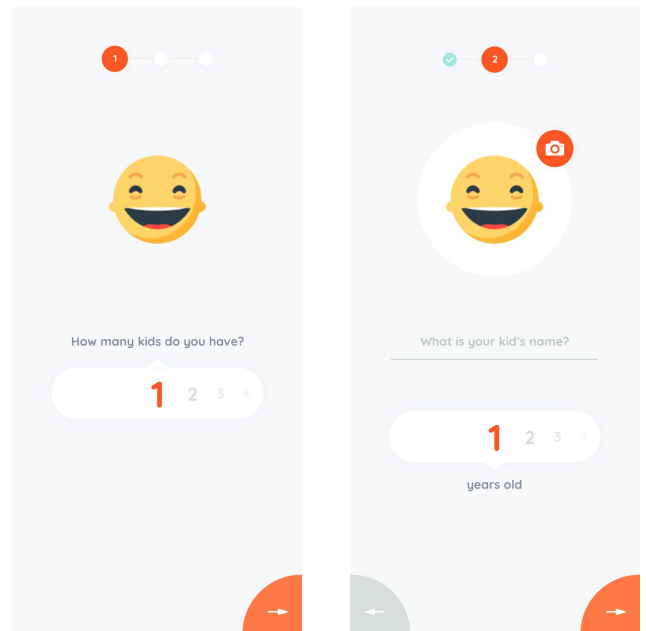


Figure 2. First step of onboarding.

The second step is to select topics preference. Parents can choose from categories like animals, fairy tales, food, transportation etc based on their kids' interests. After the onboarding, each kid will have his/her own profile. We can suggest relevant content from our curated kid-friendly content sources based on their ages and interests.

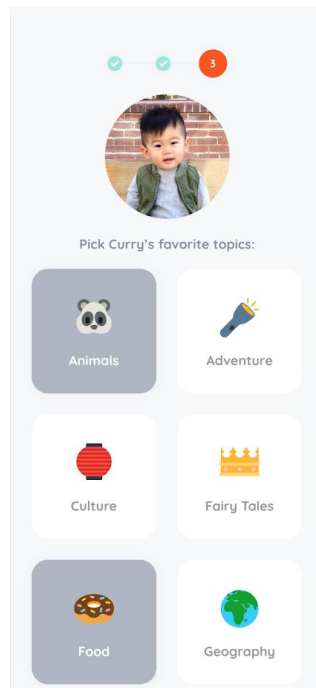


Figure 3. Second step of onboarding.

Our interviews and survey showed that kid podcasts are hard to find and set up. With TingTing, listening to podcast is going to be like radio-listening experience. When the parents open up TingTing in the car, we will verify which child is with the parent at the moment and we can start recommending podcasts or audiobooks.

TingTing and Kid: Interactive Audio Content

To enhance the listening experience for the children, we turn passive listening into active listening. After each podcast or audiobook chapters, TingTing will ask the kids some question related to the content. For example, after playing a book called "I'm new here", a book about new immigrant classmates overcoming fears and sadness in a new American school, TingTing can ask "do you know someone in your class that is not confident speaking English like Maria in the story? How would you help?" In the optimal situation, it will ask follow up questions based on the answer of the children.

The goal is to engage children in the story. From our survey, over 60% of the parents indicated that their children ask questions while listening to audio content. In the driving context, initiating conversations or answering questions can become a distraction for the driving parents. Having TingTing as an assistant to help initiate conversation alleviates cognitive overloading burden that leads to distracted driving.

Even though kids are the main consumers of the audio content in the car, parents are still in peripheral participation. Parents can still hear the content and even participate in conversation when available.

Driving Context and Kid: Geolocation Adventure Game

As kids get older, they started to get curious about their surrounding. During our user interviews, some parents mentioned that their kids start asking about information about the trips from time to destination to navigation routes. To the more extreme level, some parents call their kids backseat drivers. On one hand, It's great that curious children want to participate, on the other hand, however, when curiosity turns into a burden, both parents and kids can become unsatisfied with the trip.

We want to solve this problem by introducing "Go on Adventure" mode in the application. When the parent choose this mode, we will use the geolocation on the phone to start sharing fun places with the children. We will inform the children about interesting places within 10-15 minute drive with a little description of the place and shout out the name of the location when getting close. For example, if the family is on a day trip driving around San Francisco, TingTing can say "in another 15 minutes, we will pass by Ferry Building. You will see a white building with a clock tower in the middle. Don't miss out! Shout out 'Ferry Building' when you see it!

When they are getting closer, TingTing will remind the kids to stay alert by saying "we are about to pass by Ferry Building. Look on your right and shout out Ferry Building when we get there!" After the kids shout out the name of the location, TingTing will provide a fun fact about the location.

We want to encourage kids to look outside of the window and stay informed about the trip while allowing the driver to stay focused on driving.

NEXT STEP

We have not yet conducted user studies of our design to measure how effective the application can help parent drivers reduce child-related distraction for documentation in

this paper. During our final presentation, we will have a set-up for simulation and get feedback from participants.

Set-up

We will have our handmade chair to mimic the driver seat and have a projector project scenes on the wall to simulate the driving scenario. As our prototype is not fully functional, we would use Alexa as the Wizard of Oz and let the participants try out a geolocation prototype eye-spy game from our application.



Figure 3. Second step of onboarding.

Feedback

On the demo day, We will have a survey at the table to collect feedback and comments from users who have tried the demo. We will analyze the feedback and further develop the product accordingly.

Future iteration

Currently, our working prototype is designed for a single child. We would like to make setting up profile for multiple children more easy. In addition, how can our technology detect two voices and distinguish multiple persons is also something we would like to explore.

In addition, as the era of self-driving car is approaching, we would like to take into consideration of this context and make TingTing a family-friendly application even in the self-driving car.

CONCLUSION

We believe that TingTing can provide a better and safer driving experience for families by eliminating parents'

guilty feeling when they are too exhausted to initiate conversation with their kids. In addition, it provides kid-friendly content and help reduce screen time. It encourages children to look outside of the window and get connected with their surroundings. We believe that TingTing can empower family in commute with ease and joy. We hope that one day TingTing can be the new seeing.

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