

DR. SOUMABHA BHOWMICK

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PROFILE SUMMARY

- Hands on experience on computer Vision, machine learning and Artificial Intelligence, for medical as well as natural image.
- Research experience, including writing of research articles, invention disclosures or patents, as well as active part of multiple clinical study spread across globally.
- Well acquainted with agile way of working.

EDUCATION

PhD , Indian Institute of Technology, Kharagpur November 2018
Field of research: Computer Vision, Image processing, Embedded Systems and AI

Masters in Technology , Indian Institute of Information Technology July 2013
Specialization: Robotics

Bachelors in Technology, West Bengal university of Technology July 2009
Major: Electronics and Communication Engineering

SKILLS

Languages	Python, Matlab, Shell Scripting, C
Frameworks and Libraries	Pytorch, Keras, OpenCV, Voxel51, ROS
Personal Interests	Arduino, Embedded Systems

WORK EXPERIENCE

Scientist 1, Philips July 2021 - Till Date

- Deep Learning (YOLOV5 and YOLOV3) based anatomy detection for Obstetric ultrasound scans.
- View plane Classification (HRNET + STN) and bookmarking of B-mode Ultrasound OB scans for reporting and biometry computations.
- Active role in project ideation, assumptions mapping, literature review and algorithm proposals for Obstetric features on Lumify (Hand held ultrasound device).
- Currently focusing on building prototypes which would enable AI based applications on a low computing platforms which would cater to Low and Low Middle Income Countries.
- Active contributor in planning clinical study spread accross multiple sites globally.
- Proposed fault and inconsistency detection in segmentation annotation and implemented in LabelMe tool using STCN.
- 1 patent in drafting stage and 1 publication under review.

Research Engineer 2, Philips Oct 2018 - June 2021

- Deep learning based semantic segmentation (HRNET, UNET, NNUNET) algorithm for biometry computations on B-mode Obstetric ultrasound scans.
- Registration of ultrasound volumes with a IMU/EM sensors and blending them in order to establish an enlarged field of view for better visualizations.
- Motion tracking from an ultrasound video using pose regressors.
- Classification algorithm analysis and explainibility computation using Grad Cam.
- Uniqueness, and data inconsistency computation using Voxel51 tool.

- Classification model optimization using Tensor RT framework, and conversion to Onnx format for easy integration in the Ultrasound carts (Initial exploration).
- Co-creator in planning a clinical study and drafting clinical study protocols with frequent interactions with experts in house and experts in various clinical sites in India.
- 1 Patent filed, 2 patents under filing process, 2 accepted conference proceedings, 1 technology transfer 1 invention disclosure under review.

Assistant System Engineer, Tata Consultancy Services

March 2010 - June 2011

- Support and maintainance of a name and address database for a telecom company.
- Responsible for process automatons using shell scripts, Ab-initio and control-M tool.

PROJECTS

PhD Project *Monocular Vision Based Map Generation for Mobile Robot*

- Developed an occupancy grid based map using Monocular vision.
- Developed a topological map using monocular vision.
- Novel Path Planning algorithm for a mobile robot on an Occupancy Grid

M.Tech Project *Person Identification Using Gait Biometrics*

- Proposed a Novel feature for speed and cloth invariant person identification using Gait biometrics
- Background subtraction in an indoor well lit environment

PATENTS

1. **Soumabha Bhowmick** et. al, "*Method and system for automatically detecting anatomical structures in a medical image*", WO2021144230A1
2. **Soumabha Bhowmick** et. al, *Automating Localization and Estimation of heart beat in First trimester Ultrasound scans*, Filing under progress
3. Nitesh K, Aliarshad K, Giridhar NR, **Soumabha Bhowmick**, et. al. *Improving image quality of medical images*, Filing under progress
4. Shashaank M, **Soumabha Bhowmick**, et. al. *Automatic Heart Cycle extraction and Heart rate computation from Fetal Ultrasound Scan*, Drafting in progress

PUBLICATIONS

1. **Soumabha Bhowmick** et al., "Intelligent Annotation Tool for Accurate Tracing of Segmentation in Ultrasound Videos" IEEE-IUS 2022 (under review)
2. **Soumabha Bhowmick** et al., "A framework for improved ultrasound heart view plane classification using Spatial Transformer Network" SPCOM-2022 (under review)
3. Manimaran Gouthamaan, Airsang Urmila , **Soumabha Bhowmick**, et al. "Evaluation Tool to Diagnose Faults and Discrepancy in Semi-Automated or Manual Annotations in Ultrasound Cine Loops (Videos)" accepted in Proceedings of the the 44th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC'22)
4. **Soumabha Bhowmick** et al. "A Novel Framework for Placental Mega Volume Segmentation" accepted in Proceedings of the 2021 IEEE International Ultrasonics Symposium
5. **Bhowmick, Soumabha**, Jayanta Mukherjee, and Alok Kanti Deb. "An incremental topological map building using monocular vision." Proceedings of the 11th Indian Conference on Computer Vision, Graphics and Image Processing. 2018.

6. **Bhowmick, Soumabha**, Alok Kanti Deb, and Jayanta Mukhopadhyay. "Monocular Vision based Topological Map Generation in Real-time." 2018 IEEE Symposium Series on Computational Intelligence (SSCI). IEEE, 2018.
7. **Bhowmick, Soumabha**, Jayanta Mukhopadhyay, and Alok Kanti Deb. "Fast path planning on planar occupancy grid exploiting geometry of obstacles." 2017 Ninth International Conference on Advances in Pattern Recognition (ICAPR). IEEE, 2017.
8. **Bhowmick, Soumabha**, et al. "A novel floor segmentation algorithm for mobile robot navigation." 2015 Fifth National Conference on Computer Vision, Pattern Recognition, Image Processing and Graphics (NCVPRIPG). IEEE, 2015.
9. Nandy, Anup, **Bhowmick, Soumabha**, et al. "Gait biometrics: An approach to speed invariant human gait analysis for person identification." Proceedings of the Second International Conference on Soft Computing for Problem Solving (SocProS 2012), December 28-30, 2012. Springer, New Delhi, 2014.
10. **Bhowmick, Soumabha**, et al. "A speed invariant human identification system using gait biometrics." International Journal of Computational Vision and Robotics 4.1-2 (2014): 3-22.
11. Nandy, Anup, **Bhowmick, Soumabha**, et al. "A Sensor-Based Technique for Speed Invariant Human Gait Classification." Intelligent Computing, Networking, and Informatics. Springer, New Delhi, 2014. 549-556.
12. **Bhowmick, Soumabha**, et al. "Gait biometrics: A vision based approach for cloths invariant walking pattern classification." 2013 IEEE International Conference on Signal Processing, Computing and Control (ISPC). IEEE, 2013.

ACHIEVEMENTS

1. Session Chair in 3rd Online Conference to Unite Philips AI (OCUPAI'21)
2. Award for exercising Philips behavior "Take ownership to deliver fast" in 2020
3. IIT Allahabad, Chancellor's Gold medallist for the graduate batch 2013.
4. IIT Allahabad, Mtech Gold medallist for the Mtech graduate batch 2013
5. Gate qualified in 2009 (95.29%ile), 2010 (98.7 %ile)

I hereby declare that all the information given above is true and correct to the best of my knowledge.

Soumabha Bhowmick