Aparajita Sahoo

CONTACT
INFORMATION

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RESEARCH
INTERESTS

I am passionate about creating a social impact by working at the intersection of health technologies, data science, design and social innovation that will impact the lives of the people globally. I am also interested in enhancing user experiences by combining the power of computing, mobile technologies and effective design. I have also worked on electronics prototyping of low cost healthcare devices that can be deployed in rural areas that dont have access to medical facilities.

EDUCATION

Univ. of Mumbai, Fr. Conceicao Rodrigues Inst. of Technology, Mumbai   *2011 – 2015*
    Bachelor of Engineering, Electronics and Telecommunication Engineering, *First Class*

Atomic Energy Junior College, Anushaktinagar, Mumbai   *2008 – 2010*
    Intermediate Degree, Science with Vocational Training in Electrical Maintenance, *88%*

Atomic Energy Central School, Anushaktinagar, Mumbai   *1998 – 2008*
    Matriculation, *93.8%*, *All India Topper in Mathematics*

RESEARCH
EXPERIENCE
AND PROJECTS

REDX Innovation Lab, under **Emerging Worlds Special Interest Group**, **MIT Media Lab**
Innovation Engineer, focusing on healthcare technologies for rural areas

Project: Dermato   ‖   *Guide: Dr. Anshuman J. Das*   ‖   Oct '15 – Present
A project aiming to solve important problems faced by dermatologists in diagnosis in rural areas

The first part is a study aimed at reducing the subjectivity in visual examination of skin diseases, especially in depigmented conditions. Here, it is difficult to diagnose similar looking diseases without an intravenous procedure like biopsy. We have developed a non-intravenous method to identify the condition which is much faster, cheaper and less painful than existing methods. The device is a fluorescence spectroscopy test that can be done with the help of a mobile phone. I have been involved in collaborating with doctors to design and implement this study at the K. J. Somaiya Hospital, Mumbai. I have been actively helping doctors to collect data using our device, from around 200 skin patients over a period of 5 months. I have been working on analyzing this data and improving the design and user interface based on feedback from doctors. We plan to publish the results of this study at a prominent healthcare conference.

The second part of the project is a portable mobile clip-on that can be used by dermatologists in visual examination of the skin. This affordable app-based device provides magnified, high quality and polarized images of skin lesions and allows one to annotate, store and access them along with patient data. I was involved in giving inputs for its design and usability. I was involved in a pilot study that included doctors from K. J. Somaiya hospital to test the device on their patients and give us critical feedback of its design and app interface. Its success led us to mass-manufacture the clip-on, to be distributed to about 500 dermatologists in and around Mumbai.

Project: StethoCG   ‖   *Guide: Guy Satat*   ‖   Jun '13 – Oct '13
A project aiming to provide better detection of cardiovascular disorders in rural areas

Cardiovascular diseases, among all reasons, cause the maximum number ($\sim$ 1.4 million) of deaths per year in India. Rural areas are especially affected due to a lack of doctors specializing in diagnosis of these disorders. We aimed to solve this problem with a screening device that helps in detecting heart murmurs in patients leading to possible further diagnosis and treatment. The device combines a digital stethoscope and an ECG to identify irregularities in heartbeat. I had developed the hardware prototype which led to better data collection. The user interface of the device designed to be simple for use by a health worker and its form factor was reduced to make it portable. This was used to collect data samples from various patients and the preliminary data was analyzed to detect similarities in their pattern.
This project was *presented to Ratan Tata* and it got positive feedback.

Project: Pediatric Perimeter ‖ *Guide: Dr. Premnandhini Satgunam* ‖ Jun '13 – Oct '13
A project aiming test for visual field in infants with cerebral palsy

Peripheral vision impairment is an indicator of potential abnormalities in the human body. It is a challenge to measure the visual field of an infant suffering from physical disabilities like cerebral palsy where the body's movement is restricted and the patient cannot be tested in the standard way. Pediatric Perimeter is a novel device to measure and quantify visual fields and reaction times to light stimulus in infants. This device assists in the early detection of neonatal eye diseases and early signs of vision-threatening conditions. The prototype we made recorded the response and the movement of pupil. I was a part of the initial team that had started the project and was involved in hardware prototyping and design of the enclosure. We had tested it on few babies and got valuable feedback.
The first version was presented to Dr. A. P. J. Abdul Kalam and received encouraging reviews.

INTERNSHIPS **LVP – MITRA Fellow, Srujana – Centre of Innovation**
Guides: Shantanu Sinha , Tristan Swedish, Dhruv Joshi Dec '14 – Present

I worked on the hardware prototyping of a modular eye diagnostic device that could be used for tracking the movements of pupil. Its design was inspired by the Google Cardboard.

Health Tech Intern, MIT Rethinking Diagnostics, IIT Bombay
Guide: Guy Satat *December 2015 – Present*

I worked on developing the initial prototype of StethoCG and tested the initial circuits. The design and form factor was made small so that it could be carried easily by a physician. I took up this project again when I joined the REDX Innovation Lab, Mumbai for further development in its design and data collecting capabilities.

Product Development Intern, Qyuki, Mumbai
Guide: Kshitij Marwah and Anand Dhople *December 2015 – Present*

Qyuki, a startup by Oscar winner A. R. Rahman, film maker Shekhar Kapur and Samir Bangara, is a network that brings together artists to collaborate and create content. I worked on its product detailing and wireframing of the website to help in connecting the creators. I was also involved in designing and testing the website interface. This got me interested in designing user interfaces.

OTHER **Detecting Short γ-ray Bursts in Astrosat CZTI Data** *PH426: Astrophysics*
PROJECTS *Guide: Prof. Vikram Rentala, PH, IITB and Prof. A. R. Rao, TIFR, Mumbai* *Spring 2015-16*

We did a literature survey on γ-ray bursts, including open problems in the field. We tackle detecting short γ-ray bursts from data acquired by the CZTI X-Ray Imager on-board Astrosat.

Variability Analysis for Globular Cluster NGC2419 *NIUS, Astronomy*
Guide: Prof. Priya Hasan, MANUU, Hyderabad *December 2015*

We analyzed raw data for the globular cluster NGC2419 taken at the HCT, post-processed it to correct for detector bias and flat-fielding, inverted the effect of atmospheric mass and extracted the variation of magnitudes of stars in the cluster on the scale of a day. Code here.

An X-ray Study of Black Hole Candidate X Norma X-1 *NIUS, Astronomy*
Guide: Prof. Manojendu Choudhury, Center for Basic Sciences *December 2013*

We analyzed data from the RXTE for a low-mass X-Ray Binary. Fitting 3-30 keV spectra with a model accounting for blackbody & non-thermal radiation, and interstellar extinction, we obtained values of system parameters like internal radius and temperature. Report here.

Estimation of Photometric Redshifts with Machine Learning *NIUS, Astronomy*
Guide: Prof. Ninan Sajeeth Philip, IUCAA, Pune *December 2012*

Here, we trained a neural network for photometric redshifts, given data for sources whose spectra and redshifts have been measured. We predicted spectra for these objects viewed at various other values of redshifts. Using this expanded dataset, we achieved good predictions for test data.

KEY TALKS **Coded Source Separation for Compressed Video Recovery** *Master's Thesis Talk*
AND SEMINARS *Department of Electrical Engineering, Indian Institute of Technology Bombay* *May 2016*

Here, I presented results from the first stage of my dual degree thesis. Presentation here.

Template-Based Stereo Odometry   *Invited Talk*
The AIR Lab, Carnegie Mellon University   *July 2015*

    I presented results of summer internship at CMU. The talk included a detailed description of the method used, comparisons with ground-truth and stress-tests on the method. Presentation here.

The Cosmic Distance Ladder   *Invited Talk*
Krittika – The Astronomy Club, IIT Bombay   *September 2014, February 2016, August 2016*

    This talk climbs the Cosmic Distance Ladder, a sequence of steps, each building on previous steps' results, for calculating distances in the universe. We begin with solar system distances, and end at enormous distances where the only option is using indirect methods. Presentation here.

KEY COURSEWORK

Computer Programming	Signal Processing	Computer Networks
Machine Learning (Coursera)	Digital Image Processing	Wireless Networks
Java	Interaction Design (Coursera)	Mobile Communication

TECHNICAL SKILLS

Software   Matlab, R, Python, C, C++, Java, Solidworks, LaTeX

Hardware   Arduino, Teensy, Olimex, IoT development boards like Linkit

OTHER INTERESTS

I like reading books, listening to music and watching movies. I like doodling in my spare time. I am a foodie and like travelling.

REFERENCES

Guy Satat, Camera Culture
MIT Media Lab | E–Mail | Webpage

Prof. Ajit Rajwade, CSE
IITB | E–Mail | Webpage

Dr. Sebastian Scherer, Robotics Institute
CMU | E–Mail | Webpage

Ashutosh Richhariya, Ophthalmic Biophysics
LVPEI | E–Mail | Webpage

Prof. Mayank Vahia, Astrophysics
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Dr. Aniket Sule, Astronomy
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Dr. Manojendu Choudhury, Astrophysics
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