

# Sudhir Gunaseelan

Portfolio: [sudhir848.github.io/My-Personal-Portfolio/](https://sudhir848.github.io/My-Personal-Portfolio/)  
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## SUMMARY

Pursuing M.S. in Computer Science (Cybersecurity option) at UMass Lowell, expected December 2025. Strong foundation in software development, algorithms, and computer systems, with hands-on experience building projects and solving complex programming challenges. Seeking opportunities to apply technical expertise in software engineering and cybersecurity to address real-world problems.

## SKILLS

- **Programming Languages:** Python, C, C++, HTML/CSS, JavaScript and SQL.
- **Frameworks/Libraries:** SFML, Flutter, jQuery UI, React, Bootstrap, Node.js, Express.js, REST API, OpenCV, TensorFlow, PyTorch, Keras, scikit-learn, NumPy, and Pandas.
- **Software/Tools:** Visual Studio Code, GitHub, Git, Oracle VirtualBox, Linux, Ubuntu, Kali Linux, Putty, and Wireshark.
- **Soft Skills:** Time-management, Active Listening, Problem-Solving, Teamwork, and Communication.

## EDUCATION

### Master of Science (M.S.) in Computer Science - Cybersecurity

- University of Massachusetts Lowell, Lowell, MA September 2024 – December 2025  
*Coursework: Algorithms, Data Communications, Database, Natural Language Processing, Computer & Network Security, Malware Analysis, Artificial Intelligence, Fundamentals of Robotics, Computer Architecture and Design, Intrusion Detection Systems.*

### Bachelor of Science (B.S.) in Computer Science

- University of Massachusetts Lowell, Lowell, MA September 2021 – August 2024  
GPA: 3.404 Honors: Cum Laude, Dean's List  
*Relevant Coursework: Computing IV (Advanced C++ Programming), Object Oriented Programming, Machine Learning, Mobile Robotics, Data Structures, Analysis of Algorithms, Data Comm., Computer Architecture, Compiler Construction, Operating Systems.*

## EXPERIENCE

### Graduate Research Intern

University of Massachusetts Lowell – Kennedy College of Sciences May 2025 – August 2025

- Designed a machine learning-based hybrid IDS that combines a Bi-LSTM on temporal flow windows with a LightGBM classifier on tabular features, plus a rule-based logic layer. Tuned confidence thresholds per dataset to classify traffic as Normal, Known Attack, Suspicious, or Zero-Day, reducing false positives while isolating ambiguous cases for analyst review.
- Preprocessed and harmonized NSL-KDD, CIC-IDS-2017, and UNSW-NB15 datasets (imputation, encoding, scaling, sliding-window generation). Achieved >99% precision for high-confidence Known Attack/Normal labels on NSL-KDD and CIC-IDS-2017, and ≈ 89% on UNSW-NB15, with ambiguous flows safely routed to Suspicious/Zero-Day bins.
- Enhanced explainability by integrating XAI tools: applied LIME to LightGBM and SHAP to LSTM outputs. Verified SHAP additivity ( $\sim 10^{-10}$  residuals), and introduced a coherence rubric to map top features into domain categories, improving analyst trust and decision-making quality.

## PROJECTS

- **Fake News Detection (Python, Machine Learning, Natural Language Processing):** Developed a machine-learning model on a dataset of 44,919 labeled news articles (23.5k fake, 21.4k real) using TF-IDF vectorization and classification models such as Logistic Regression and Random Forest. Implemented preprocessing techniques, feature engineering, and hyperparameter tuning to optimize model performance. Achieved 99.38% accuracy, 99.61% precision, 99.19% recall, and 99.40% F1-score, with only 56 misclassifications out of 9,000+ test samples. Visualized linguistic patterns distinguishing fake from real news using word clouds and bar charts. **Tech:** Python, Scikit-learn, TF-IDF, Logistic Regression, Random Forest (October 2024 – December 2024)
- **Scrabble Game (JavaScript, HTML, CSS, Game Development):** Developed an interactive Scrabble game using JavaScript, HTML, and CSS, allowing players to form words and score points based on letter values. Implemented game logic, word validation, and an engaging UI to enhance the user experience. Designed an intuitive drag-and-drop interface for tile placement and score calculation. **Tech:** JavaScript, HTML, CSS (June 2024 – August 2024)
- **Cozmo Robot Programming (Python, Mobile Robotics, Sensor Fusion):** Implemented navigation algorithms for the Cozmo Robot, improving pathfinding accuracy through sensor fusion and environmental representation. Leveraged OpenCV to detect colored cubes and utilized the Rapidly-exploring Random Tree (RRT) algorithm for optimal pathfinding. Implemented a finite state machine for task execution based on AR markers, enhancing precision in target detection. Applied Monte Carlo localization using particle filters, significantly improving the robot's navigation and task completion efficiency. **Tech:** Python, OpenCV, RRT algorithm, Monte Carlo localization (January 2024 – April 2024)
- **Checkers Game (C++, Game Development, Object-Oriented Programming):** Built a fully functional Checkers game using C++ and the SFML library, with complete game logic including move validation, piece elimination, and promotion to kings. Focused on object-oriented programming to ensure smooth gameplay with a visually appealing SFML-based interface. **Tech:** C++, SFML, OOP (March 2023 – April 2023)