

HealthEar

Using noise cancelling earbuds to detect fluid in the middle ear, we can help guardians identify the need for further screening.



Problem

80% of children will have had at least one episode of an ear infection by the age of 2. Guardians will lose sleep, miss work to schedule appointments, and have to watch their child in pain during these ear infections. There is also a large financial impact, where ear infections are responsible for 24 million office visits per year costing \$2 - 5 billion dollars annually.

Many of these office visits are unnecessary, and guardians can avoid delayed treatment or unneeded antibiotics with more information on the child's ear health status.

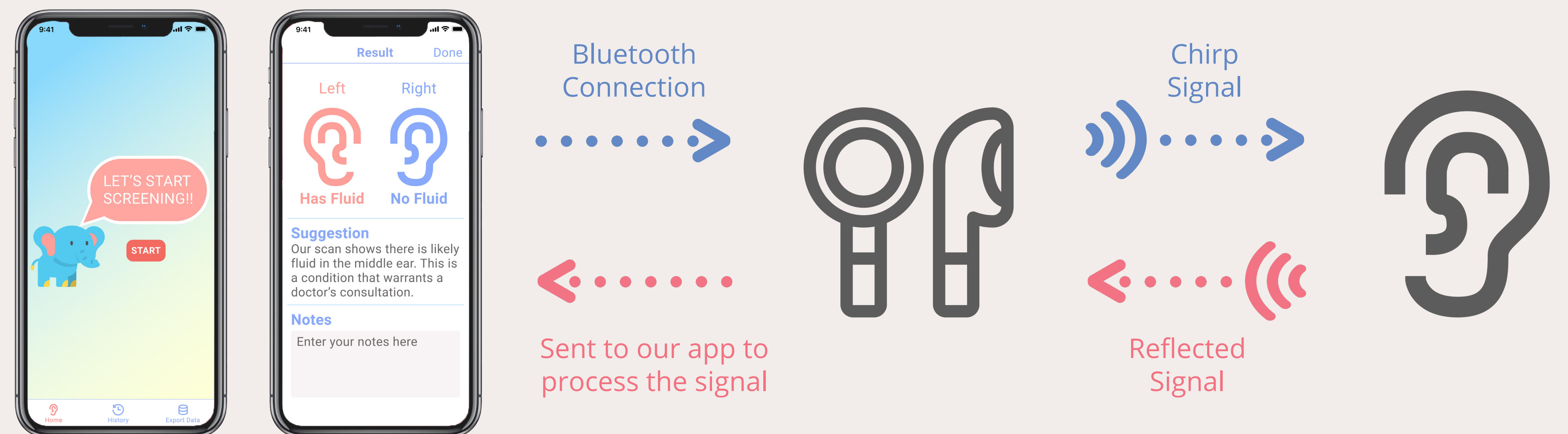
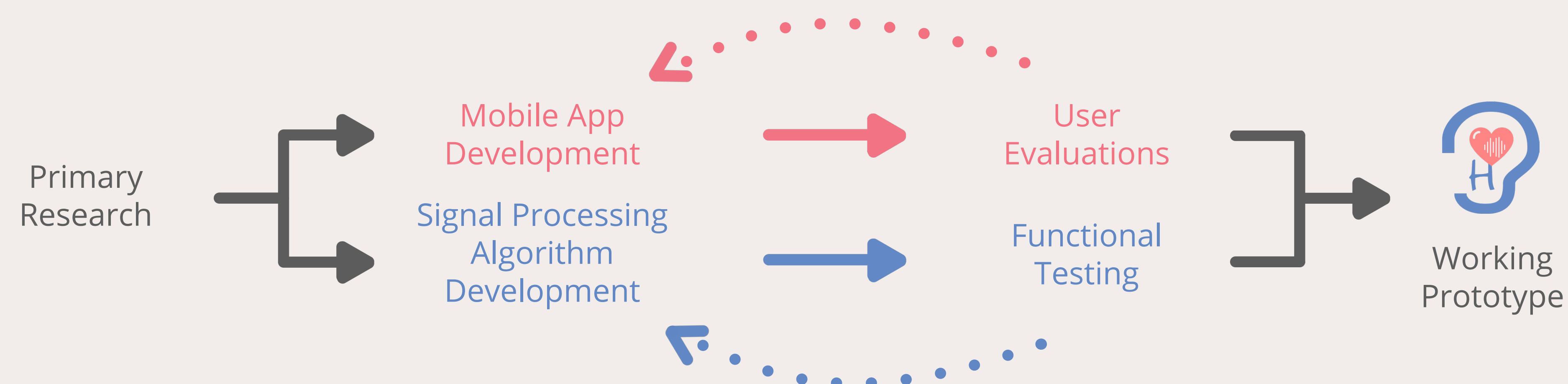
How can we create a solution that assists guardians in early detection / rehabilitation of middle ear infection (Otitis Media - OM) for determining optimal time for medical intervention?

Solution




Using commercially available wireless earbud headphones to aid in the diagnosis of ear infections in children by sensing changes in the acoustic properties of the eardrum.

Through a process known as acoustic reflectometry, a chirp signal is played through the earbud speakers where it will reflect off of the tympanic membrane of the eardrum and echo into the microphone. The returning signal will differ depending on the amount of fluid in the child's ear, and can differentiate between healthy ears and ears that are likely to be infected. This tool is a first step in supporting guardians in understanding their child's ailment before making an appointment with their doctor.

Process



Solution Diagram

-  **Home/Screening**
Guide guardians through the screening process
-  **History**
Show past screening results
-  **Export**
Export screening histories to share it with healthcare givers

Main functions of HealthEar mobile app.



To develop our algorithm in controlled circumstances, we modified earbuds and plastic model ears to collect data.

