SAI CHAITANYA ERUVARAM

Mobile: +91-9742998737

esaichaitanya@gmail.com

Summary:

- **3+years' experience** in Software Development Life Cycle involving analysis, design, development, deployment and testing of **Computer Vision** applications using **C/C++** based technologies.
- Strong Expertise in **Image-Processing** domain involving object detection and recognition, object tracking, segmentation, feature detection, classification, image quality and image enhancement.
- Worked extensively on **face detection and recognition** technologies.
- Strong experience in providing **security and analytical solutions** using Computer Vision algorithms.
- Strong experience in building **Video Streaming applications** for Windows/Linux and Android/iOS apps.
- Good knowledge in H.264 video encoding and decoding.
- Good knowledge in Video and Audio Containers like **MPEG-4, FLV, 3GP, MPEG-3.**
- Good introduction in RTMP and RTSP streaming protocols.
- Experience in developing **Android Apps**.
- Good experience in Java, C# and web technologies like HTML, XML, JS.
- Ability to grasp new technologies and tools to build applications.
- Experience in analysis, design, coding, unit testing, implementation & peer-to-peer code review of projects.
- Team player with good interpersonal skills; takes initiatives and is very proactive in solving problems.

Technical Skills:

Languages	**:** C, C++, Matlab, python, Core Java, C#
Script Languages	**:** VBScript, NSIS
Internet Technologies	**:** HTML, XML, Java Script, JQuery
Libraries	**:** OpenCV, scikit-learn,IPP, OpenGL, OpenGL-ES, Apache Portable Runtime, Boost C++, C++ TUT Framework, FFMPEG
Tools	**:** Visual Studio, Netbeans, Eclipse, SQL Developer, Tortoise SVN, CMake
Software	**:** Adobe FMLE, Wowza Media Server, EvoStream Media Server, YouTube Live Streaming, Red5, WireShark
Operating Systems	**:** Windows, Linux, Mac OSX, Android

Achievements:

- Received "**Engineering Excellence**" award for the commitment and excellence exhibited in the project.

Education:

- Bachelor of Technology in Electrical Engineering at Indian Institute of Technology Madras, Chennai, India.

Professional Experience:

Mamigo Inc, Bangalore, India **Aug 2013 - Present**
Computer Vision Engineer

Projects:

Motion Detection and Object Analysis using Stereo Camera: The aim of the project is to monitor video feed from two cameras and detect objects entering the region of interest and

determine the direction of motion, speed of motion and height of the object. This system has been developed as POC to trigger door opening and closing based on stereo camera.

Face Liveliness Detection: The aim of the project is to detect liveliness of the face captured from a mobile device. The algorithm developed was to provide additional Security feature for an **E-Commerce** application. Data has been collected for testing and validation of the algorithm developed. The data has been collected in different ambient light conditions and different race, gender people participated. The data has been collected at various poses. The frequency of blood flow on face has been used as feature for face liveliness detection.

Scoreboard Timer Change Detection: Video stream of scoreboard is monitored for timer start and stop detection. This module eliminates the game production software operators to manually start-stop the timer everytime the referee stop-starts it.

Bridge Scour Detection: Monitor video stream from a camera overlooking bridge with custom built sensor, which forms specularities, attached at strategic places on the bridge. The relative position of the specularities on the sensor is analyzed to detect soil erosion and predict bridge scour; the software runs on a fit-PC2. This system was developed to replace the laser based system and eliminate the need for electricity at the bridge and lots of maintenance associated with it.

Video Streaming from Mobile Devices: Developed an Android App which streams FLV packaged H.264 Video and AAC encoded audio using RTMP to YouTube. Tested the stream on various media servers like YouTube, Wowza Media Server, Red 5, EvoStream Media Server. Implemented adaptive bit rate strategy to account for varying internet bandwidth and ensure near live stream output. Extensively tested the application for video quality and audio-video sync. Adapted strategies to ensure audio video sync after video packets are dropped when accumulated buffer size limit is exceeded. Built MP4 and FLV container parsers for analysis and testing of the stream.

Game Production Software: The software is end to end game production software; some of the features are – adding multiple cameras to have different view point and can be switched to cover different view angles of the game on the field, Time Stamping of the Stream which can be used for Replays, Bookmarking the camera configuration for fast switching, Flexible scorecards support, Ads support, Logo support, commentary support and many other features. Few of the features contributed to the software are graphic primitives like text, line, circle, eclipse, Picture in Picture support, Animation on video, Scorecard support etc.

Roles and Responsibilities:

- Gathering Functional & Technical Requirements based on the Business Functional specs collected from the Business Team
- Involved in **analysis, design, coding, unit testing and implementation** of the project.
- Planning and giving solutions to the requirement balancing accuracy, performance and time-line of the project in very little time.
- Used **C/C++** to develop computer vision applications and video streaming applications.
- **Data Collection** for testing and evaluation of the Image Processing algorithms developed.
- Built and used custom **data structures** to save information of the processed video feed from cameras.
- Integrated many custom **Heuristic algorithms** useful for video analysis into the existing image processing library.
- Developed **Motion Detection algorithms** to detect and analyze motion in the region of interest and integrated into the image processing library.
- Developed and integrated **Object Tracking algorithms** to track objects in the region of interest.
- Developed **Specular Highlight Detection algorithms** and integrated into the image processing library.
- Developed **Change Detection algorithms** useful to monitor a region of interest.
- Developed and integrated **Shape Analysis** algorithms into the image processing library.
- Used **Camera Calibration algorithms** to calibrate stereo camera.

- Developed parser for **MPEG-4** container.
- Developed parser for **FLV** container.
- Used **Wireshark** to track and analyze **RTMP** packets sent over network for analysis and evaluation of the streaming module.
- Used **Facebook SDK** for authentication and sharing information from Android App.
- Developed unit tests for all the code written using C++ **Template Unit Test Framework**
- Used NSIS to build an installer for the applications developed
- Used **Intel's IPP APIs** to increase the performance of the code.
- Used **OpenCV** Image Processing Library for Image Analytics
- Used **XML** as tool to configure inputs and parameters to the applications
- Used Shell Scripts to launch applications synchronously
- Used C# and JS to build web pages.
- **Refactoring** the existing Code to support new features with enhanced flexibility and reusability.
- Actively participating in architectural meetings and design changes.
- Attending **daily standup, retrospective, story sizing, iteration planning, sprint backlog and product backlog** meetings.
- Involved in Peer-to-Peer code review

Environment: C, C++, C#, Java, JS, VBScript, NSIS Script, XML, Matlab, OpenCV, IPP, FFMPEG, Boose C++, APR, OpenGL-ES, Microsoft Visuval Studio, Eclipse, SQL Developer, Windows, Linux, Android and iOS.

Audience Information Measurement System **Jan 2013 - Aug 2013**
Hubino Technologies, Chennai, India
Software Engineer

Description: The aim of the project is to estimate attributes of people in the region of interest. Emotions, Gender, Age, Shirt Color, and Attention Span are estimated. The software is developed to analyze the audience watching ads played on displays in public places such as malls.

Responsibilities:
- Gathering Functional & Technical Requirements based on the Business Functional specs collected from the Business Team
- Involved in **analysis, design, coding, unit testing and implementation** of the project.
- Actively participating in architectural meetings and design changes.
- Data Collection for training and testing of the algorithms developed. Collected many useful face database from different universities for the project.
- Integrated **face detection** with Adaboost Cascade Classifier using Haar/LBP features. Implemented dress color pooling from the person.
- Developed algorithm to **classify** a person's **face expression** into one of smile, surprise, sad, happy, disgust or angry.
- Developed algorithm to **classify** a face into Male/Female.
- Implemented algorithm to estimate the **age** from the face.
- Developed analytics to estimate the **attention time** of a face in the region of interest.
- Handled multiple faces in the region of interest by assigning a **face signature** and tracking.
- Testing and validating the algorithms developed.
- Estimating optimal distance range from the camera for better accuracy of the algorithms.
- Attending **daily standup, retrospective, story sizing, iteration planning, sprint backlog and product backlog** meetings.
- Involved in Peer-to-Peer code review

Environment: C, C++, Matlab, OpenCV, NetBeans, Windows

Other Projects **Sep 2012 - Dec 2012**
Hubino Technologies, Chennai, India
Software Engineer

3D Animation Fun app: The project is to develop a fun app in iOS, Android devices. User captures a face image and feeds as input to the app. The image is projected on to 3D face object and is animated. Eye-blinking, head rotation and lip movement is simulated to make the face alive. Make-up can be applied to the face like lips-stick, eye-lens and hair-wig. Facial Expressions are also be simulated.

Iris and Pupil Detection: The aim of this project is to develop an iPhone app to detect and measure the pupil and iris size with applications to dynamic pupillometry. The images are converted to gray scale and processed using normalization and threshold techniques to enhance the image, and then, the Hough Transformation is used to detect the iris and the Greedy Snakes Algorithm is used to detect the pupil.

Pedestrian Detection: The aim of the project is to detect and track the pedestrians and collect analytics. Histogram of Oriented Gradients and Support Vector Machines are used to detect the pedestrians.

Theft Detection: The aim of the project is to monitor a virtual line and if a pre-defined pattern is observed, an alarm is to be triggered. Frames are processed from overhead camera, back ground subtraction is done and motion is tracked. The alarm is triggered when the pre-defined pattern, for example object moving from left to right, is detected.

Basketball Tracking: The aim of the project is to draw the trajectory of the basketball just before the ball touches the basket. Back ground subtraction is applied and motion history image is generated. Contour detection is done to identify the position of the ball. The software is developed to help coaches to analyze the players.

Roles and Responsibilities:

- Gathering Functional & Technical Requirements based on the Business Functional specs collected from the Business Team
- Involved in **analysis, design, coding, unit testing and implementation** of the project.
- Planning and giving solutions to the requirement balancing accuracy, performance and time-line of the project in very little time.
- Actively participating in architectural meetings and design changes.
- Used OpenGL-ES in Objective C++ to simulate 3D object motion.
- Used **HOG** and **SVM** algorithms to detect pedestrians.
- Used **heuristic algorithms** to track objects in the region of interest.
- Used Matlab for quick proof of concept.
- Developed applications in **C/C++** with **OpenCV** library.
- **Supervised data collection team** while collecting data for testing of algorithms developed and validation of applications built.
- Attending **daily standup, retrospective, story sizing, iteration planning, sprint backlog and product backlog** meetings.
- Involved in Peer-to-Peer code review

Environment: C, C++, Matlab, OpenCV, TBB, IPP, OpenGL, NetBeans, Eclipse, SQL Developer, Windows, Linux and iOS.

Face Verification and Recognition System **Dec 2011 - Aug 2012**
Hubino Technologies, Chennai, India
Software Engineer

Description: The project is to use face to authenticate a user. Face Authentication technology replaces traditional password based technology to gain access to bank accounts, emails, social networking sites, etc.

Responsibilities:

- Gathering Functional & Technical Requirements based on the Business Functional specs

collected from the Business Team.
- Designed and developed **Metrics** to evaluate accuracy and performance of the algorithms.
- Collected **Face Data** for testing and validation of the system. The face data has been collected from people of different race, gender and ethnicity. The face images captured are at different poses and ambient light conditions.
- Integrated **Face Detection** functionality into the system with Adaboost Cascade Classifier using Haar/LBP features. Tested the accuracy and performance of Active Shape Models, Active Appearance Models, and Constrained Local Shape Models with Random Forests.
- Integrated **Spoof Attack Detection** into the system as additional security measure.
- Developed **Image Quality Metrics** to filter images and improve accuracy of recognition algorithms. Sharpness, Illumination and Pose of the images are used for checks.
- Added **Image Preprocessing** filter to improve image quality. The filter includes illumination normalization, pose correction and image alignment to the pipeline
- Integrated **Feature Extraction** and **Classification** filters. Tested different algorithms and chose an algorithm which meets the requirement.
- Designed **Enrollment** and **Authentication** use cases for the system.
- Actively participating in architectural meetings and design changes.
- Involved in Peer-to-Peer code review.

Environment: C, C++, Matlab, OpenCV, NetBeans, Windows

3D Reconstruction of CT-Scan **May 2011 - Jun 2011**
Perfint HealthCare, Chennai, India
Intern, Q&A Team

Description: The software is developed for a robot which assists doctor in treatment of cancer. The technology is novel in interventional oncology. The software takes 2D CT Scans as input and reconstructs the images into a 3D object.

Responsibilities:
- Attending **daily standup, retrospective, iteration planning, sprint backlog and product backlog** meetings.
- Validate the software by creating **3D objects** to serve as ground truth.
- Created 3D objects of known dimensions.
- Slice the 3D objects into images with separation t simulating the CT Scan.
- Converting the images into **Dicom** Format to provide as input to the software.
- Developed metrics to calculate the accuracy of the software.

Environment: Matlab, DICOM Images

Academic Projects

Face Recognition Algorithms **Jul 2011 – Dec 2011**
- The aim was to study various algorithms to obtain illumination invariant face recognition.
- Implemented feature extraction algorithms like Principal Component Analysis, Linear Discriminant Analysis, Kernel Discriminant Analysis and Local Binary Pattern.
- Also implemented preprocessing on the images using Difference of Gaussian filter and Discrete Cosine Transform. The performance of the feature extraction algorithms increased very much after the preprocessing is done on the images.
- All the above algorithms were implemented using Matlab.

Speech and Music Signal Separation **Oct 2011 – Nov 2011**
- Aim of the project is to separate speech from music signals
- Used various features like variance of zero crossing rate, percentage of low energy frames, linear predictive coding residual.
- Achieved an efficiency of 95.7% for music samples and an overall efficiency of 84.8% on the data used.
- The project was implemented using Matlab.