Varun Dagar

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AREAS OF INTEREST

Embedded Systems
Multimedia streaming
Realtime low latency systems

System Software
Operating System
Device Drivers

Machine Learning
Computer Perception
Knowledge Graphs

WORK EXPERIENCE

R&D Software Engineer - III, Broadcom Inc., Bangalore, India **Mar 2015 – Jul 2019**
Developed software components of Automotive SDK for ARM-based AVB enabled camera/display endpoints (BCM8910x) and ethernet switches(BCM8953x/56x) SoCs. Software components were architected on message-based Client-Server Software architecture. The software was optimized for small memory footprint, low latency & real-time constraints. Software components were developed in compliance with AutoSAR, MISRA-C, ISO26262 standards.

Majorly contributed to:

- Software components for BootROM, Bootloader, RTOS, and multi-threaded applications.
- OS thread protection, IPC, Memory manager.
- Flash partition manager, Secure boot image & configuration updater & manager.
- Owned proprietary Multimedia framework
- Owned device drivers for Audio (I2S Controller, Codec), Ethernet (MAC, PHY, Buffer Queues), DMA, I2C, SPI, Flash, Watchdog, Timers, UART, PWM, MCU.

Responsibilities included – SDLC - Software development and documentation, code and document review, analysing and debugging component-level & system-level issues, chip and board bring-up.

Senior Engineer, Ittiam Systems Pvt. Ltd., Bangalore, India **Jul 2012 – Feb 2015**
Developed software for Audio-Video encoder/decoder(streaming servers) on Texas Instrument's ARM-based DM8168/69 SoCs. Lead a team of two engineers to develop and deliver the board-support package for custom boards.

Majorly contributed to:

- OpenMAX based video components
- Linux audio (ALSA) framework - kernel space driver and driver abstraction layer.
- Owned device drivers - TSIF, EDMA.
- Designed and developed a novel software license protection scheme.

Graduate Teaching Assistant, Georgia Institute of Technology **Fall 2019 – Fall 2020**
Introduction to Computer Security – Enabled the deployment and adoption of docker containers-based lab framework.

SELECTED PROJECTS

Semi-Supervised Fine-Grained Image Classification **Georgia Tech, Spring 2020**
Developed model for CVPR-2020 semi-supervised image recognition challenge. Implemented FixMatch – ResNet50 and FixMatch-WideResNet architectures using PyTorch to do semi-supervised learning on a corpus of unlabeled images. Dataset had 200 classes, 4K labelled train images, 26K unlabeled train images, 2K labelled validation image.

Link/Entity Prediction on Biomedical Heterogeneous Knowledge Graph **Georgia Tech, Spring 2020**
Developed novel links/entity prediction model using PyTorch based Deep Graph Library(DGL). Supervised link and entity prediction were performed on the embedding of the graph nodes learned using GCN, GraphSAGE, TransE and RotatE algorithms. The Graph contained 47K entities, 400K relation, 120 entity types, 61 relation types.

Object Detection in RGB-D images **Georgia Tech, Fall 2019**
Developed multi-objects detection model in RGB-D images using LightNet & R-CNN deep architectures. EPFL RGB-D pedestrian dataset used. The model performance was relatively better compared to RGB images.

Image Denoising **Georgia Tech, Fall 2019**
Developed Supervised (CNN, ResNet50), and Unsupervised (PCA) learning models to denoise images in Python. Pascal and CBSD68 datasets used. Achieved result improvement of PSNR-10 with high noise.

EDUCATION

M.S. - Computer Science, **Georgia Institute of Technology** Aug 2018 - Dec 2020
B.E. - Electronics and Communication Engineering, **University of Delhi** Aug 2008 - May 2012

SKILLS/TOOLS

- C – Advanced Level
- C++, Python – Intermediate Level
- Linux, RTOS (OSEK OS) – Interrupts, Schedulers
- Data Structures, Algorithms, Multi-thread program
- Libraries – OpenCV, Pandas, Numpy, NLTK, Scikit-learn, DGL, Beautifulsoup
- ARM architecture – M7/R4/A8
- Shell, Makefiles, Linker scripts – Intermediate
- Debugger - GDB, Trace32 – Lauterbach/Segger
- Understanding of Board Schematics
- Tools - Coverity Static Code Analyzer, CTC++
- Tools - Oscilloscope, Multimeter
- Palladium RTL emulator - Hands-on experience
- Git, Gerrit – Hands on experience