

Description

The LoLiPoP-IoT project aims to optimize energy consumption and maintenance efficiency on the spray-painting manufacturing line, aligning the energy monitoring system with Industry 4.0 standards.

State of the Art (SoTA)

- Present sensors are not sufficient to assure quality of produced parts and avoid breakdowns
- Large energy consumption shows great potential for savings
- Energy monitoring helps also to detect and prevent failures and to optimize efficiency

Innovation (beyond SoTA)

- Improved monitoring to be compatible with Industry 4.0
- Reliable and centralized sensor data collection & processing infrastructure
- Algorithms (to reduce energy costs in different processes and stages in the facility; for predictive maintenance on conveyor to reduce total down-time and maintenance costs
- Monitor and control (the water flow to estimate pump health; the curing quality to reduce oven temperatures)

UC Description

Measurable target

- 95% heat measurement accuracy
- 95% curing quality accuracy
- 15% energy/resource reduction
- 10% defect reduction

Assessment Strategy and Methodology

- Validation using:
 - Real sensor data (PT100)
 - Thermographic measurements
- Data enhancement:
 - Synthetic data generation
 - Data augmentation & imputation
- Lab testbed simulating real industrial environment
- Continuous comparison: virtual vs real thermographs

Deployment and Readiness Level

- Deployed at Arçelik Eskişehir paint ovens
- Sensors + gateways fully installed
- Continuous monitoring system operational
- Software-centric solution (minimal hardware)
- Ready for scaling across multiple facilities

Results and Assessment

Continuous 24/7 thermal visibility achieved

Accurate virtual thermograph (Profile) generation

Early detection of thermal anomalies

Reduced need for manual inspections

Stable performance in real industrial conditions

Impact Assessment

Economic

€75K–€100K

Yearly savings per oven line

~€35K–€40K

Yearly savings by eliminating inspection downtime

~12–18%

Energy savings

Operational

0

downtime for temperature inspection

24/7

Monitoring & fault detection

8–15%

Reduction in paint defects

Social

↓

Reduced manual work in high-temperature areas

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Improved operator safety

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Lower maintenance stress

Exploitation and Future Collaboration

- Deployed as software-centric monitoring solution
- Modular add-on (PT100 + edge node, minimal hardware)
- Easy integration with IoT / SCADA systems

Scalability

- Replicable across Arçelik facilities (multi-country)
- Extendable to:
 - Automotive paint lines
 - Industrial coating systems
 - Heat-treatment ovens

Future Work

- Broader industrial deployment
- Integration with energy management platforms
- New collaborations in Industrial IoT



The LoLiPoP-IoT project, Project No: 101112286 is supported by the Chips Joint Undertaking and its members.



LoLiPoP-IoT confidential

