# SIBI CHAKKARAVARTHY S B.E, M.Tech, Ph.D.,

**Security Researcher - Network Security | Targeted Cyber Attacks | Advanced Persistent Threats | Malware analysis**

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## Education

- **Ph.D (2018): Network and System Security**

  **Anna University (Madras Institute of Technology (MIT) campus), Chennai.**

  **CGPA - 8.4.**

  **JRF - Department of Science and Technology (DST) Fellow**

  **Thesis Title: Targeted Cyber Attacks and their mitigation techniques**

- **Master of Technology (2014): Computer Science and Engineering**

  **VelTech Rangarajan Dr.Sagunthala R&D Institute of Science And Technology, Chennai**

  **CGPA - 8.9.**

- **Bachelor of Engineering (2012): Computer Science Engineering**

  P.S.R Engineering College, **Anna University, Chennai**

  **CGPA - 8.1**.

## Work Experience

- **Associate Professor, Vellore Institute of Technology – Andhra Pradesh (VIT-AP), 17.09.2018 - Till date.**

- **Assistant Professor, Vellore Institute of Technology – Andhra Pradesh (VIT-AP), 09.05.2018 - 16.09.2018.**

- **Junior Research Fellow (DST-PURSE II)**
  **Department of Electronics Engineering, Anna University (MIT Campus),**
  **(14.03.2015 - 31.12.2017)**

- **Junior Research Fellow (DST-NRDMS)**
  **Project title: "Complex Event Processing for sensor network"**
  **AU-KBC Research Centre, Anna University (MIT Campus),**
  **(04.1.2015 - 13.03.2015)**

## Research Grant

| | | |
|---|---|---|
| **Title** | **:** | **GPU accelerated security system** |
| Funding agency | : | **NVIDIA** |
| Grant in INR | : | **1.7L** |
| Duration | **:** | **01.07.2018 - 01.07.2019** |

## Fellowship, Awards and Achievements

- **Global Speaker Grant (2019) –** Sponsored by **University System of New Hampsire, United States of America.**
  **Grant Worth: $3000 USD.**

- **Junior Research Fellow (2015 – 2017) – Sponsored by Department of Science and Technology (DST) for pursuing Ph.D.**

## Research Experience

**Remote Health Monitoring System [Award Winner - Hackathon]**

- Deployed a cloud infrastructure using OpenNebula.
- Examined the literature on Activity recognition, remote healthcare and vital sign classification algorithms.
- Designed a Machine Learning based remote health monitoring system that performs intelligent diagnosis alerting the most common abnormalities such as fall, ECG, blood pressure and oxygen level - **National Winner in healthcare vertical**, Open Innovation Hackathon for Smart villages, 2017, organized by **Andhra Pradesh** Government.
- Genetic Algorithm is used (Selection, Mutation, Crossover).
- Fitness estimation is performed in each layer in order to estimate the best chromosome to fit.
- Scaled individual data node's disk space usage by setting up an alert threshold.

**Automatic Leaf Vein Feature Extraction**
**(Research Intern at SS & DM group, C-DAC, Pune)**

- Automatic Leaf Vein Feature Extraction
- Hough lines are used to extract the first degree veins and Centroid vein angle (medial axis line) is considered to be the primary feature.
- Skeletonization (Thinning) algorithm is applied to extract the possible medial axis from the veins and finally a pruning algorithm is applied to determine the dominant veins.
- A Sequential correlation is applied in order to perform template matching.
- Designed a plugin for leafilia (leaf recognition system developed by C-DAC) to extract first degree vein from leaf images.

**Face spoof attack detection**

- A hybrid feature descriptor such as Color Local Binary Pattern (CLBP), Haralick feature, Color moment are used.
- Optimized the feature extraction phase using GPU-based real-time data analyses and speed up more than 5 times.
- NVIDIA Quadro K2000 is used for optimizing computation.
- OpenCV library is used for implementation

**Automatic Phishing detection using machine learning techniques (algorithms)**

- Hybrid classification model is used to classify the phishing pages
- Ensemble of classifiers are used (Intermediate layer and Decision layer)
- Intermediate layer - Classifiers used: K-NN, RandomForest, Logistic regression, DNN (MLP with 5 neurons for each layer, Maximum epoch = 750)
- Random forest is further used to classify the results of intermediate layer.

**Trajectory based Abnormal Event Detection in Video Traffic Surveillance**

- General Potential Data field (GPDf) is used along with spectral clustering to detect outliers such as illegal U-Turn, frequent lane changing and overlapping.
- Nvidia Quadro K2000 is used for GPDf estimation (approximately 1000 trajectories)
- Complex Event Processing (rule) Engine is used to make decisions.

**Intrusion Detection Honeypot**

- Examined the literature on Honeypot, Intrusion Detection System, CEP etc.
- Designed a Hidden Markov Model based Honeypot to detect and prevent ransomware attacks.
- Hidden Markov Model is used as the classifier to classify the ransomware and benign activities.
- Viterbi algorithm is used for training the samples.
- Complex Event Processing (CEP) engine is deployed to aggregate the data from different security systems to confirm the ransomware behavior, attack pattern and respond them in a timely manner.
- Handled nearly 100+GB of logs.

**CEP based Hybrid Intrusion Detection System**

- Examined the literature on Honeypot, Intrusion Detection System.
- Designed a CEP based Hybrid IDS that integrates the output of the Host IDS and Network IDS into the CEP Module and produces a consolidated output with higher accuracy.
- Multivariate Correlation Analysis (MCA) is used to estimate and characterize the normal behavior of the network.

## Git

- **https://github.com/sibichakkaravarthy**

## Professional Experience

- Experience with varied forms of practical data, including drone data, healthcare, logs & other high-dimensional data
- Strong expertise in detecting intrusions via network scans and deep packet analysis
- Hands-on experience in deploying cloud servers (OpenNebula, Openstack) and monitoring the Server Health status, backup management, update checklist and reports based on daily, weekly and monthly basis.

- Hands-on experience in deploying Honeypot (Dionaea) and Malware analysis sandboxes (Cuckoo) in production environment.
- Hands-on experiencein deploying SIEM (OSSIM) to monitor real time security events (visualization using ELKB) using Elasticsearch, Logstash, Kibana and Beats (ELKB).

## Selective Publications

### Journal

1. **S. Sibi Chakkaravarthy**, V. Vaidehi and Steven Walczak,"Cyber Attacks on Healthcare Devices Using Unmanned Aerial Vehicles", Journal of Medical Systems, **Springer, (SCIE).**

2. D. Arivudainambi, K.A. Varun Kumar, **S. Sibi Chakkaravarthy**, P. Visu, "Malware traffic classification using principal component analysis and artificial neural network for extreme surveillance", Computer Communications, **November 2019**, **Elsevier, (SCIE)**.

3. Akshay T, **S. Sibi Chakkaravarthy**, D. Sangeetha, M. Venkata Rathnam, V. Vaidehi,"Role Based Policy to Maintain Privacy of Patient Health Records in Cloud", Journal of Super Computing, **June 2019**, **Springer**, **(SCIE)**.

4. **S. Sibi Chakkaravarthy**, D. Sangeetha and V. Vaidehi,"Intrusion Detection System to detect Wireless attacks in IEEE 802.11 networks", IET networks, **July 2019**, Volume 8, Issue 4, pp. 219- 232, **IET**.

5. **S. Sibi Chakkaravarthy**, D. Sangeetha and V. Vaidehi,"A Survey on malware analysis and mitigation techniques", Computer Science Review, **May 2019, Elsevier, (SCIE)** .

6. Jerart Julus L, Manimegalai D, **S. Sibi Chakkaravarthy**, "FBMC-Based Dispersion Compensation Using Artificial Neural Network Equalization for Long-Reach Passive Optical Network", International Journal of Wavelets, Multiresolution and Information Processing, **April 2019, World Scientific Publisher**, **(SCIE)**.

7. Joshan Athaneious, **S. Sibi Chakkaravarthy**, S. Vasuhi and V. Vaidehi, "Trajectory based Abnormal Event Detection in Video Traffic Surveillance using General Potential Data field with Spectral clustering", Multimedia Tools and Applications, **February 2019, Springer**, **(SCIE)**.

8. **S. Sibi Chakkaravarthy**, D. Sangeetha, M.Venkata Rathnam, K.Sri nithi, V. Vaidehi; "Futuristic cyber-attacks", International Journal of Knowledge based and Intelligent System Engineering, Vol.22, no.3, pp. 105- 204, 2018. **IOS press**.

9. **S. Sibi Chakkaravarthy**, P.Rajesh and V. Vaidehi,"Hybrid analysis technique to detect Advanced Persistent Threats", International Journal of Intelligent Information Technologies, 59 -76, Volume 14, Issue Q2, 2018, **IGI Global**.

10. V Mohanraj, **S. Sibi Chakkaravarthy**, I Gogul, V Sathiesh Kumar, Ranajit Kumar, V Vaidehi ; "Hybrid Feature Descriptors to Detect face Spoof Attacks", Journal of Intelligent & Fuzzy Systems, vol. 34, no. 3, pp. 1411-1419, 2018, **IOS press, (SCIE)**.

11. D. Arivudainambi, Varun Kumar K.A and **S. Sibi Chakkaravarthy**; "LION IDS: A meta-heuristic approach to detect DDoS attacks against Software Defined Networks", Neural Computing and Applications, 1-11, 2018, **Springer, (SCIE)**.

## Monographs/Books/Book Chapters

12. V Mohanraj, **S. Sibi Chakkaravarthy**, V Vaidehi; Ensemble of Convolutional Neural Networks for Face Recognition, Recent Developments in Machine Learning and Data Analytics, vol 740, 467-477, Springer, Singapore, 2019.

13. V Vaidehi, Ravi Pathak, Renta Chintala Bhargavi, Kirupa Ganapathy, C Sweetlin Hemalatha, A Annis Fathima, PTV Bhuvaneswari, **Sibi Chakkaravarthy S**, Xavier Fernando. Enhanced Complex Event Processing Framework for Geriatric Remote Healthcare, Handbook of Research on Investigations in Artificial Life Research and Development, 348-379, 2018, IGI Global.

## Conference

14. Mohan Raj, I Gogul, M Deepan Raj, V Sathiesh Kumar, V Vaidehi, **S Sibi Chakkaravarthy**; Analyzing ConvNet Depth for Deep Face Recognition, Second International Conference on Computer Vision & Image Processing", CVIP'17, IIT Roorkee, September 09 -12, 2017.

15. **Sibi Chakkaravarthy S** and V. Vaidehi; Drone based Targeted Cyber Attacks: A Practical Study, Doctoral colloquium, IDBRT, November 30 - December 1, 2017.

16. **Sibi Chakkaravarthy S** and V. Vaidehi; Deploying Low Interaction Honeypot for Darknet, Security and Privacy Symposium 2016 (SPS'16), IIITDelhi, February 12-13, 2016.

17. **Sibi Chakkaravarthy S** and V. Vaidehi; Hybrid analysis model to detect Advanced Persistent Threats, International Summer School on Information Security and Protection (ISSISP'16), 02-06 August, 2016. **(Best Research Paper award).**

18. **Sibi Chakkaravarthy S** and V. Vaidehi; Behavior based anomaly detection model for detecting wireless covert attacks in Wi-Fi, Security and Privacy Symposium(SPS'15), IIITDelhi, February 13-14, 2015.

19. Ranjan Mohan, V Vaidehi, Ajay Krishna, M Mahalakshmi, **S Sibi Chakkaravarthy**; Complex Event Processing based Hybrid Intrusion Detection System, ICSCN'15, March 26-28, 1-6, 2015.

20. **S Sibi Chakkaravarthy**, G Sajeevan, E Kamalanaban, KA Varun Kumar; Automatic Leaf Vein Feature Extraction for First Degree Veins, SIRS'15, IIIT Kerala, AISC, 581-592 , Springer.

21. **Sibi Chakkaravarthy S** and V. Vaidehi; Detecting Covert attacks in Wireless networks, International Conference on Cloudification of the Internet of Things, June 10-11, 2015, Paris, France.

22. Kamalanaban Ethala, R Sheshadri, **S Sibi Chakkaravarthy**; WIDS-Real Time Intrusion Detection System using Entropical Approach, ICAEES, Artificial Intelligence and Evolutionary Algorithms, Springer, 73-79, 2014.

## Magazine

1. **Sibi Chakkaravarthy S** and Deepsagar Mandal**;** "Things you should know about Buffer overflow", eForensics Magazine, March 2019.

2. **Sibi Chakkaravarthy S**; "Dissecting malwares using sandboxing technique", Pawning through Powershell, PentestMag, November 2016.

3. **Sibi Chakkaravarthy S**; "Volatility: The open source framework for memory forensics", Open Source for you, October 2016, EFY publishers.

4. **Sibi Chakkaravarthy S**; "Introduction to Qubes", Open Source for you, March 2016, EFY publishers.

5. **Sibi Chakkaravarthy S**; "Exploring processes using Sysinternals", Open Source for you, January 2016, EFY publishers.

6. **Sibi Chakkaravarthy S**; "Malware analysis using REMnux" – Second series, Open Source for you, November 2015, EFY publishers.

7. **Sibi Chakkaravarthy S**; "Malware analysis using REMnux", Open Source for you, October 2015, EFY publishers.

8. **Sibi Chakkaravarthy S**; "Things you should know about Advanced Persistent Threats", Open Source for you, August 2015, EFY publishers.

## Active Projects

1. **AI enabled Chatbot**
    - **Chatbot name: VIT Assist, VIT Admissions.**
    - **Available live in Google Assitant**
2. **TARS: The Autonomous Rhapsody spider**
3. **Humanoid – A physical personal assistant**

## Student Research (under my guidance)

1. "Tools that Accelerate a Newbie's Understanding of Machine Learning", Open Source for you, October 2019, EFY publishers.
2. "An Introduction to Processing, a Tool for Graphics Designers", Open Source for you, November 2018, EFY publishers.
3. "Designing a simple 3d block jumper game", Open Source for you, January 2019, EFY publishers.
4. "Things you should know about Buffer overflow", eForensics magazine, Volume 08, 2019.

## Courses Handled

- Problem Solving using Java, Theory and Lab, Fall 2019.
- Web Technologies, Theory and Lab, Fall 2019.
- Problem solving using CPP, Lab, Summer 2018.
- Computer Graphics, Theory and Lab, Fall 2018.
- Secure Coding, Theory and Lab, Winter 2018.

## Event Organized

- One day Hackathon at VIT-AP on 08.10.2018.
- Four days FDP on Python and Java programming, 16.04.2019 – 20.04.2019.
- One day Workshop on Cyber Security, 04.11.2019.

## Editorship

- **Associate Editor, International Journal of Cognitive Informatics and Natural Intelligence (IJCINI), IGI Global Publisher.**

**Reviewer**

- **Computer Networks, Elsevier.**
- **IEEE Consumer Electronics, IEEE.**
- **Journal of Super Computing, Springer.**
- **IEEE Access, IEEE.**
- **International Journal of Cognitive Informatics and Natural Intelligence (IJCINI), IGI Global.**
- **Journal of Organization and End User Computing, IGI Global.**

**References**

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**Place:Chennai**

Date: 01.11.2019 **SIBI CHAKKARAVARTHY S**