**Malick Fall, Senior Software Dev.**

Your vision my motivation**.**

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*/***Languages**: *French, English , Turkish , Spanish , Wolof*

**PERSONAL SUMMARY**

❖ Versatile, hardworking and highly efficient software developer with 4+ years of international experience (Sénégal, Canada) in software development and Product development.

❖ Tackles any multidisciplinary challenges using a combination of skills and expertise in Embedded Ai Systems Development, IoT integration, and data analytics, providing comprehensive solutions that optimize efficiency, enhance performance, and drive innovation..

**EDUCATION**

**Université de Montréal /Group 3737:** Certification in Business & Product Launch Aug.*2023~Jun.2024* ❖

**Université du Québec à Montréal** : Bachelor in Computer science and electronics. Jan.2022~Now ❖

**Université Cheikh Anta Diop de Dakar** : DEC / Bachelor in Technical Sciences. Jan.2018~2021 ❖

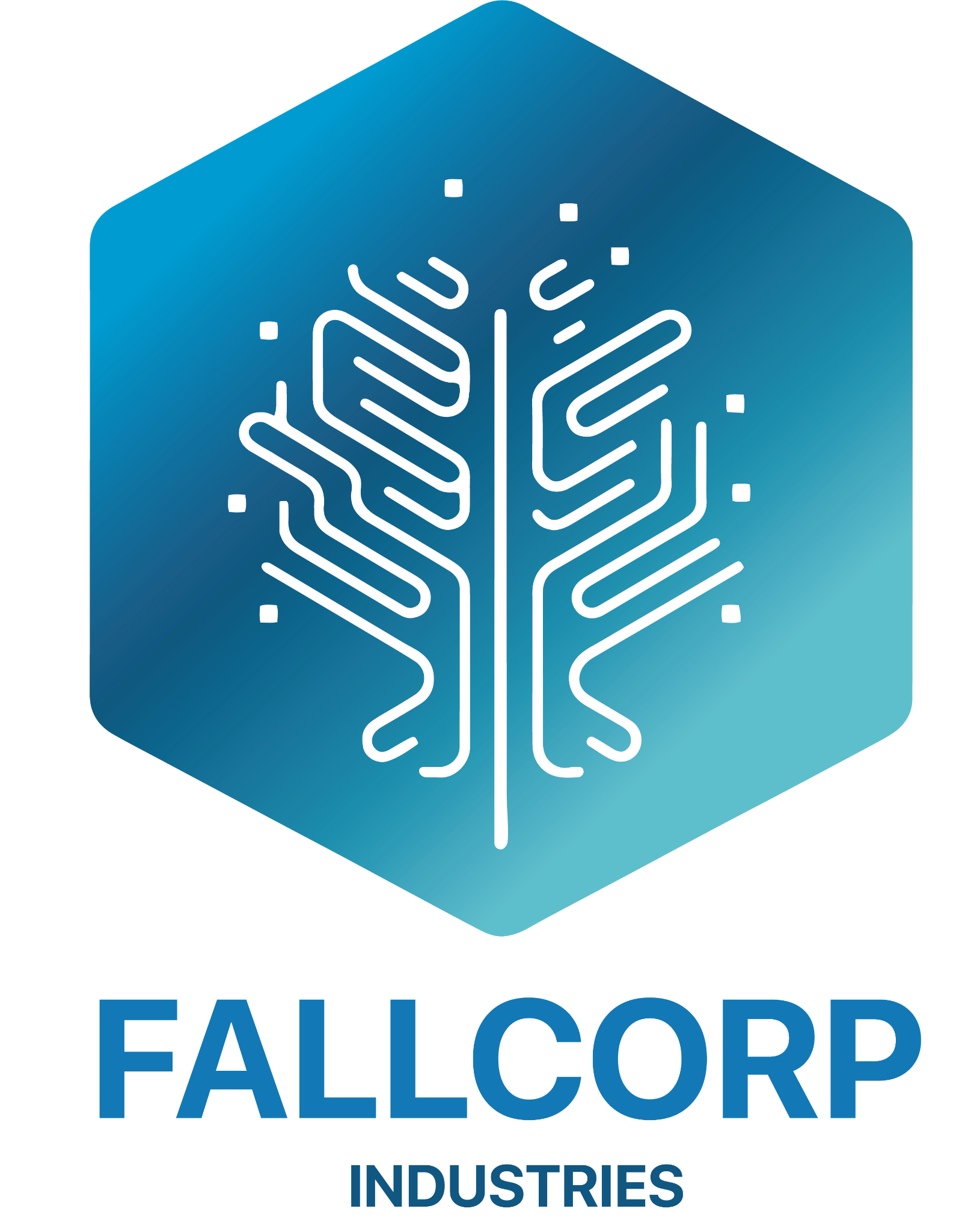
**TECHNICAL & INFORMATICAL SKILLS**

**Office**: *Linux, MS Office, LaTeX, Vim, MS Project, Slack, Jira, DOORS.*

**CAD**: *Fusion 360*

**S/W**: *MatLab/Simulink, C/C++, Python, Java , UML, Fortran, LabVIEW, Karel,Assembly, VBA, ROS, Bash/Shell, AxureRP, XML, HTML,JS,CSS.* Open-cv , Yolo , Tensorflow , CUDA , Nvidia Isaac platform , SQL, MySQL, PostgreSQL, MongoDB, Oracle

*.* **Others**: *Visual studio, IntelliJ Audacity, Photoshop, Illustrator , Blender , UE5 , Unity , Asana. Docker , Linux systems , Android Studio*

**CEO of Fallcorp Industries and Head of the Research & Development Team** *Mar.2022~Now Montreal ,* 

* Vision and Strategy Definition: Crafting long-term strategic plans for technology development, aligning R&D efforts with business objectives.
* Leadership and Decision Making: Steering the R&D team through technical challenges, making pivotal decisions on technology directions.
* Stakeholder Management: Liaising with internal and external stakeholders to align R&D projects with customer needs and market demands.
* Market and Competitive Surveillance: Analyzing market trends to keep abreast of technological advancements and maintain competitive edge.
* Performance and Growth Piloting: Monitoring and analyzing R&D outcomes to ensure growth targets are met, and performance benchmarks are achieved.

❖ Design, test, and validate control systems for an AI algorithm within embedded systems for an intelligent white cane. (Python/Tensorflow/ROS/MatLab/Simulink)

❖ Do DevOps R&D for the Controls Team.*Azure DevOps/Simulink Test & Build/Dockers/Python/Powershell/Chocolatey/Parallel Processing.*

***Design and Implementation of AI Models for Obstacle Detection and Free Path Prediction***

*Key Contributions:*

1. ***Data Selection and Preparation:***
   * ***Data Collection:*** *Gathered a diverse dataset comprising images and videos captured in various environments (urban, rural, indoor, outdoor) to train the AI models.*
   * ***Data Annotation:*** *Used annotation tools such as LabelImg or RectLabel to mark obstacles and free paths in images, facilitating supervised learning.*
   * ***Data Preprocessing:*** *Applied preprocessing techniques like normalization and data augmentation (rotations, zooms, flips) to improve model robustness.*
2. ***AI Model Development:***
   * ***Model Architecture:*** *Designed suitable convolutional neural networks (CNN), such as YOLO (You Only Look Once) or SSD (Single Shot MultiBox Detector), for real-time obstacle detection.*
   * ***Model Training:*** *Developed and trained AI models using TensorFlow Lite, optimizing hyperparameters (learning rate, number of epochs, batch size) to maximize detection accuracy and speed.*
   * ***Model Evaluation:*** *Tested the models on validation datasets, evaluating metrics such as accuracy, recall, F1-score, and inference time.*

***Optimization of Hardware-Software Integration for Wearable Devices***

*Key Contributions:*

1. ***Deployment of Optimized Models:***
   * ***Model Conversion:*** *Converted trained models into TensorFlow Lite format to ensure compatibility and optimal performance on wearable devices.*
   * ***Quantization and Pruning:*** *Applied quantization and pruning techniques to reduce model size and improve inference time without significantly sacrificing accuracy.*
2. ***Hardware Integration:***
   * ***In-House Designed Electronics:*** *Programmed the internal electronic board to capture real-time video streams, process images locally, and run optimized AI models.*
   * ***TFMini Plus Sensor Integration:*** *Connected TFMini Plus sensors to the electronic board to measure obstacle distances in real-time, providing additional data for decision-making.*
3. ***Software Development:***
   * ***Electronic Board Firmware:*** *Developed efficient firmware using PlatformIO, integrating necessary libraries for image processing and sensor communication.*
   * ***Communication and Interface:*** *Implemented communication protocols (e.g., MQTT, HTTP) to transmit processed data to a mobile application or centralized server for further analysis.*

***System Testing and Validation***

*Key Contributions:*

1. ***Testing Environment:***
   * ***Real-World Scenarios:*** *Conducted tests in various environments to evaluate system performance, including areas with different lighting levels, varying obstacles, and changing weather conditions.*
   * ***Load Testing:*** *Simulated high-load conditions to ensure system stability and responsiveness under heavy use.*
2. ***Performance Analysis:***
   * ***Performance Data Collection:*** *Measured key indicators such as response time, detection accuracy, energy consumption, and communication latency.*
   * ***Continuous Optimization:*** *Analyzed test results to identify weaknesses and made improvements to the AI models and hardware integration.*
3. ***Iterations and Improvements:***
   * ***Feedback Loop:*** *Integrated feedback from tests to refine AI models, adjust hardware parameters, and optimize software processes.*
   * ***Documentation of Results:*** *Maintained detailed documentation of tests performed, results obtained, and changes made to ensure traceability and facilitate future improvements.*

**Computer Vision Developer (Full-stack) - ADDAD - Part time** *Aug 2022~Mar 2023 Montreal ,* **

* Algorithm Design and Optimization: Creating efficient algorithms tailored for computer vision applications.
* Machine Learning Systems Integration: Embedding AI models into operational systems, enhancing their intelligence and functionality.
* Cross-Platform Adaptation: Ensuring the adaptability of applications across different hardware and software platforms.
* System Interfacing: Bridging the AI system with other software components or hardware devices for cohesive functionality.
* Project Management: Overseeing the project lifecycle from conception through deployment, including resource allocation and timeline management.

❖ Developed an embedded software on Odroid-c2 single chip board interfaced with webcam and linux computer via a TCP/IP connection for facial recognition purposes. (*SCB (OdroidC2), Scientific Linux 7.5, USB Logitech c270, C++, Yocto, Bitbake, OpenCV*)

❖ Sales & Marketing: Making bids, setting terms & prices, developing and implementing online marketing strategies.

**Sonatel Academie Dakar (Project Manager & Consultant in Embedded Systems)** *Jan. 2019~ Aug.2019 , Dakar , Senegal* 

* Needs Analysis: Assessing and defining the requirements for Computer vision embedded system projects.
* System Design: Architecting embedded systems that meet specified requirements and constraints.
* Optimization: Fine-tuning systems for maximum efficiency and performance.
* Technological Monitoring: Keeping updated with the latest developments in embedded systems.
* Training: Educating team members on new technologies and methodologies.
* Integration: Seamlessly integrating embedded systems with existing infrastructures.
* Project Management: Handling the complete project cycle, ensuring deliverables are met on time and within budget.
* Documentation: Creating comprehensive documentation for system design and usage.
* Post-Deployment Support: Providing technical support and system maintenance post-implementation.
* Collaboration: Working in tandem with cross-functional teams to achieve project goals.

❖Embedded Systems Design and Integration (Jetson Nano / OpenCV, CUDA, OpenCL / Python, Java, C++ / TensorFlow, Keras, PyTorch, Scikit-learn , CNNs)

**Anamarie Studio Dakar (C++ Developer)** *May 2019~ Oct.2019* Dakar ,Senegal

* Programming and Scripting: Writing and maintaining robust code in C++ for various software applications.
* Graphical Rendering: Developing rendering algorithms for visual output in applications.
* Input Management: Implementing systems to handle user input and interactions within the software.
* Network and Multiplayer: Establishing network communications and multiplayer functionalities within games or applications.
* In-App Purchasing Systems: Integrating transactional systems for in-app purchases and managing related data securely.
* Data Management: Overseeing the storage, retrieval, and security of data within the application's ecosystem.

❖ Game Engines: Unreal Engine 5

**ADDITIONAL EXPERIENCES / PROJECTS**

**Real-Time Object Tracking System Developer – Project Lead**

*Sept. 2024 – Present*

**Key Technologies:** YOLOv8, Kalman Filters, Re-Identification Models, Cosine Similarity, Python, TensorFlow, CUDA, GPU Acceleration

* **Objective:** Designed and developed a real-time object tracking system capable of handling complex, dynamic environments, focusing on tracking vehicles even during long occlusions.
* **Challenges and Solutions:**
  + **Tracking Switching Between Nearby Objects:** Implemented advanced object re-identification models, fine-tuned similarity thresholds, and enhanced vehicle differentiation to reduce misidentification of similar objects (e.g., nearby cars).
  + **Handling Occlusions:** Developed robust strategies to manage temporary occlusions (e.g., trees, traffic), increasing system tolerance for lost frames. Enhanced the re-identification model to allow accurate re-acquisition of objects based on past trajectories and embeddings.
  + **Maintaining Real-Time Performance:** Optimized code for asynchronous processing using Kalman Filters for motion prediction and leveraged GPU acceleration to maintain real-time tracking performance without compromising on accuracy.
* **Mathematical Modeling & Algorithms:**
  + **Kalman Filters:** Integrated to predict object positions during occlusion or uncertainty, ensuring seamless tracking.
  + **Cosine Similarity:** Applied for efficient and precise comparison of object embeddings, ensuring accurate re-identification after objects reappear.
* **Results:**
  + Achieved high accuracy in tracking objects, even in occluded environments, by combining real-time detection, prediction, and re-identification.
  + Successfully optimized the system to ensure real-time performance, crucial for applications such as autonomous driving, surveillance, and traffic monitoring.
* **Key Learnings:**
  + The combination of multiple techniques such as Kalman Filters and Re-Identification enhanced system robustness, enabling it to tackle real-world tracking challenges.
  + Maintaining performance through GPU optimization and asynchronous processing was essential for real-time deployment in dynamic environments.

**Solutions Avancées de Web Scraping en C# avec Diverses Technologies**

This ambitious project allowed me to develop sophisticated web scraping tools in C#, incorporating a variety of technologies and following a structured process. The key steps and technologies used included:

Requirement Analysis: Deep understanding of client needs and specifics of target websites, focusing on the automotive sector.

C# and .NET Framework: Use of C# and the .NET Framework to create robust and efficient scripts.

HtmlAgilityPack and Selenium: Utilization of HtmlAgilityPack for simple HTML parsing and Selenium for handling dynamic contents and interactions on complex websites.

RESTful APIs and HTML Parsing: Data extraction via RESTful APIs when available, or through HTML parsing using XPath and CSS selectors.

Iterative Development: Application of an iterative approach to development, allowing for quick adjustments based on client feedback.

Testing and Debugging: Rigorous testing to ensure the accuracy and reliability of the extracted data, as well as the robustness of the code.

Optimization and Maintenance: Optimization of scripts for performance and ease of maintenance by following SOLID principles.

Ethical Web Scraping: Adherence to ethical and legal standards, respecting website policies and ensuring data confidentiality.

Communication and Collaboration: Close collaboration with the client for mutual understanding and alignment of goals.

The experience gained in this project goes beyond mere programming in C# and covers a wide range of skills in web scraping, from handling dynamic websites with Selenium to extracting and processing complex data.



**Barman, Waiter, LeUptown Restaurant , Old port , Montreal**   
April 2024 – September 2024

**Technical Assistant, University of Montreal Millenium Quebecor**  
April 2024 – September 2024

**Floor Supervisor, Pharmaprix, Longueuil**  
April 2022 – September 2022

**Receptionist & Fleet Manager, Aïssa Taxi**  
August 2016 – December 2021

**Assistant Manager, Ameublement Petite Panthère, Sept-Îles**  
Employment Duration: 8 months



**Website Design:**

* **Web Redesign Consultant for FEEJAD**
* **Design of the website** [**https://kenouemile.wixsite.com/ekautomotiveexports**](https://kenouemile.wixsite.com/ekautomotiveexports) **(Note: the individual did not want to purchase a domain name, and my contract does not include website maintenance)**
* **Design of the showcase site for** [**https://Fallcorpindustries.com/**](https://fallcorpindustries.com/) **(key focus on accessibility for visually impaired individuals)**
* **Advanced Web Scraping Solutions in C# with Various Technologies**