Enis BILICAN

Date of birth 26/02/1998

Industry 4.0 Engineer

FORMAL EDUCATION

2021: Master's in engineering & Industry 4.0 – University of Lille - France

2019: Bachelor of Science in in Electronics, Electrical Energy and Automatic – University of Lille - France

EXPERTISE

- Machine vision engineering
- AI & DL development/integration/use and regulatory
- Vision-enabled robotics
- IIoT manufacturing systems
- Embedded systems
- Cryptography in industrial environment
- Data manipulation and processing
- Technical project management

SPOKEN LANGUAGES

ENGLISH: Advance
FRENCH: Mother tongue
TURKISH: Fluent

TECHNICAL KNOWLEDGE

CAD
ANSYS Scade Suite/Display/Test, Autodesk Inventor, Fritzing

ELECTRONICS
Visual components, embedded systems, Raspberry, Arduino & ESP32, Power electronics, Energy optimization

PROGRAMMING
PYTHON, C/C++, .NET, JAVA for ANDROID

APPLICATION
MFC in C++, Flask in PYTHON, DASH with PYTHON, BASH on Ubuntu 22.04 LTS

AI & DEEP LEARNING
AI in GxP context, Yolo v5 use and hyper tuning, Deep Learning hyper parametrization, ChatGPT API

DATA MANAGMENT
SQL (Relational Database), Influx DB (Temporal Database), Data Processing & Optimization

MACHINE VISION
Image optimization, Filtering, 3D modeling, Edge detection, Blob detector, Colorimetric controls, Real time processing

PROFESSIONAL EXPERIENCE

As consultant– Takeda: FROM 01/2024 TO NOW
AI & IT PROJECT ENGINEER – Automatic Visual Inspection (AVI)

Context of the project:
At Takeda Lessines, we initiated a significant project to implement the first Automatic Visual Inspection (AVI) systems powered by AI (Artificial Intelligence). It composed of 17 cameras stations with a robot arm, using advance DL Deep Learning) model. This project aimed to enhance the quality control of 10 different formats and products of liquid biological solutions based on purified IgG. My goal was to integrate advanced technologies in IT, AI, and vision systems to ensure high precision and reliability in product inspection, in line with Takeda's commitment to innovation and quality in the pharmaceutical industry.

Achievements:
During my mission, I led the AI IT and Vision workstream of the project, conducting the vision of the project and ensuring the application of pharmaceutical regulations with regard to AI, choosing the model which fit to the need. It's not a single model but 10 different, for each formats and products. Through the workstream, we managed the integration of the system into the IT infrastructure, addressing issues such as data retention, storage management, and path routing to ensure seamless integration and functionality. Additionally, I contribute, verified and improved vision algorithms with AI developed by suppliers.

Manage the integration of vision systems and advanced AI algorithms to detect defects and ensure the integrity of biological products by the supplier. By participating in the training process, and simulated a digital twin of the product and process flow.

Transversality and collaboration were key aspects of my role, Led the AI workstream mean to manage cross-functional teams, including production, technical, and global engineering. It also means to create projects milestones, create the planning for AI & IT and managed the allocated budget.

Team:
1 Project manager, 1 team manager, 4 process engineers, 1 IT Lead, 1 Computer systems manager, 2 QA, 2 QV.
- ✓ Technological Advancement: Leading AI part and vision technology in pharmaceutical manufacturing with multidisciplinary team, setting a benchmark for future projects and innovations.
- ✓ Manage the project in technical point of view for AI, vision algorithms and IT. Create and make sure that everybody follow the planning, choose the right technologies. Manage the allocated budget and make products/machines orders.
- ✓ Enhanced Quality Control: The implementation of the AVI system significantly improved the accuracy and efficiency of product inspections, reducing the risk of defects and ensuring high-quality standards for all products.
- ✓ Operational Efficiency: Achieved a substantial reduction in inspection times and increased throughput, leading to better resource utilization and productivity.
- ✓ Regulatory Compliance and ML compliance framework: Ensured that all inspection processes met stringent GMP regulations and FDA requirements, contributing to the overall reliability and safety of the manufacturing process.

Technical environment / methodologies:
MS Project, Python, Digital Twin Visual components, Brevetti Vision config, Prometheus digital twin

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As Otofacto consultant– Arcelor Mittal: FROM 11/2023 TO 01/2024
EMBEDDED SOFTWARE ENGINEER – Image processing and Lidar Expert

Context of the project:
In a context of human security and quality optimization. Arcelor Mittal, one of biggest company in metallurgy invest for internal machine vision solutions. They goals is to controls each kind of product in all production line across the world. A major part of product is more than 5/10 meters of length and need specific hardware and software develop from scratch for being controlled and reduce downtime, reworking the metal and reduce the total coast.

Achievements:
Use of existent 2D cameras for creating aspect and shape controls from 5 meters away. Measure and process in real time all algorithms like length, thickness, shape format but also straightness, squareness and convexity. Develop for sending all info and images through network with RTSP (Real Time Streaming Protocol) program to plant HMI. Integrate develop and use of a lidar from scratch for detecting the product shape with object recognition, the accurate size and thickness. Verify the coherence with the 2D measure and calculate relative errors.

Team:
2 engineers in embedded software and the R&D technical leader.

✓ Develop RTSP (Real time Streaming Protocol) video streaming server in C++ with GStreamer for streaming in real time and securely all images capture. Use specific settings and compression for streaming images with a size of 22000*1080 pixels.
✓ Develop in Python control algorithms for straightness measures, object detection, data merging, relative and absolute errors calculations. Image Stitching, dynamic camera calibration and auto adjustment.
✓ Sensor fusion with Lidar, use Lidar in parallel for merging data for the shape detector and the straightness algorithm. The goal is to have the minimum error possible and the best precision in the quality records. Connecting the lidar, prepossessing the data and developing the 3D object detector C++. for founding products.

Technical environment / methodologies:
C++ on VS with OpenCV, Boost, GStreamer, FFmpeg,, Phyton, Git. Lidar Drivers and private software

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In Otofacto Delivery Center – FN Herstal : FROM 01/2023 TO 10/2023
EMBEDDED SOFTWARE AND CRITICAL DEVICE ENGINEER

Context of the project:
FN Herstal is a worldly famous defense and security company. They were specialized in gun manufacturer however, today they want more innovative and complex defense system. They engage the Otofacto delivery center, a team of 11 member that I join for the project. The main goal it the creation of IT part of a complex marine firing defense systems. With moving parts, multiple cameras for aiming and viewing, firing systems. It is about all the IT development and, the electronical adjustment of chips and the creation of the OS.

Achievements:
Execute activities for design conception (C++), global IT architecture, model development with SCADE suite and the final user HMI with SCADE Display, implementation of C++ in Linux environment, and integration of the software onto the electromechanics systems.

Team:
8 embedded software engineers, 2 QA engineers and a PM

- ✓ Create the main user HMI POC in C++ with QT, and the real one with Ansys Scade.
- ✓ Develop specifics and confidential algorithms with C++ and python for the configuration of the system, the aiming, and the auto aiming powered by AI.
- ✓ Master the software detailed design and understand its role in the complete system.
- ✓ Coach other developers in the team, help on code review and best practices.
- ✓ Guide QA's and validation engineer for User Acceptance Testing (UAT).
- ✓ Help your team members to collect and design the requirements and understand the conception of the API and software design, as well as the functional validation.
- ✓ Contribute to the necessary documentation (validation & standardization).
- ✓ Respect the processes and organizational standards.
- ✓ Are an active member of your team and stimulate trust and collaboration with all stakeholders.

Technical environment / methodologies:
C++ with native libraries, boost, and QT framework. Python with OpenCV, PyQt5 and Pytorch. Scade Suite and Scade Display for HMI and logic of the system. Yocto Linux embedded distribution OS. Hardware manipulation, SCUM methodology.

As Otofacto Consultant – GSK (GlaxoSmithKline) : FROM 03/2022 TO 12/2022
PROCESS AND MACHINE VISION ENGINEER

Context of the project:
GSK (GlaxoSmithKline) is one of the largest pharmaceutical companies in vaccine era. In this context, and in FVI (filling and visual inspection) department the main goal is the optimization of machine vision algorithm in order to reduce false ejection of syringe and vial. Parallelly, increase the detection of defaults. The default could be in the product like static or moving particles, foreign objects. However, it could be in contents like cracks, glass breaks, scratches. It represents more than 50 machine vision programs and luminance consigns for more than 15 cameras in each of 4 production lines.

Achievements:
Development of many machine vision algorithms and improvement of existent ones to 4 production lines. Improving the luminance system and adjusting the consigns for the right use between all machine vision programs. Assure the proper function of all the systems, it is software, hardware, and the algorithms. All of these in the extreme respect of hygiene, security protocol and GMP (good manufacturing practices).
In the mission, a second goal in link with pharma4.0 was emerged. Many engineers for 12 years developed algorithms and it is chaotic now. I launched the standardization of all machine vision algorithms and cross comparison between all detection algorithms for all vaccines to applying the right one and converging all different algorithms to optimize one.

Team:
5 engineers in process, vision, QA and 3 technicians

- ✓ Handling all GSK protocols and machine vision programs.
- ✓ Developing and improving the performance of automatic inspection equipment and finding solutions (Process, programming, mechanical, software).
- ✓ Assuring proper functioning of automatic visual inspection machines (corrective and preventive maintenance).
- ✓ Lead investigation in case of deviation and PSS (problem solving sessions) thanks to Six Sigma, 5 whys, Root Cause Analysis.
- ✓ Continuous improvement projects (Analysis, Business Case, scheduling, developing).
- ✓ Check the performance in production (KPI).
- ✓ Validation/qualification (IQ, OQ, PQ), writing of validation report and protocols.
- ✓ Interaction with Production, QA and Maintenance.
- ✓ Respects current good manufacturing practices (GMP).

Technical environment / methodologies:
Seidenader machine vision programming, ImageJ, VBA, Python, VMware, Six Sigma, 5 whys, Root Cause Analysis

As Otofacto Consultant – AGC : FROM 10/2021 TO 02/2022
DATA POST PROCESSING ENGINEER

Context of the project:
AGC is one of the leading glass manufacturers in the world. In the R&D department, I worked in the automotive electronics & sensors team, with as theme the integration of Lidar sensors on windshields. The goal is to optically optimize the sensor behavior behind windshields. This allows to model the environment with 3D point clouds, which is the first step towards the development of self-driving cars.

Achievements:
Development of Lidar data reception algorithm. Processing the data for standardizing them for AGC analyze protocols. Use of this algorithm generalize and simplify the integration of much lidar who use TCP/IP network protocol. All of these with extreme reliability and near real time programming architecture.

Team:
Multidisciplinary 5 R&D engineers team

- ✓ Handling of codes already available and adaptation of the need
- ✓ Getting started with the equipment and familiarizing with lidars parameters
- ✓ Development of the connection protocol and communication management system.
- ✓ We do not have the possibility to debug in real test phase. Program robustness and reliability are the watchwords. Implementation of a self-diagnostic system
- ✓ Create data parsing algorithm who uses real time programming with the state representation concept. Lidars returns a cloud point. Dynamic parsing of data is necessary to adapt to all sensors
- ✓ Implementation of data extraction procedures of standardized items and saving resulted parsed data
- ✓ Test of the algorithm in reel conditions and with different kinds of specific windshield glasses who was developed for that
- ✓ Future implementation of others type of communication has been anticipated by the creation of add-on functionality.
- ✓ Deep learning hyperparameter optimization for different windshields glass materials and training of the model

Technical environment / methodologies:
C# with .NET framework, PYTHON with TensorFlow, WIRESHARK for frames analyses, Specific LIDAR software

PASQUIER : FROM 09/2020 TO 10/2021
INDUSTRIAL MACHINE VISION ENGINEER

Context of the project:

Attached to the Methods and Projects and Industrial IT department. The main theme is the management and development of a new industrial vision solution prototype to guarantee the traceability and sorting of products produced through sharp real-time controls such as volume calculations and colorimetric analysis, as well as data feedback controls on the IS.

Achievements:

Creation of all hardware and software. Development of two machine vision algorithms, the volume and colorimetric. Realization of working mobile prototype for the machine vision controls that can be moved from line to line to try different product families to allow deployment on all factory lines.

Team:

Operational and Industrial IT department

- ✓ Managed and proposed, as a lead field engineer, modifications, and new technical alternatives for the existent vision system. It is the integration of an industry 4.0 solution for the company.
- ✓ Study of the system meeting the need in transversally with the quality assurance department and the mechanical design office to establish functional specifications and choose the system that best meets our needs.
- ✓ Create volumetric algorithm with triangulation 3D sensor who uses real time programming concept. With specific SDK, the sensor returns a point cloud, and the volumetric calculation was manually implanted. Dynamic control is necessary to adapt to all our products. Processing volume data to improve reliability of the algorithm and detect eventually problems.
- ✓ Color comparison is used to quantify the cooking of the product. Color analysis algorithm is for extremely close color shade comparison. We use CIELAB color space and color distance DeltaE for this task. Study of the different means of lighting and environmental control.
- ✓ Formatting all of data for communicate between computer processes and for sending on databases.
- ✓ Development of a prototype by dimensioning the computer hardware and programming of the processing algorithms and the factory HMI with .NET framework. We designed a mobile prototype with the creation of the box. It's on a frame and it can be moved with the help of wheels. Inside of the box, there is all the computer vision equipment connected to electrical cabinet made for the prototype.
- ✓ Implementation and management of automated calibrations and training sessions for technicians in order to democratize technology for factory staff.

Technical environment / methodologies:

PYTHON with NUMPY, OPENCV and COLOUR-SCIENCE modules, C++, IMAGEJ, AUTOCAD (electrical design)

CONNECTED AND VENTILATED MASK : FROM 10/2020 TO 04/2021
ELECTRONICS ENGINEER – DESIGN AND COMMUNICATION

Context of the project:
For my end-of-study project, I had the idea of the creation of safe, connected & ventilated mask. Mask incorporates 2 PWM fans for intelligent ventilation according to a beforehand established airflow algorithm. The main goal is to avoid the fogging of the glasses that happens with standard masks.

Achievements:
First prototype for the mask, with specific 3D printed structure, the airflow algorithm and BLE communication between Arduino and the designed Android app for monitoring and adjust control parameters

Team:
Binomial with classmate

- ✓ Technology watching for existing solutions.
- ✓ Air flows study for ventilation that doesn't bother the user by imposing a respiratory rate on it. This is possible with the use of a differential pressure sensor which makes it possible to compare the pressure outside the mask. We adapt in real time the ventilation speed, but also the opening and closing cycles of the fans.
- ✓ Cost study for use in a large public market and market habits.
- ✓ Optimization of comfort with energy management for regular use and management of mass distribution, especially with the serialization of batteries of different capacities.
- ✓ Mechanical design of the structure on Autodesk Inventor for 3D printing. It must meet specifications so as not to be rigid and inconvenience the user. It also serves as a cable passage with a "spider web" structure.
- ✓ Electronic design with an Arduino nano base. Adjust all electronical components for safety use with resistor. Management of electrical disturbances with the use of capacitors for having the purest signal as possible.
- ✓ Communication is allowed by Bluetooth low energy with an Android application for configuring the mask. Parameters like ventilation state or use of automatic / manual fan speed are disponible. There is data feedback in statistic forms to display in dashboard on the app. All data are preprocessed in the app to ensure performance analysis of ventilation and energy.

Technical environment / methodologies:
INVENTOR (MODELING and ANIMATING), ARDUINO (C), ANDROID STUDIO (JAVA and XML), BLE communication, 3D PRINTING, FRITZING (Design of ON-BOARD circuit), Electromagnetic disturbances

CONNECTED AND SMART HOME : FROM 10/2019 TO 06/2020
IT ENGINEER

Context of the project:
In the case of my studies, I made a connected system for smart home. The system brain is an Arduino nano, and we control all sensors with a designed app. The main objective is the combination of multiprotocol communication.

Achievements:
User interface for Android and iOS app for multiprotocol communication, Bluetooth between the app and microchip, Zwave between Arduino and lights, radio LoraWan for a pressure sensor and MQTT protocol for temperature sensor.

Team:
Alone for the project

- ✓ Technology watching for existing solutions and study for adapting existent solutions to our problem.
- ✓ Development of the multiplatform application under Windev, the idea is to have a single functional code for Android and iOS. In this app we can control sensor like the opening of lights, and we receive many data like temperatures, pressure. We compare obtained data to environmental data thanks to "API Meteo" using user localization.
- ✓ Zwave is one of most popular smart home protocols. I use the mesh system for controlling equipment connecting to a bridge. Zwave is incorporating to Arduino with a module and standard library.
- ✓ For element who is out of range, LoranWan is adapted. This radio protocol uses few energies and can be used at greater distance. The integration with our system goes through a module and we can have an autonomous sensor in time.

Technical environment / methodologies:
IARDUINO (C), WINDEW, ZWAVE (API RESTFUL), LORAWAN, MQTT

SMART IIOT SENSORS : FROM 10/2019 TO 01/2020
IOT and visualization ENGINEER

Context of the project:
I made a real time IOT interface for displayed temperature and humidity data. The system use DHT sensor and network connection was manage by a microcontroller.

Achievements:
Physical and electrical connection between sensor and raspberry with security system. Establishment of 2 kinds of communication. First is server-client connection and the second is a messaging dialogue. Exploitation of data in 2 different IIOT platform for proof that data are not preformatted for specific application and easy-integrable.

Team:
Binomial with classmate

- ✓ Electronical assembly for reduce hardware cost and for made the smallest system. It's thought for an easy addable to existents materials. We use DTH dual humidity and temperature sensor and connect to Raspberry PI 3 which have server role. The microcontroller is connected to network with secure access.
- ✓ All data is managed in python with "numpy array". It's powerful scientific tool for data science. We arrange the data frame for create a standard in the order to share it through the internet. Each data is sent in time database to have historical in real time and backup solution.
- ✓ Development of connection, transmission, and reception algorithm in python. First way of communication is with API REST. It's traditional way to communication in internal or external network thanks to URL link. It's client-server architecture. The second way for the communication is with MQTT. It's messaging system which don't need powerful and complicated server but just a broker. We diffuse a message in a topic and much client can subscribe in the order to be notify.
- ✓ The main user interface is hosted by "Ubidots". It's IOT platform which allow fast implementation. To quarry configuration parameters, I create Dash web Interface in Python. We can see any changeset in real time with animated and friendly design.

Technical environment / methodologies:
PYTHON (NUMPY, MATPLOTLIB DASH, PANDAS modules), API RESTFUL, MQTT, INFLUXDB, MICROCONTROLLER, FRITZING (prototype of connections between all electronic components)