DEEBTHIK RAVI

| deebthik.com ↗ | linkedin.com/in/deebthik ↗ | github.com/deebthik ↗ | deebthik@gmail.com | +91 9566596100 |

EDUCATION

NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI ↗
B.Tech (First Class) - Electrical & Electronics Engineering
Trichy, Tamil Nadu, India | 2016 - 2020

THE INDIAN HIGH SCHOOL DUBAI ↗
CBSE AISSCE - Science Stream with Computer Science
Dubai, UAE | Grad. 2016

RELEVANT COURSEWORK

Data Structures and Algorithms
Computer Organization
Operating Systems
Database Management Systems
Network Security
Big Data Analytics
Software Engineering
Artificial Neural Networks

WORK & RESEARCH EXPERIENCE

VISTEON ↗ | Software Engineer II (Cybersecurity) — Bangalore, India | Aug 2020 – Present
- Implementing Secure Boot, Secure Storage, PKI, etc. for automotive ECUs on SoCs from Qualcomm, Mediatek, etc.
- Developing Android and QNX crypto libraries & encryptions to facilitate AppSec, PKI, & TrustZone infrastructures
- Researching novel topics for product innovation - Software-Based PUF & MFHE and SIR tech stack with Dispatch
- Created a lightweight Java obfuscation API for runtime protection on custom-coded Firmware and Android HLOS
- Optimized the Secure Boot time for a modified NXP I.MX6, by 10x, using Falcon Mode, U-Boot SPL & Linux Kernel

NEW YORK UNIVERSITY ABU DHABI ↗ | Research Intern — Abu Dhabi, UAE | May–Jul 2020
- Researched in Static Binary Analysis for unknown binary formats using Semantic Segmentation and Deep Learning
- Leveraged space-filling curves to transform binaries into 2D images, as input to feed into CNN models on DeepLab
- Eventually achieved an average accuracy of 91% for separating code and data sections in non-standard binary files

INDIAN INSTITUTE OF TECHNOLOGY MADRAS ↗ | Research Intern — Chennai, India | Dec–Jan 2020
- Explored Side-Channel Attacks and its methodologies - SPA, DPA, Hiding, Masking, Cipher Cracking, & PLATYPUS
- Worked on masking an integral 32-bit adder circuit module to protect its operands from Differential Power Analysis
- Used the precomputation method and dynamic width of possible operands to introduce a high activation probability

PROBE INFORMATION SERVICES ↗ | Software Developer Intern — Bangalore, India | Dec–Jan 2019
- Worked as a Full-Stack Developer on Probe's microservices and server architectures with Java, PHP, Nginx, & AWS
- Partly worked with the Data Science team in improving data extraction from documents by 7x using Python & NLTK

NATIONAL INSTITUTE OF TECHNOLOGY TRICHY ↗ | Research Intern — Trichy, India | Sep–Oct 2018
- Studied and worked on Secure Smart Grid Communication with Elliptical Curve Cryptography implemented in C++
- Developed the end-to-end structure: calculation of jump points, generation of keypairs, encryption of messages, etc.
- Optimized the implementation of point multiplication and addition operations in the binary finite field $GF(2^{163})$

ABB ↗ | Cybersecurity & Network Engineering Intern — Chennai, India | May–Jul 2018
- Worked on the Cybersecurity framework of MACH and SCM for substations, and implemented Patch Management
- Reduced the data latency in SCADA & TCP/IP software stacks for Substation Automation and Control & Protection

PUBLICATIONS & PREPRINTS

PRIVACY PRESERVING TRANSPARENT SUPPLY CHAIN MANAGEMENT THROUGH HYPERLEDGER FABRIC ↗
Blockchain: Research and Applications (Elsevier) ↗
Ravi, D., Ramachandran, S., Vignesh, R., Falmari, V. R., Brindha, M. | National Institute of Technology Tiruchirappalli

BINSEG: LEVERAGING SEMANTIC SEGMENTATION FOR CODE AND DATA SEPARATION IN NON-STANDARD BINARY FORMATS ↗ — Preprint (In Review)
Benkraouda, H., Ravi, D., Ansari, A., Kumar, G., Maniatakos, M. | New York University Abu Dhabi

DISTINCT FIRMWARE SECURITY USING SOFTWARE-BASED PUF AND MFHE — R&D Whitepaper (Submitted)
Ravi, D. (Software Engineer II) | Visteon Corporation (Global Cybersecurity Team)

SKILLS

PROGRAMMING: Python, C/C++, Java, Bash, Javascript, Ruby, PHP, SQL, HTML, CSS, Haskell, Rust

DEVELOPMENT: Linux/Unix, Android, QNX, Crypto, Unity, OS-BSP, Web

FRAMEWORKS: OpenSSL, Metasploit, Git, Hyperledger Fabric, Vue.js, DeepLab, IDA Pro, Docker

CERTIFICATIONS

eJPTv2 | eLearnSecurity - [In Progress]

Machine Learning | Stanford University - [Coursera]

Cryptography I | Stanford University - [Coursera]

Computer Communications Specialization | CU System - [Coursera]

Data Structures & Algorithms Specialization | UC San Diego - [Coursera]

Deep Learning Specialization | DeepLearning.AI - [Coursera]

Secure Coding Practices Specialization | UC Davis - [Coursera]

Blockchain Specialization | University at Buffalo - [Coursera]

SELECTED PROJECTS

PERMISSIONED & PRIVACY PRESERVING SUPPLY CHAIN BLOCKCHAIN USING HYPERLEDGER FABRIC ⬀

Undergraduate thesis-project at NIT Trichy under Dr. M. Brindha. The goal of this research project was to enable a more nuanced blockchain architecture using Hyperledger Fabric, that would draw the best balance between traditional web technology and a public blockchain, including privacy protection and security. A preliminary analysis was performed, then the proposed system was formulated and implemented - Network, Chaincode SDK, Asset Definition, Rest API, and the Membership & Access Control which constituted the crucial security & privacy components i.e. TLS, PKI and Identity Mixer (ZKP). Finally an E2E performance evaluation was performed to strengthen the proof-of-concept. [Publication-Elsevier]

CODE & DATA SEPARATION FOR UNKNOWN BINARY FORMATS USING SEMANTIC SEGMENTATION ⬀

Research internship at NYU-AD under Dr. M. Michail with B. Hadjer. The aim of this research project was to automate one of the stages of binary analysis - code and data separation. The binary files were converted into images using space-filling curves. Next, image-based machine learning algorithms were leveraged to perform semantic segmentation to identify the data and code sections of binary images. The model was trained using DeepLab on known binary formats and then tested on binary files of non-standard formats. The results showed that the trained model had achieved a maximum accuracy between 91.91% and 89.22% depending on the underlying methodology used for interpreting the binary files. [Preprint]

SECURING FIRMWARE USING PHYSICALLY UNCLONABLE FUNCTION AND HOMOMORPHIC ENCRYPTION

R&D side-project at Visteon. The objective of this research project was to explore how an intrinsic PUF (on DRAM) can be implemented through software on a generic SoC for various cryptographic security solutions. First, a Python+C algorithm library was built for the key generation scheme and reliability & uniqueness test of stable bits, to derive a Root-of-Trust. Then, this implementation was extrapolated and combined with MFHE (AES+RSA) to construct the final system, enabling unique multi-key Secure Boot, Disk Encryption and Secure Update. The proof-of-concept was tested on a Rasberry Pi 3B+.

VISCOIN: ROAD SAFETY INCENTIVISATION USING COMPUTER VISION & IPFS ⬀

Runner-up at the Pragyan Hackathon 2019. This project was aimed as a blockchain incentivization system for drivers and solution to the problem of driver drowsiness. Signs for such scenarios were detected and quantified using OpenCV and empirical heuristics, into a custom "drowsiness index" which was stored using IPFS. This metric was then used to reward or deduct a custom coin i.e. "VisCoin" to or from the driver's digital wallet, using smart contracts developed with Solidity.

ANDROID-UNITY GAME & APPLICATION SUITE ⬀

Self-driven set of side-projects as a self-taught App Developer, from high school till the end of college. Ideated, designed and created several Android games and applications with the Unity engine and Android SDK, using Java, C# and Javascript. Developed, tested and published some of the apps online, the major ones being a suite of gaming apps. [Google Play Store]

ACTIVITIES & RESPONSIBILITIES

SentiDA | Co-Founder ⬀	Remote | Jul 2020 – Present
VyuWing Learning | Mentor - Cybersecurity ⬀	Remote | Jun 2021 – Aug 2022
United Nations Volunteers | Online Volunteer ⬀	Remote | Feb 2021 – May 2022
OWASP - NIT Trichy | Co-Founder and Head-CTFs ⬀	NIT Trichy | Oct 2019 – Jul 2020
Music Troupe | Saxophonist & Keyboardist ⬀	NIT Trichy | Jun 2019 – Feb 2021
TEDxNITTrichy | Head of Graphic Design ⬀	NIT Trichy | Feb 2018 – Mar 2019
Delta Force | System Administrator ⬀	NIT Trichy | Jun 2017 – May 2018
National Service Scheme | Student Volunteer ⬀	NIT Trichy | Jul 2016 – Jun 2017