Senthil Palanismay

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Best outgoing student, ECE department, CIT, 2016 ♦ R&D Engineer, Soliton Technologies 2016-19 ♦ 2 Research Papers

EDUCATION:

COIMBATORE INSTITUTE OF TECHNOLOGY, Coimbatore, affiliated to **Anna University, Chennai, India** **GPA: 8.54/10.0** May 2016
Bachelor of Engineering in Electronics and Communication Engineering. **(First class with Distinction)**

TECHNICAL SKILLS:

Languages: C, C++, Python, LabVIEW ♦ **Domains**: General Robotics, Computer Vision, 3D vision, Machine learning, Deep learning, Algorithms and Data Structures ♦**Math Skills:** Linear Algebra and Probability ♦**OS known:** Linux ♦ **Tools**: Vim, Bash, Git

RESEARCH PUBLICATIONS BASED ON ACADEMIC PROJECTS:

- 1st Author, "Automated Robotic Moisture monitoring in Agricultural field" presented in an IEEE sponsored International conference-ISITIA, 2018, soon to be published in IEEE Xplore Digital Library (Paper Link)
  - Set up a small study lab. Implemented Simple graph search based robotic path planning based on images taken by an aerial camera
  - Investigated an image processing based soil moisture estimation procedure. Interfaced and controlled a servo-mounted camera pod
  - Designed circuits for establishing communication between moisture sensors and robotic kit.
- 1st Author, "Smart Mobile Phone Usage restriction by extending mobile phone circuitry - An alternative to jamming" presented in an IEEE sponsored International conference-ISITIA, 2018, soon to be published in IEEE Xplore Digital Library. (Paper Link): Designed a system to lock a mobile phone's keypad and loudspeaker as soon as the phone enters a silent zone by extending its circuitry. Best project idea, ECE, 2015

R&D PROJECTS AT SOLITON:

Optical Character Verification in Soliton Smart Camera (Link for demo video)

- Estimated an Affine transformation to align input image with a template image based on ORB feature matching. Performed Algorithmic Optimisation to run code under 90 ms in Soliton Smart Camera (an ARM processor-based) platform.

Image Depth Categorisation based on deep learning

- Images have to be classified into one of four categories: Close-up, Medium, Long and Ultralong range shot. Generated depth maps for a given image based on pre-trained models and constructed a four channel RGBD image by appending the depth map to an RGB image.
- Experimented with different Deep Learning Architectures and fine-tuned a model based on ResNet-50 to achieve an accuracy of 85 percent.

Seat Belt Detection in a Video (Link for demo video)

- Constructed a sliding window detector by training an SVM classifier on HoG features. Performed Hard Negative mining and Non-Max Suppression to enhance performance. The final IoU of the detector was about 75%.

PinMap Generation

- Generated a graph representing circuit connections for a given netlist. Found the pin mapping between any two devices present in the circuit by applying shortest path algorithms on the generated graph and incorporating electronics component knowledge.

Shape Context matching as a post processing to improve Deep Learning HCR accuracy

- Improved the accuracy of an AlexNet HCR model from 90.1% to 91.2% by overriding deep learning outputs by shape context-based matching results only for images where the deep learning network showed very low confidence.
- to find the best match based on shape context, measured the Hausdorff distance between the shape context approximation of a given image and shape context approximation of every image in the database.

Card Reader (Link for demo video)

- Guided an intern to develop an application for reading government cards like PAN and Aadhar. Found the four corners of the card by detecting its edges and estimated homography for transforming an input image to a predefined template view.
- Ran text detection by Stroke width transform (SWT), segmented characters and ran OCR engine for each segmented character.

Improving Titan Cast and Bagging Automation system

- This a jewelry component identification system consisting of a size filter, hu moments filter followed by pattern matching.
- Proposed based on ablative analysis that using Zernike moments instead of Hu and ORB feature matching instead of pattern matching will improve the overall accuracy from 55% to 75%

Album designing (Link for demo website)

- **Background blending:** Developed an algorithm that synthesizes adaptive background for a given album page by picking up colors from the photos present in the image.
- **Embellishment placement:** Developed an algorithm for placing decoration objects according to the rules defined by their aesthetics associated with each object. Came up with a mathematical formulation to measure the aesthetics and storytelling value of a picture.

Other Projects

- Developed an end to end iris recognition system involving image acquisition through soliton smart camera, Iris localization by Daugman's transform, image normalization and unwrapping, encoding by Gabor wavelets and matching by L2 distance.
- Guided a team to develop a data collection tool that lowers a human's effort in tagging data by auto-tagging only very confident images using Machine learning.

AWARDS AND ACCOMPLISHMENTS

The best project idea, 2015 ♦ Selected in eYRC plus robotics competition ♦ Conducted 3 workshops in CV, ML & DL (Workshop Links) ♦ Placement coordinator 2015-16 ♦ Leader in Bhumi for educating underprivileged kids 2015-18 ♦ Active member of college NSS ♦ Rajyapuraskar (Governor award) recipient in Scouts