A novel device and system to screen newborns for hearing loss in resource constrained settings

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India
Stanford India Biodesign fellow
500,000 babies are born with hearing loss every year all over the world. 90% are born in the developing countries.

1 in every 5 children born with hearing loss are born in India. 

Hearing loss is one of the most common birth disorders.

3 M. Shamim Ansari, “Screening programme for hearing impairment in newborns: A challenge during rehabilitation for all.” Asia Pacific Disability Rehabilitation Journal; 2004; 83 Vol. 15 No. 1
Too many births

Too little time

Noise immunity

Sedation is high risk

Prohibitive costs

Lack of skilled care givers

Mass screening

Saving time by decreasing preparation time and by checking both ears simultaneously.

Innovative algorithm

The novel method of automation detects the signal without getting effected by noise

The novel algorithm takes care of the movement of the baby and thus test can be conducted without sedation

Sustainable cost structure

The cost is decreased through non-disposable electrodes and service based model.

Minimal human error

The easy to use electrode system requires very less skill to place the electrode.
Technology

- ABR Signal
- Signal Conditioning: Amplification and filtering
- Signal Acquisition: Analog to digital conversion
- Signal Analysis: Automated hearing screening

Stimuli through earphone

Three electrodes on the scalp

Technology

Sohum innovation lab, nitin@sohumforall.com
Signal Conditioning – Amplification filtering
Signal Acquisition – Analog to digital conversion
Signal Analysis – Automated hearing screening

Brainstem Evoked Response Audiometry

Stimuli through microphone

ABR Signal
After care
Network of Audiologist/ENT

Technology
Affordable and appropriate for low resource settings

Awareness
New media for parents and healthcare providers
It is recommended that all activities are done when the child is rested, fed and ready to play, and is done under adult supervision. For any of the activities, never use objects that are sharp, toxic, might electrocute or are dangerous to the baby in any way. Actively by talking to your child's doctor if your child is missing milestones or is achieving them late. © 2012 Sohum innovation lab | http://sohumforall.com
After care: Network of ENT, Pediatricians and Audiologists
## Implementation plans across India for Hearing health

<table>
<thead>
<tr>
<th>National and state level program</th>
<th>Institutes</th>
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<tbody>
<tr>
<td>National rural health mission</td>
<td>All India Institute of speech and hearing, Mysore</td>
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<tr>
<td>Rehabilitation council of India</td>
<td>National Institute of Mental health and Neurosciences (NIMHANS), Bangalore</td>
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<tr>
<td>National deafness prevention program</td>
<td>St Johns Institute of Medical Sciences, Bangalore</td>
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<td>Sound Hearing 2030</td>
<td>Ali Yavar Jung national Institute of hearing health</td>
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<td>Maternal and child care, State and central govt programs</td>
<td>Manipal Institute of Allied Health Sciences</td>
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<td>Ministry of Health</td>
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Institutional births

Maternity homes/NICU
Pediatrician

- Additional revenue
- Better quality of care and services to their customers

General physician

- Additional revenue
- Increased popularity through better reliability of tests

Health worker/Entrepreneur

- Provides employment
- Shared revenue model provides incentive to screen all newborns

Child, parents, society

- Early identification of hearing impairment
- Normal growth and learning
- Early intervention saves money in comparison to late rehabilitation

Referred for further care

Audiologist and specialists

- Increased access to patients through referrals

Sohum certification

URBAN

RURAL

Births at home

Institutional births

Births at home

Sohum certification

Sohum certification

Sohum certification
Future plan

- Proof of concept
- Product refinement, IP
- Clinical trials on adults, Prototype 3
- 10 ready to use products, Clinical trials on 800 newborns, CE mark
- First batch of product launch

You are here now.

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<tr>
<th>Year</th>
<th>Recognition and Grant support:</th>
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<td>2013</td>
<td>MIT Technology Review</td>
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<tr>
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<td>STANFORD UNIVERSITY Center for Innovation in Global Health</td>
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<td>2011</td>
<td>Department of Biotechnology Government of India</td>
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<td></td>
<td>Robert howard Medical Technology Next step award</td>
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<td>SIEMENS</td>
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Screening for all!
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