The HealthPAC project received its funding from the EU 7th Framework Programme Marie-Curie FP7-PEOPLE-2013-ITN under IDP Grant agreement nr. 604063

1 ESR's Details

Name of the ESR: Snandan Sharma
Nationality: Indian
ESR number within HealthPAC: 09
Research work-package: 09
Work-package leader: Ad Snik
Starting date ESR: 01-01-2015
Supervisor and co-supervisor: Ad Snik and John Van Opstal
Host-institution - Department: Department of Bio-Physics, Radboud University

2 Research Progress Report 1

To begin with I will like to express gratitude to my supervisor and my seniors at the department of Biophysics, Radboud University and the department of ENT, RadboudUMC who all are helping me thrive well in pursuit of my PhD. Furthermore I will like to thank HealthPac and EU's Marie Curie programme for their generous funding.

I started my PhD at the beginning of 2015 and I am working on Bimodal Hearing. To elaborate it means two ways of hearing and i.e. acoustic hearing through a hearing aid (HA) and electrical hearing via a cochlear implant (CI). A majority of population, which relies upon bimodal hearing, faces a strong challenge while communicating in a noisy environment. A way to study such a problem is to test their sound localization ability and speech intelligibility in a laboratory. In the first few months I studied sound localization in normal hearing because in order to fundamentally understand how listeners with bimodal hearing binaurally process sounds it is vital to study how it works in normal hearing listeners. I conducted sound localization experiments with NH individuals to get an understanding of sound cues they use to localize sounds. These are binaural cues such as intermural time difference (ITD) and interaural level difference (ITD). It gave me a better understanding of the well established findings that NH listeners use ITD's to localise low pass (LP) sounds in horizontal plane (azimuth) and ITD's to localise high pass (HP) sounds in vertical plane (elevation).

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In the meanwhile upon reviewing the literature and knowledge of my colleagues I got to know one of the crucial aspect in hearing research. Bimodal hearing individuals pose difficulty not only because of damage on their hearing but also because the hearing prosthesis they use, be it a CI or a HA may not necessarily improve every aspect of hearing for a person with hearing challenges. The reason being, every person responds distinctively to a CI and HA because the nature of sound representation and the way it is interpreted at cognitive level is something that is still beyond comprehension in its entirety.

Alongside the research I have had the opportunity to visit different institutes and conferences. These are –

Intersectorial Training.

1. Visit to Xsens and University of Twenthe.
2. Visit to Philips.

Research Visit and Collaborations.

The Ear Institute, University College London- In October I got an opportunity to visit the Ear Institute to get a detailed overview of their research. It includes prospects of collaborative work that I may like to do with the EAR Institute.

Conference, Workshop, Seminarand Summer School

1. Auditory Modeling Workshop, June 2015, University of Oldenburg, Germany.
2. International Symposium on Hearing, June 2015, Groningen, The Netherlands.
3. Cosmo Summer School, July 2015, Nijmegen, The Netherlands.
4. Bayesian Modeling Workshop, August-2015, Amsterdam, The Netherlands.
5. Presented a poster titled '*Sound spatial perception in bimodal EAS in 2016"* at a conference in Association of Research in Otolaryngology, San Diego, USA.
6. Presented two posters titled "*Effect of frequency compression in bimodal CI listeners*" and "*Cross-frequency ILD perception in NH listeners*" at the Conference in Implantable Auditory Prosthesis in 2017 held in Lake Tahoe, California, USA.

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Secondment

1. Advanced Bionics, Hannover, Germany- I did my first secondment in Hannover, Germany in collaboration with Advances Bionics from September –Novemeber 2016. I evaluated the effect of a new hearing aid algorithm on the performance of bimodal cochlear implant listeners. Presently I am preparing a manuscript based on the results from the secondment and I will send the manuscript for a review so that it can be published in a peer review journal. This project also addresses the milestone "*M10- Auditory Test on bimodal hearing aid users with ABE and with new search algorithms*" and the deliverable "*D10-Integration strategy for bimodal cochlear implant listeners*".

2. Oticon Medical, Copenhagen, Denmark- I visited the research and development headquarters of Oticon Medical in Copenhagen in October 2017. It is an ongoing project and it seeks to investigate the possibility of enhancing interaural level differences (ILDs) in cochlear implant users by synchronizing the effect of induced loudness reduction across the ears.