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SANJAY MALAKAR

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RESEARCH INTEREST

Software Engineering, Computer/Software Security, Programming Languages.

EDUCATION

Bangladesh University of Engineering and Technology (BUET) — **Dhaka, Bangladesh** — **Mar 2016 – Feb 2021**

- BSc. in Computer Science and Engineering
- CGPA: *3.60/4.00*
- Thesis supervisor: Dr. Rifat Shahriyar
- Selected coursework: Compilers, Operating Systems, Database Systems, Computer Networks, Computer Architecture, Bioinformatics, Digital System Design, Algorithms, Data Structures, Artificial Intelligence, Machine Learning

Notre Dame College — **Dhaka, Bangladesh** — **Jul 2013 – Jun 2015**

- Higher Secondary School Certificate
- GPA – *5.00/5.00*

PROFESSIONAL EXPERIENCE

Senior Software Engineer — **OpenRefactory, Inc. | CA, USA** — **Feb 2021 – Present**

Working on Intelligent Code Repair (iCR), which is a static analysis-based bug detection engine that (1) detects bugs that other tools miss, (2) does that with dramatically low false warnings, and (3) is the first and only tool in this space that can also synthesize fixes automatically for over half of all the bugs detected. I am currently working here remotely from Dhaka, Bangladesh. Worked on iCR for Java and Python.

Key responsibilities and contributions:

- Contributed to the core IP of iCR by working on the static program analysis.
- Developed and implemented algorithms for the pointer analysis engine.
- In-depth performance hacking by updating the serialization mechanism of iCR with ProtoBuf.
- Contributed to the creation of deep learning-based algorithms to detect logical bugs in Python code.
- Contributed to creating a Kubernetes-based deployment of iCR.
- R&D on software weakness and vulnerabilities.
- Contributed to the CI/CD pipelines.

RESEARCH AND PUBLICATIONS

- **Developer Discussion Topics on the Adoption and Barriers of Low Code Software Development Platforms.**
  Md Abdullah Al Alamin, Gias Uddin, Sanjay Malakar, Sadia Afroz, Tameem Bin Haider, Anindya Iqbal
  We were invited to extend the MSR 2021 paper titled, *An Empirical Study of Developer Discussions on Low Code Software Development Challenges* for the Special Issue of MSR 2021 of the Empirical Software Engineering (EMSE) journal.
  Status: Accepted for publication at the *EMSE Journal*. (preprint)
- **An Empirical Study of Developer Discussions on Low-Code Software Development Challenges.**
  Md Abdullah Al Alamin, Sanjay Malakar, Gias Uddin, Sadia Afroz, Tameem Bin Haider, Anindya Iqbal
  We presented an empirical study of around 5K SO posts that contain discussions of nine popular LCSD platforms. We applied topic modeling to the posts to determine the types of topics discussed. Our study findings offer implications for low-code practitioners, platform providers, educators, and researchers.
  Status: Accepted in *2021 IEEE/ACM 18th International Conference on Mining Software Repositories (MSR)*. (pdf)
- **RaceFixer - An Automated Data Race Fixer** (BSc. Thesis)
  Sanjay Malakar, Tameem Bin Haider, Rifat Shahriar
  We presented *RaceFixer*, a clang-based tool that automates the process of fixing single-variable atomicity violations. Using the bug reports of an existing bug-detection tool *ThreadSanitizer*, it augments these with static analysis to construct a suitable patch for each bug report. It combines the patches of multiple bugs for better performance and code readability.
  Status: Ongoing.

Scholarships and Achievements

- Achieved *'Merit Stipends'* from BUET in four out of seven terms
- Got *'Dean's Award'* in Junior year from BUET for extra-ordinary result
- Received *'Shapla Cub Award'* from the honorable Prime Minister of Bangladesh for extraordinary performance as a Cub Scout
- Achieved *'Bangladesh Education Board Scholarship'* in Higher Secondary School Certificate Examination (2015-2020), Secondary School Certificate Examination (2014-2015), and Junior School Certificate Examination (2011-2012)

Languages and Technologies

- **Languages** Java, C, C++, Python, JavaScript, Matlab, Shell, Dart
- **Database:** Oracle, MySQL, SQLite, MongoDB, Firebase
- **Frameworks:** Django, React, Flutter, Express.js, JavaFX, Scrapy
- **Libraries:** NumPy, Pandas, TensorFlow, Scikit-learn, Matplotlib
- **Technical Writing:** LaTeX, Beamer, Overleaf
- **DevOps:** Docker, Kubernetes, OpenShift, Jenkins, Ansible, AWS, Linode
- **Others:** Git, NS2, Eclipse JDT, IntelliJ Platform SDK, Gradle, Maven, CMake

Selected Academic Projects

- **DNS Cache Poisoning** (GitHub link)
  Remote DNS cache poisoning attack exploiting Kaminsky's DNS Cache poisoning flaw.
  Tools: Bind9, Virtual Machines
- **Website Development for Flight and Hotel Room Reservation System** (GitHub link)
  Developed a website where customers can book flight tickets and hotel rooms through card payment, and companies can update their page and manage bookings.
  Tools: Django, JavaScript, SQLite
- **Micro-controller Project: DX-Ball** (YouTube video link)
  The popular arcade game DX-Ball with LED Dot Matrix and Atmega32 micro-controller.
  Tools: Micro-Controller, Accelerometer Sensor, LED Matrix
- **Software Development for Football Club Management**(GitHub link)
  An application that stores all information about the club (players, managers, games). The club's Admin can update, add, and delete this information and generate graphs from given data.
  Tools: Java, JavaFX, Oracle Database
- **Tic-Tac-Toe** (GitHub link)
  Tic-Tac-Toe game using Minimax algorithm created in C++ using a wrapper for OpenGL in 2D.
  Tools: Game Theory, OpenGL
- **Miscellaneous**
  - **C Compiler:** Using lexical analyzer and parser designing tools.
  - **4-bit Microprocessor:** Using Atmel Studio, MIPS architecture.
  - **AI:** Simulating Mancala game by using basic algorithms in Artificial Intelligence.
  - **Machine Learning:** Exploring different ML algorithms such as KNN, decision tree, naïve bayes, neural network, etc.
  - **Networking:** Modifying some functionalities of the computer network in NS2.
  - **Others:** Implementing some functionalities of an OS on XV6, Ray tracing using OpenGL.

Activities

- Attended Global DevSlam '22 in Dubai, UAE as an exhibitor.
- Actively worked as an organizer of BUET CSE FEST 2019, 2020, which includes Hackathon, Inter-University Programming Contest, and other CS-related programs.
- Participant, ICPC Dhaka Regional
- Member, Notre Dame Nature Study Club
- Hiked to the summits of Keokradong and Chimbuk Hill located in Bandarban, Bangladesh

Standardized Test Scores

TOEFL: 103/120 (Reading: 25, Listening: 29, Speaking: 23, Writing: 26)