AMERICAN CHAMBER OF COMMERCE IN BULGARIA

30 YEARS

CURTIS

AmCham Bulgaria Hackathon 2025

February 26 – April 10, 2025

BUSINESS CASE

Creating Digital Twins for Smart Manufacturing & Maintenance

- To enhance efficiency in **motor drive electronics manufacturing**, our company is implementing **digital twins**—virtual replicas of physical manufacturing equipment. Using **Microsoft or specialized software tools**, we aim to:
- **Improve Production Planning:** Simulate workflows, optimize machine utilization, and predict bottlenecks.
- **Enhance Equipment Maintenance:** Monitor real-time performance, detect early signs of failure, and schedule predictive maintenance.
- **Boost Operational Efficiency:** Reduce downtime, minimize waste, and improve overall equipment effectiveness (OEE).
- By creating digital twins, we bridge the gap between physical assets and data-driven decision-making, enabling a **more agile, efficient, and intelligent manufacturing environment**.

SKILLS to be developed

- **Digital Twin Development** – Creating virtual models of manufacturing equipment using Microsoft or specialized software tools.
- **Data Collection & Analysis** – Gathering, structuring, and interpreting equipment performance data.
- **Production Planning & Optimization** – Simulating workflows and identifying efficiency improvements.
- **Maintenance Strategies** – Implementing data-driven maintenance plans to reduce downtime.
- **IoT & Real-Time Data Integration** – Connecting physical equipment with cloud-based digital twin systems.
- **Software & System Implementation** – Hands-on experience with industrial digitalization tools.
- **Problem-Solving & Critical Thinking** – Tackling real-world manufacturing challenges.
- **Collaboration & Teamwork** – Working with mentors, engineers, and fellow students in an industry setting.
- **Presentation & Communication Skills** – Presenting technical findings and recommendations to stakeholders.
- **Industry Knowledge & Best Practices** – Gaining insights into **smart manufacturing, Industry 4.0, and operational efficiency**.

ASSIGNMENT CONTENT

The project will focus on developing **digital twins** of manufacturing equipment used in microelectronics production. These digital replicas will be used for **real-time performance monitoring, predictive maintenance, and production planning**.

Students will be responsible for:

1. **Equipment Data Collection:** Gathering technical specifications, operational parameters, and historical performance data.
2. **Digital Twin Modeling:** Using **Microsoft tools or specialized software** to create virtual equipment models.
3. **Production Planning Simulation:** Analyzing machine utilization, optimizing workflows, and identifying potential inefficiencies.
4. **Maintenance Strategy Development:** Implementing predictive maintenance schedules based on digital twin insights.
5. **Final Report & Recommendations:** Presenting findings, challenges, and future optimization opportunities.

This project offers a **hands-on experience in digital manufacturing, IoT integration, and predictive analytics**, providing students with practical skills in **Industry 4.0 and smart manufacturing solutions**.

MENTORS:

Lead mentor:

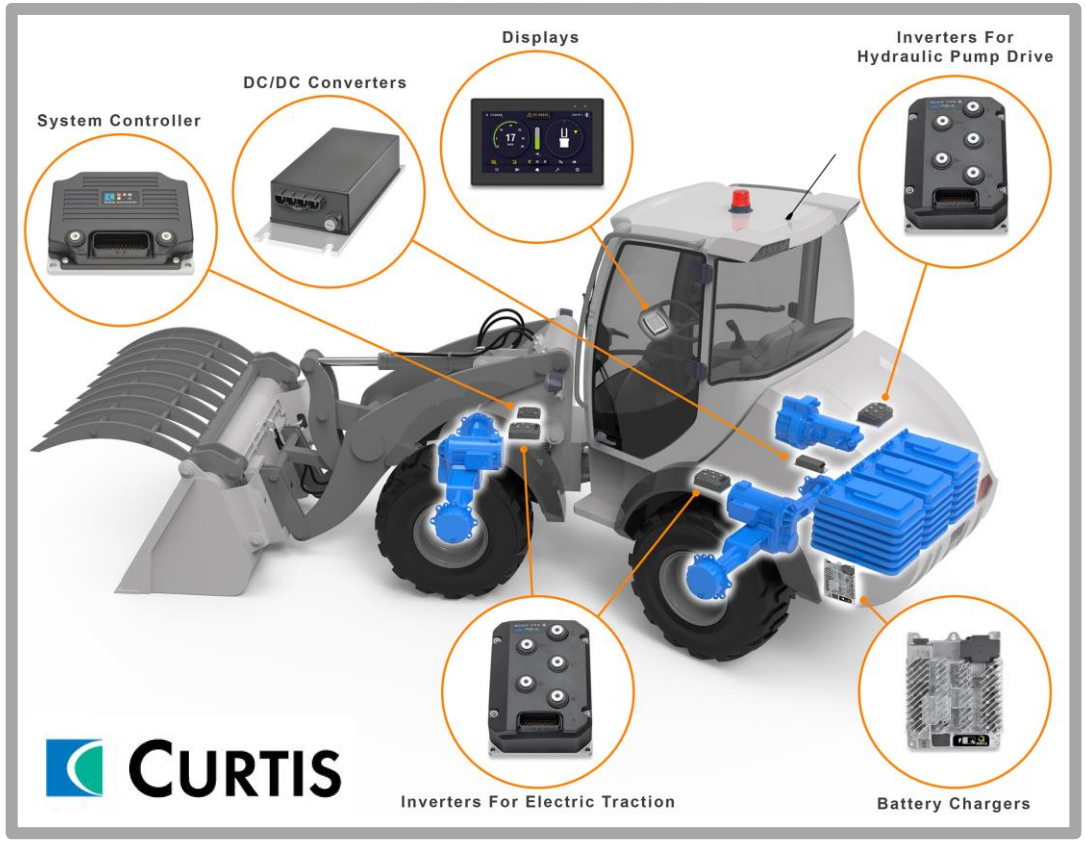
- Bilyana Doncheva
  Senior Test Engineer

Support mentors:

- Milen Avramov
  Senior Manufacturing Engineer

- Stamen Altavanski
  Director Manufacturing

- Ruslan Papazyan
  Executive Director



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