



ASWIN RAGHAV NIRMALESWARAN

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EDUCATION

Cornell University, School of Engineering, Ithaca, NY

Master of Engineering in Biomedical Engineering,

May 2016 - May 2017

Relevant Coursework: Computer Vision, Advanced Artificial-Intelligence, Statistical Signal Processing & learning

University of Texas at Arlington, School of Engineering, Arlington, TX

Master of Science in Biomedical Engineering,

Jan 2016 - May 2016

(Transferred to Cornell)

Anna University, SSN College of Engineering, Chennai, India

Bachelor of Engineering in Biomedical Engineering,

Aug 2011- May 2015

NOTABLE PROJECTS

• Segmentation of Skin Lesions using Combined Adaptive Thresholding and Connected Component

Analysis (3rd best project award-during the course 'Computer Vision' at Cornell)

- Developed a novel algorithm involving RGB color channel operation, filtering & equalization, Otsu-based thresholding and logical operation of channels etc., to efficiently detect skin lesions.
- Trained the algorithm using a dataset of 900 clinical dermoscopic images & tested the performance.
- The algorithm removed hair and other artifacts; Segmentation was achieved with average Jaccard Index of 0.497

Skills and Expertise: Computer Vision (2D Color clustering, Adaptive Snake, Otsu's method) - using VisionX & C, MATLAB.

• Automated Anatomical Landmark Detection in 3D Chest CT(DICOM) images

- Design, develop, and evaluate algorithms (without using any prebuilt libraries) that will reliably detect unique locations including Supra-sternal notch & Costal notch using 50 DICOM (3D-CT) images.
- Algorithm developed include Thresholding in Hounsfield-units, Geometric filtering, ROI extraction, Slice based feature enhancement & tracking, Closing, Opening, Region growing, 2D to 1D feature mapping, Landmark localization etc.
- The Algorithm produced a Mean Distance Error of 56.54 pixel from Manually marked Ground truth, producing a 3.931cm error in localization of Jugular Notch.

Skills and Expertise: Computer Vision in 3D DICOM images using VisionX & C

• Observation and Identification of Erythrocyte Cell Membrane Vibrations for Differential Diagnosis

- Invented a Diagnostic technology that measures induced Cell vibration (due to thermal excitation) in RBCs.
- Tracked 2D Cell boundaries from recorded video and translated it into 1D vibration signal, using techniques like Median based Background estimation, Luminance Normalization, Autothresholding, Blob Analysis, Individual blob tracking, Kalman Filter etc.
- Feasibility of Differential Diagnosis was proved with Normal, infected and cancerous RBC vibration-data.

Skills and Expertise: Image Sequence (Video) and Signal Processing using Matlab, SIMULINK; Fluorescent Microscopy.

• Pore size estimation in developed Tracheal Scaffold using Circle Hough-transform.

- Development of a Scaffold which aids in Directional Cell growth & suture-less implantation.
- Analysis of pore size in calibrated images of Scaffold using Hough transform.

Skills and Expertise: DS- SOLIDWORKS, Replicator-G, Image-J, Matlab.

PATENTS

MULTISYRINGE MODEL- JECTABLE

India Patent Application 5847/CHE/2014

A multi-injection pen which features reduced needle-pricking, Less manufacturing cost, Increased shelf life of drugs.

ELECTROMAGNETIC VASCULAR FORCEPS

India Patent Application 5848/CHE/2014

Electromagnetic forcep which can be electronically controlled during surgery without traditional lock mechanism.

RELATED EXPERIENCE

CORNELL UNIVERSITY-BRC Imaging Facility

-Current Position

Researcher-Imaging

- Conduct imaging studies using various imaging modalities including Spinning-disk Confocal microscopy
- Research involves the study of motility of breast cancer cells & the changes in extracellular matrix deposition, particularly in response to obesity.

INDIAN INSTITUTE OF TECHNOLOGY-MADRAS, India

May- December 2015

Healthcare technology Innovation center: Biomedical/Electrical Engineer Intern-Data Analysis

- **WEARABLE R&D**- Embedded programming using Freescale K53 MCU (Arm Cortex M4-100Mhz) & IAR Workbench
- Estimated the relationship between core body temperature & body's surface parameters like HeartRate, Blood Pressure, SpO2, skin temperature, atmospheric temperature & humidity;
Regression of dataset collected from 532 people. #Algorithm development #Data Analysis
- Circuit design for Body-Fat % estimation using Body Impedance. #Biosignal Acquisition using NI- ELVIS 2, NI- DAQ

SSN RESEARCH CENTER, Chennai, India

May-December 2015

Research Assistant

- Design, control and automation of custom temperature controller setup (involving LABVIEW, myRIO and circuit design) for Crystal Growth Research; #Signal Conditioning #Feature extraction #PID controller design
- Furnace temperature was controlled using a thyristor from the raw data-logged from K-type thermocouple
- Temperature data (30 to 1000°C) was measured from K-type thermocouple and calibrated according to NIST standard.
- Data logging of Calibrated signal was done to a remote PC using myRIO; this data was used to control the Furnace temperature through a Thyristor using a developed PID control loop.

THE MEDICARE SCIENTIFIC SUPPLIES, Chennai, India

Sept 2012- Jan 2015

Design and Development Engineer- Part time

- Image processing- Developed algorithm to extract the bands in the captured Electrophoresis Gel Images and found their relative band distances in the 2D image.
- Design of H-bridge, ULN2004 circuits for Stepper motor & automation of optical filter setup in Professional gel documentation system named **Gelstan 4X/8X Chemi**

TEACHING EXPERIENCE

CORNELL UNIVERSITY, Ithaca, NY

Lab Assistant

PHYS 2213: Electromagnetism

August 2016- Dec 2016

PHYS 2214: Oscillations, Waves, and Quantum Physics

Jan 2017- May 2017

PHYS 1112: Mechanics & Heat

Jan 2017- May 2017

BHUMI, a Non-governmental Organization, India

May 2013- June 2015

HR Manager & Teaching Volunteer

Management of events and coordinating volunteers for teaching students of class 6,7,8.

LEADERSHIP

GEEKYCROC, Chennai, India

May 2015

Founder- www.geekycroc.com

- College life experiences turned into a working E-commerce Business involving Textbooks, Consulting and material-supply for Higher education, Food review, Travel agency etc only for College Students;
- Also formed a network and logistics division; convinced clients for partnership; Annexed local businesses as a part.

HONORS AND AWARDS

- Ranked amongst one of the top 5 finalist in GE EDISON CHALLENGE 2013, Bangalore, India.
- Ranked among one of the top 20 venture proposals in ASSOCIATION OF BIOTECHNOLOGY LED ENTERPRISES- BEST 2014, Bangalore, India.
- Elected Speaker, Best 5 student papers in IEEE GLOBAL HUMANITARIAN TECHNOLOGY CONFERENCE 2014 - October 2014 at San Jose, California.
- Ranked amongst the top 150 semi-finalist teams in "BIG-C COMPETITION 2014" by Livestrong Foundation.
- Awarded best paper in National level Technical Conference on Bioengineering 2014 at Bharath University, India.

OTHER SPECIALIZED SKILLS

Languages

C,Java, JSP- Basics, Javascript, SQL, HTML-CSS, Python, Matlab, LABVIEW

Tools

Adobe Photoshop, Multisim, Office, SIMULINK, Adobe Lightroom, Adobe Aftereffects, FL Studio, Audition, SOLIDWORKS