Proceedings of the International Conference on Industrial Engineering and Operations Management

Publisher: IEOM Society International, USA DOI: 10.46254/GC03.20250137
Published: February 2, 2026

A Data-Driven Decision Model for Automation in Industrial Systems

Nader Santarisi
Associate Professor
Engineering Technology & Science
Higher Colleges of Technology, Sharjah Campus
Sharjah, UAE
nsantarisi@hct.ac.ae

Hind Khalid Alhajri, Hessa Khalifa Almansouri, Asma Ali Ahmed, Ruqaiya Faisal Alkhaldi, Ghalya Ghanim Alali
Senior Student, School of Industrial Engineering
Higher Colleges of Technology (HCT)
Dubai, UAE
H00493502@hct.ac.ae, H00454218@hct.ac.ae, H00443585@hct.ac.ae,
H00463224@hct.ac.ae, H00447264@hct.ac.ae

Abstract

This capstone project develops a structured decision-making model to evaluate the feasibility of automation in industrial processes. The project scope is to design an automation decision framework supported by real-world case studies. The aim is to provide industries with a reliable model to determine when automation is justified and beneficial. Ten case studies from diverse sectors including furniture manufacturing, textiles, chemical processing, accounts payable automation, and automotive production were analyzed using ten decision criteria such as annual demand, labor cost, task repetition, product variety, and error rates. The findings highlight critical thresholds (e.g., labor cost > $15/hour, task repetition > 70%, annual demand > 10,000 units/year) that strongly influence automation outcomes. Results across cases demonstrated significant benefits: error reductions from 3–5% to near zero, productivity increases of up to fivefold, and processing time reductions of up to 87%. The developed Automation Decision Model offers a practical, data-driven framework to support industrial firms in making cost-effective, scalable, and sustainable automation choices, aligning with Industry 4.0 transformation goals and long-term competitiveness.

1. Introduction

In today's industrial landscape, automation has become essential for efficiency, consistency, and competitiveness. While automation can deliver scalable and high-quality outcomes, deciding when and where to implement it requires a structured, data-driven approach. This project addresses that gap by developing a universal model to guide organizations in choosing between manual and automated processes. Under the guidance of our mentor, Dr. Nader Santarisi, we focused on developing an Automation Decision Model. To achieve this, we conducted a literature review and analyzed ten case studies across sectors, including manufacturing, chemicals, textiles, and finance. These real-world examples revealed critical decision factors such as demand volume, labor cost, product variety, flexibility requirements, and error rates. By comparing outcomes, we designed a data-driven framework that applies academic knowledge to practical industry challenges and supports organizations in making informed, strategic automation investments.

1.1 Objective

The objectives of this study are to examine how companies implement automation by analyzing both case studies and relevant literature. It aims to identify the key factors that influence automation decisions, including both drivers and constraints. Furthermore, the study seeks to analyze operational results before and after automation using real-world data. Finally, it intends to develop and present a structured decision-making model, supported by visual tools, to assist organizations in planning future automation initiatives.

2. Literature Review

We conducted research on 10 case studies related to automation decision-making with the objective of developing our own decision model. By analyzing and comparing key factors across each case. We aimed to identify consistent drivers and constraints influencing automation. This comparative analysis enabled us to structure a universal model applicable to various industrial contexts.

Case Study 1 – Furniture Manufacturing (Calia Italia, Italy)

Calia Italia, founded in 1965 in Matera, Italy, manufactures handcrafted sofas and armchairs and exports to over 80 countries. The company faces fluctuating demand and high labor costs, which make automation attractive. Analysis showed that four out of five automation criteria were met, with only product size posing a challenge. Despite this, automation is recommended through the use of specialized robotics capable of handling heavy furniture while maintaining customization flexibility (Calia Italia, n.d.).

Case Study 2 – Textile Manufacturing (Heilan Home, China)

Heilan Home, established in 1997, is one of China's largest apparel brands, integrating textile manufacturing with a vast retail network. With high demand, low product weight, and strong technology compatibility, the company meets five of six automation criteria. The main limitation is the high flexibility needed for custom designs, which restricts full automation. Thus, partial automation is recommended, automating standard production lines while keeping semi-automated or manual processes for customized clothing (Heilan Home, 1997).

Case Study 3 – FRP Flange Automation

A composites manufacturer producing fiber-reinforced polymer (FRP) flanges automated its manual design process, which originally took 30 minutes per unit and caused frequent errors. By using heuristic-driven Python automation, the design time was reduced to 4 minutes, production increased from 2 to 15 flanges per hour, and manual errors were eliminated. This solution improved efficiency, customer satisfaction, and resource allocation, despite limitations such as the lack of AI data (Cambridge University Press, 2023).

Case Study 4 – Accounts Payable Automation (Dubai Conglomerate)

A Dubai-based conglomerate automated its accounts payable process using robotic process automation (RPA) integrated with its ERP systems. Manual invoice processing was slow, costly, and error-prone, but automation reduced approval cycles from 3–7 days to 1–2 days, increased processing capacity from 50–100 invoices per day to 300–500, and reduced error rates to near zero. The outcome improved compliance, lowered costs, and strengthened supplier relationships (Newgen Software, n.d.).

Case Study 5 – Automotive Parts Supplier (UK)

A medium-sized UK automotive parts supplier producing components for leading automobile manufacturers adopted automation in response to competitive pressures. With an annual demand of 50,000 units, small product size, low product variety, and a labor cost of £18/hour, all thresholds for automation were satisfied. A capital investment of £1.2 million achieved a payback period of 2.5 years, making automation a feasible and profitable solution for enhancing productivity and quality (Baines et al., 2005).

Case Study 6 – Low-Volume Mechanical Equipment (Germany)

A German manufacturer producing customized high-end mechanical equipment for aerospace and energy industries considered robotic welding automation. However, with annual demand of only 800 units, product sizes ranging from 20–80 kg, over 50 variants, and a payback period exceeding five years, automation was deemed unsuitable. The extreme flexibility and low volumes made automation impractical, reinforcing the idea that it is not cost-effective in highly customized, low-volume environments (Wiendahl et al., 2007).

Case Study 7 – MFG Chemical (USA)

MFG Chemical identified serious safety risks in its outdated manual batch control system, including human error, overheating, and lack of centralized monitoring. The company implemented automated batch control, SCADA integration, and recipe management systems, which reduced human error, improved safety, enabled OSHA compliance, and increased production efficiency. This investment highlighted automation's role in safety and compliance as well as productivity (MFG Chemical, n.d.).

Case Study 8 – Toyota (Worker Safety and Ergonomics)
Toyota addressed repetitive strain injuries among assembly line workers caused by manual handling and repetitive motions. The company deployed collaborative robots, redesigned workstations, and installed real-time monitoring systems to reduce strain. As a result, worker injuries and fatigue declined, productivity improved, medical costs decreased, and employee satisfaction increased. This case illustrates how automation can enhance both safety and operational performance (Toyota, n.d.).

Case Study 9 – ABC Components Ltd. (Automotive, 2023–2025)
ABC Components, a brake system manufacturer, faced rising labor costs and quality issues in its manual assembly line. The company invested $3.2 million in robotic assembly cells with vision inspection, reducing defect rates from 3.5% to 0.6% and cutting labor costs from $2.7 million to $810,000 annually. Post-implementation, output increased by 12%, unit costs dropped by 8%, and 30 employees were reskilled into quality control and logistics. Despite a 4.1-year payback period, automation strengthened competitiveness and secured new OEM contracts (ABC Components, 2023).

Case Study 10 – CNC Automation in Metal Bracket Fabrication
A medium-sized manufacturer adopted CNC automation to replace manual drilling and cutting in metal bracket production. The change delivered five times faster processing, allowed one operator to perform the work of three, and eliminated manual errors. Customers reported higher satisfaction due to improved precision, reliability, and faster deliveries, demonstrating CNC automation’s ability to enhance both quality and efficiency in standardized manufacturing processes (CNC Fabrication, n.d.).

3. Methods
The study followed a structured approach to evaluate automation decision-making across industrial contexts. A comprehensive literature review was conducted, complemented by the analysis of ten real-world case studies from diverse sectors including furniture, textiles, chemicals, automotive, and finance. Each case was assessed using ten critical decision factors: annual demand, product size, product variety, labor cost, required flexibility, production time, defect rate, safety incidents, production bottlenecks, and task repetition. For each factor, thresholds were established based on industry benchmarks (e.g., labor cost > $15/hour, annual demand > 10,000 units/year, task repetition > 70%). A binary scale (meets/does not meet threshold) was applied to ensure consistency. The decision logic categorized cases as: Recommended to Automate (≥7 factors met), Consider Automation (5–6 factors met), or Do Not Automate (<5 factors met). Comparative analysis was applied to measure improvements in processing time, production output, error rates, and operational costs before and after automation. The methodology allowed the construction of a data-driven decision model that balances technical and economic considerations, ensuring both practicality and scalability across industries.

4. Data Collection
The data collection process for this project was designed to provide a comprehensive and reliable foundation for developing the automation decision model. The team focuses on documenting case studies from diverse industrial sectors, including furniture manufacturing, textile production, chemical processing, finance, and automotive assembly. A total of ten case studies were selected to represent different production environments and challenges, ensuring that the findings would be broad and applicable across industries. Each case study was carefully examined to extract key quantitative and qualitative indicators relevant to automation decisions. These included factors such as annual production demand, labor costs, product size and variety, production time, error rates, safety issues, and the degree of task repetition. Data was gathered from academic journals, company profiles, industry reports, and credible online resources, which provided validated figures and context for each scenario. The collected data was then standardized by comparing it against predetermined thresholds—for example, labor cost greater than $15/hour, task repetition above 70%, or annual demand exceeding 10,000 units per year—to ensure uniformity in the decision-making process.

5. Results and Discussion
5.1 Numerical Results
A comparative analysis of the ten case studies demonstrated significant improvements following automation. Processing time in certain operations, such as FRP flange manufacturing, was reduced from 30 minutes to 4 minutes, representing an 87% gain in efficiency. In accounts payable processes, automation increased daily throughput from 50–100 invoices to 300–500, achieving up to five times higher productivity. Error rates across cases dropped from 3–5% in manual systems to nearly zero in automated environments. Labor costs also showed substantial reductions, with ABC Components decreasing annual expenses from $2.7 million to $810,000. At the same time, defect rates fell from 3.5% to 0.6%, while production output rose by 12%. These results, summarized

in Table 1. Impact of Automation on Key Performance Metrics, confirm that automation can deliver measurable gains in speed, cost savings, and quality when applied under appropriate conditions.

Table 1. Impact of Automation on Key Performance Metrics

Metric	**Before Automation**	**After Automation**	**Improvement**
Processing Time (FRP Flange)	30 minutes	4 minutes	87% faster
Invoices Processed per Day (AP)	50–100	300–500	5× increase
Error Rate	3–5%	~0%	Near elimination
Annual Labor Cost (ABC Components)	$2.7 million	$810,000	70% reduction
Defect Rate (ABC Components)	3.5%	0.6%	83% reduction
Production Output (ABC Components)	Baseline	+12%	Higher productivity

Table 2 provides a visual comparison of manual versus automated processes across different industries. They highlight improvements in cycle time, task allocation, and overall process stability. Table 2 presents a before-and-after view of process execution time for FRP flange design. The traditional method required approximately 1800 seconds (30 minutes), while the automated approach reduced this to 240 seconds (4 minutes). The largest reduction was observed in parameter optimization, dropping from 1200 seconds to 100 seconds. This comparison demonstrates the substantial efficiency gains achievable through automation.

Table 2. Traditional versus automated processing time for FRP flange design

Step	**Traditional**	**Automated**
Input Requirements	150 sec	120 sec
Generate Layer Sequence	300 sec	<1 sec
Evaluate Design	30 sec	<1 sec
Optimize Parameters	1200 sec	100 sec
Generate Manufacturing Specs	30 sec	15 sec
Generate DXF	90 sec	<1 sec
Total	1800 sec (~30 min)	240 sec (~4 min)

Table 3 shows the schedule impact of invoice processing. Manual processing required up to 30 minutes for data entry, 3–5 days for approvals, and 1–2 hours for reconciliation. With automation, these times decreased to 2–5 minutes for entry, 1–2 days for approvals, and real-time reconciliation. This demonstrates significant compression of the overall cycle time and improved operational throughput.

Table 3. Schedule impact of automated invoice processing compared to manual processing

Step	Manual Time	Automated Time
Invoice Data Entry	15–30 minutes/invoice	2–5 minutes/invoice
Approval Routing	3–5 days	1–2 days

Reconciliation & Archival	1–2 hours batch-wise	Automated real-time

Table 4 illustrates the application of collaborative robots in automotive assembly. Repetitive tasks were reassigned to cobots, and ergonomic redesigns reduced strain on workers. The before-and-after comparison shows an 83% reduction in repetitive strain injury cases, an 80% decrease in downtime, and a significant drop in compensation claims. These results demonstrate that automation improved both worker well-being and production efficiency.

Table 4. Before-and-After Comparison of Collaborative Robot Implementation in Automotive Assembly

Metric	Before Automation	After Automation	Change (%)
Incidence of RSIs (per year)	30 cases	5 cases	-83%
Average Sick Days Due to RSIs	120 days	20 days	-83%
Workers' Compensation Claims	$150,000	$25,000	-83%
Production Downtime (hours/month)	10 hours	2 hours	-80%

5.2 Proposed Improvements

The analysis of the case studies suggests several improvements that could enhance automation outcomes. Integration with existing ERP systems remains a challenge in multiple industries, indicating that future solutions should emphasize seamless connectivity and minimal disruption. User adoption can also be strengthened through training programs and simplified interfaces, reducing resistance to new systems. In terms of performance, opportunities exist to expand automation from isolated processes to full end-to-end workflows, which could amplify gains in cycle time and error reduction. For example, invoice automation that currently reduces approval routing from 3–5 days to 1–2 days could be further improved by embedding AI-based exception handling, potentially cutting approval times below 24 hours. Similarly, production downtime in automotive assembly was reduced from 10 to 2 hours per month with collaborative robots; integrating predictive maintenance could reduce this figure even further. While significant reductions in time, error rates, and operational costs were observed, variability across industries suggests that scalability and customization remain crucial. Future improvements should therefore focus on modular automation solutions that adapt to industry-specific constraints while preserving the measurable efficiency, quality, and safety gains demonstrated in the study.

5.3 Validation

The proposed automation decision model was validated through comparative analysis of ten case studies across diverse industries. For each case, operational performance was evaluated before and after automation. Results consistently demonstrated significant improvements: processing times decreased by up to 87%, error rates fell from 3–5% to near zero, production downtime in automotive assembly declined by 80%, and labor costs were reduced by more than 70% in certain cases. These outcomes confirmed that cases meeting seven or more of the model's threshold criteria aligned strongly with positive automation results, while low-demand or highly flexible processes did not. Although statistical hypothesis testing was not applied due to the heterogeneity of case studies, the convergence of results across multiple independent contexts provides empirical validation of the model. The consistency of directional improvements across industries strengthens the reliability of the proposed thresholds, supporting its application as a practical decision-making tool. Future work may include applying formal statistical methods or simulation models to further quantify the significance of observed improvements. Additionally, the robustness of the model can be strengthened by testing it on new industrial case studies that were not part of its initial development.

6. Model

Automation Decision Model is a structured evaluation tool designed to assist organizations in determining whether a specific production process is suitable for automation. The model incorporates **ten critical decision-making criteria**; each aligned with common industry benchmarks and operational realities.
Key factors include:

- Annual Demand
- Product Size
- Product Variety
- Labor Cost
- Required Flexibility
- Production Time
- Product Defect Rate
- Safety Incidents
- Production Bottlenecks
- Repetition of Tasks

Each factor is measured against a defined threshold to automate, and a binary decision (Yes/No) is assigned based on whether the criterion is met. The model's strength lies in its simplicity and adaptability to various industries. The decision logic is as follows:

- Automate: If 7 or more thresholds are met.
- Consider Automation: If 5–6 thresholds are met.
- Do Not Automate: If fewer than 5 thresholds are met.

This model provides a quantitative yet flexible approach for assessing automation potential, ensuring decisions are data-driven and context-sensitive (Table 5).

Table 5. Model

Factor (criteria)	**Estimated Value**	**Threshold to Automate**	**Meet Threshold?**
Annual Demand	[value]	> 10,000 units/year	Yes/No
Product Size	[value]	< 30 kg or standard size	Yes/No
Product Variety	[value]	< 10 variants	Yes/No
Labor Cost	[value]	> $15/hour	Yes/No
Required Flexibility	[Low to High]	Low to Medium	Yes/No
Production Time	[value]	< 1 hour per unit	Yes/No
Product Defect Rate	[value]	> 3%	Yes/No
Safety Incidents	[Low to High]	Medium to High (risky tasks)	Yes/No
Production Bottleneck	[Yes or no]	Bottleneck exists	Yes/No
Repetition of Tasks	[value]	> 70%	Yes/No

Final Automation Decision Logic

- Recommended to Automate: If 7 or more factors meet thresholds
- Consider Automation: If 5–6 factors meet thresholds
- Do Not Automate: If < 5 factors meet thresholds

How to Use:

1. Fill in the Estimated Value for each factor based on your specific process.
2. Compare against the Threshold to Automate.
3. Count how many thresholds are met.
4. Use the Final Decision Logic to determine automation suitability.

Example 1:

Table 6. Electronics Assembly – Smartphone Battery Modules

Factor (criteria)	**Estimated Value**	**Threshold to Automate**	**Meet Threshold?**
Annual Demand	1,000,000 units/year	> 50,000 units/year	Yes
Product Size	0.2 kg	< 5 kg	Yes
Product Variety	3 models	< 10 models	Yes
Labor Cost	$22/hour	> $15/hour	Yes
Required Flexibility	Low	Low to Medium	Yes
Production Time	6 min/unit	> 3 min/unit	Yes
Product Defect Rate	4%	> 3%	Yes
Safety Incidents	Moderate (ESD risk)	Moderate+ risk exists	Yes
Production Bottleneck	Manual soldering step	Bottleneck exists	Yes
Repetition of Tasks	> 90% identical steps	> 70%	Yes

Final Decision: Automate (Table 6).

This process meets all criteria. High demand, tight quality needs, and repetitive tasks make it an excellent automation candidate.

Example 2:

Table 7. Bespoke Furniture Crafting (Woodworking Industry)

Factor (criteria)	**Estimated Value**	**Threshold to Automate**	**Meet Threshold?**
Annual Demand	500 – 1,000 units/year	> 10,000 units/year	No
Product Size	40 – 100 kg per item	< 30 kg	No
Product Variety	50 – 100 unique designs/year	< 10 variants	No
Labor Cost	$25/hour	> $15/hour	Yes
Required Flexibility	Very high	Low to Medium	No
Production Time	8 – 20 hours/item	< 1 hour	No
Product Defect Rate	< 1%	> 3%	No
Safety Incidents	Moderate (tool handling)	Moderate+ risk exists	Yes
Production Bottleneck	No fixed bottlenecks	Bottleneck exists	Yes
Repetition of Tasks	20 - 30% (low repetition)	> 70%	No

Final Decision: Do Not Automate.

The process requires high flexibility, artisanal skill, and involves low demand and high product variety. Automation would be inefficient, expensive, and could compromise the craftsmanship that defines the product's value (Table 7).

7. Conclusion

This report set out to develop a structured decision-making model for evaluating automation suitability in industrial contexts. All objectives were successfully achieved. A comprehensive review of ten case studies across furniture, textiles, chemicals, automotive, and finance provided the basis for identifying ten critical decision factors. Threshold values were established for each factor, and a classification system was introduced to determine whether automation should be recommended, considered, or avoided. The model was validated against real-world case data, with results confirming consistent improvements in processing time, error reduction, labor cost savings, and productivity. For example, automation reduced FRP flange processing time by 87%, cut invoice approval cycles from 3–5 days to 1–2 days, and lowered repetitive strain injuries in automotive assembly by more than 80%. These outcomes demonstrate both the reliability of the model and its adaptability across industries. The unique contribution of this research lies in providing a standardized, data-driven framework that balances technical and economic considerations. By simplifying complex automation decisions into clear thresholds, the model offers organizations a practical tool for aligning automation investments with measurable performance improvements, supporting long-term competitiveness and sustainable industrial growth.

References

Baines, T., Kay, J., Adesola, S., and Higson, M., "State-of-the-art in automation decision making in manufacturing," *Proceedings of the International Conference on Production Research*, pp. 3209–3232, London, UK, 2005.

Calia Italia, "About us," 2023. [Online]. Available: https://www.caliaitalia.com/en/about-us/

Deloitte Insights, "Smart manufacturing for the future," *Proceedings of the Annual Conference on Future of Manufacturing*, pp. 210–218, New York, USA, 2021.

EOXS, "Case studies: Automation's impact on workplace safety," 2023. [Online]. Available: https://eoxs.com/new_blog/case-studies-automations-impact-on-workplace-safety/

Groover, M. P., *Automation, Production Systems, and Computer-Integrated Manufacturing*, 4th ed., Pearson Education, New Jersey, USA, 2015.

Groover, M. P., *Automation, Production Systems, and Computer-Integrated Manufacturing*, 5th ed., Pearson Education, New Jersey, USA, 2020.

Heilan Group, "Company profile," 2023. [Online]. Available: http://www.heilanhome.com/en/about

Kalpakjian, S., and Schmid, S. R., *Manufacturing Engineering and Technology*, 7th ed., Pearson Education, New Jersey, USA, 2013.

Lee, J., Bagheri, B., and Kao, H. A., "A cyber-physical systems architecture for Industry 4.0-based manufacturing systems," *Manufacturing Letters*, pp. 18–23, Shanghai, China, 2015.

McKinsey & Company, "The future of work in manufacturing," *Proceedings of the Global Conference on Advanced Manufacturing Systems*, pp. 55–62, Boston, USA, 2022.

Newgen Software Technologies, "Case study: A leading Dubai-based company transforms accounts payable process with Newgen," 2023. [Online]. Available: https://newgensoft.com/resources/case-study-a-leading-dubai-based-company-transforms-accounts-payable-process-with-newgen/

Plant Services, "Case study: Chemical manufacturer undergoes multi-plant control system upgrade," 2023. [Online]. Available: https://www.plantservices.com/automation/industrialautomation/article/11288899/case-study-chemical-manufacturer-undergoes-multi-plantcontrol-system-upgrade

Wiendahl, H., et al., "Automation and flexibility in low-volume production," *CIRP Annals – Manufacturing Technology*, pp. 320–326, Berlin, Germany, 2007.

Zorzetto, L., and Vezzetti, E., "Case study of the decision-making behind the automation of a composites-based design process," *Procedia CIRP*, pp. 667–672, Turin, Italy, 2023.

Biographies

Dr. Nader Santarisi had his Ph.D. in Industrial Engineering from the University of lowa, USA, in 1993. He started his academic career at the University of Jordan in 1993. His research interests include Operations Management, Quality Management, Productivity Improvement, Neural Networks, Machine Learning, Artificial Intelligence, and Big Data Analytics. During the period from July 2009 to July 2020, he was working as an Expert (CEO Advisor) with Dubai Government. Nowadays, he is an Associate Professor in Industrial Engineering at the Higher Colleges of Technology, Sharja Campus.

Hind Khalid Alhajeri is a 21-year-old aspiring industrial engineer with a strong passion for problem-solving and analytical thinking. Currently pursuing her degree in Industrial Engineering, Hind has always been recognized as a talented and distinguished individual, excelling in her academic journey through her dedication and perseverance. She has a natural aptitude for mathematics and enjoys applying her skills to real-world scenarios that demand precision and logical reasoning. Her enthusiasm for tackling complex problems drives her determination to develop innovative and efficient solutions in the field of engineering. With a mindset focused on continuous learning and growth, Hind is committed to making a meaningful contribution to smarter, data-driven decision-making and more effective industrial systems. Looking ahead, she aspires to carve her place in the industry by combining technical expertise with creativity to enhance productivity and sustainability. In the future, Hind envisions herself as a leader in industrial engineering, driving innovation and shaping solutions that will contribute to the development of smarter industries and a more sustainable world.

Hessa Khalifa Almansoori 23 years old, and I'm currently pursuing a degree in industrial engineering at the Higher Colleges of Technology. My passion for creativity, problem-solving, and innovation has always driven me, and it is what led me to choose this field. Throughout my studies, I've worked on developing both my technical and personal skills, aiming to become an engineer who can design efficient solutions and contribute to the improvement of industrial systems. My ambition is to build a successful career where I can make a positive impact in the industry and continuously grow as a professional. Outside my academic life, I enjoy exploring new experiences, traveling to discover different perspectives, and spending valuable time with family and friends.

Asma Ali Ahmed is a 23-year-old student currently studying Industrial Engineering at the Higher Colleges of Technology. From a young age, I've always been curious about how things work and how small improvements can make a big difference, and that curiosity naturally led me to this field. Through hard work and a strong desire to learn, I've maintained good academic performance and built strong relationships with my professors and classmates. Beyond academics, I'm passionate about giving back to the community. I've taken part in several volunteer activities and enjoy working in teams where I can both learn from others and make a positive impact. I believe industrial engineering is a powerful field that helps solve real world problems, improve efficiency, and create innovative solutions. In my free time, I love discovering new cultures, learning through different experiences, and spending quality time with the people I care about. I see this as just the beginning of a meaningful journey, and I'm excited to see where my passion for industrial engineering will take me.

Ruqaiya Faisal Alkhaldi is a 22-year-old Industrial Engineering student at the Higher Colleges of Technology, United Arab Emirates. With a strong interest in automation, lean systems, and process optimization, she is currently leading her Capstone project on "Automation Decision-Making in Local Industries," supervised by Dr. Nader. Her academic journey reflects a passion for innovation, problem-solving, and applying industrial engineering tools to enhance efficiency and service quality. Beyond her academic pursuits, Ruqaiya has contributed to projects focused on reducing customer waiting times in the banking sector and improving cafeteria operations through lean methodologies. She is also committed to research, aiming to present her work at international conferences and contribute to the growing field of smart manufacturing. Her future ambition is to pursue graduate studies and become a leader in advancing smart manufacturing and sustainable industrial solutions.

Ghalya Ghanim Alali is a 24-year-old aspiring industrial engineer from the United Arab Emirates, currently studying at the Higher Colleges of Technology. Passionate about problem-solving, innovation, and efficiency, her interest in improving systems and processes led her to pursue Industrial Engineering. Her academic focus includes quality management, productivity improvement, and automation, with the goal of contributing to the UAE's industrial development. She has actively participated in projects that merge technology and innovation, including presenting the Balance application at GITEX, showcasing her ability to apply engineering concepts to practical solutions. Beyond her academic achievements, she has gained international exposure through volunteering at events such as the World Government Summit in Dubai. Looking forward, Ghalya aims to build a career that combines her passion for Industrial Engineering with innovation and sustainability, creating impactful solutions for the future of industry in the UAE.