AI Applications of Machine Data in the EMS Industry

SYLLABUS

INSTRUCTOR INFORMATION

Instructor: Tim Burke, PhD

Email: tim@archsys.io

Phone: 650-308-8302

Best time to call: Usually available between 7pm – 9pm Pacific Time USA.
Leave message anytime.

PROGRAM DESCRIPTION

Modern equipment inside of an EMS factory generates large volumes of structured data about its performance, status and operations. This data, when collected and analyzed, can be used to improve factory processes, solve product quality issues and determine the root causes of machine failures.

Historically, data analysis has been a manual, expert activity performed using tools such as dashboards, spreadsheets, statistics programs and computational notebooks.

With the recent advent of new AI technologies like Large Language Models (Chat GPT, Anthropic Claude, etc.), many of these analysis tasks are now possible to automate either fully ('AI Agents') or partially ('AI Copilots').

In this course, we will review the data produced by factory machines such as SMT and test equipment and how AI tools can be leveraged to assist with the analysis and interpretation of the data.

The course is designed around practical, interactive learning experiences with an anonymized real-world dataset and freely available analysis and visualization tools. AI agents and copilots will be directly created live in the course using UI tools to visually illustrate the concepts and show what is possible with current technologies.

Topics include:

- What is machine data
- How to collect and analyze machine data
- Visualizing and analyzing machine data using Grafana

- What are AI copilots and agents?
- Applications of AI technologies to analyzing machine data
- IPC-CFX standard

Taught by an industry expert in the field of machine data analytics, this focused one-week program utilizes interactive webinars and job-specific exercises to facilitate mastery of the key techniques and concepts in machine data analytics.

LEARNING AND PERFORMANCE OBJECTIVES

This program is designed to provide learners with the foundations needed to use machine data in the course of their work inside an EMS factory. No computer programming is involved, and programming experience is not required.

Upon completion, participants will be able to:

- Identify the kinds of data present inside SMT and test equipment such as solder printers, SPI, AOI and AXI machines, pick-and-place equipment, reflow ovens and ICT equipment.
- Analyze machine data visually using open-source tools like Grafana.
- Understand how AI agents and Large Language Models can be applied to machine data.
- Understand how the IPC-CFX standard relates to the collection of machine data.

COURSE STRUCTURE

- Instructor and participants meet online twice from the comfort of their own home.
- Participants can view recorded online sessions to review course content and class discussions.
- Participants see concepts visually using anonymized factory data simulating a live production environment.
- All required materials are included in the course.
- Course materials are accessible 24/7 on the new IPC Edge Learning Management System.
- The course can be accessed on virtually any device with an Internet connection and major web browser, including Chrome, Firefox, Safari and Edge.

IPC STANDARDS COVERED (PROVIDED WITH COURSE)

- IPC-2591 CONNECTED FACTORY EXCHANGE

COURSE SCHEDULE

SESSION 1 – MACHINE DATA

Class session will focus on collecting, visualizing and analyzing machine data.

Topics include:

- Machine data overview
- What kinds of data are present in different machines
- IPC-CFX standard
- Understanding the class database
- Using Grafana to visualize machine data
- Examples of problem-solving using machine data

SESSION 2 – AI APPLICATIONS WITH MACHINE DATA

Class session will introduce AI concepts and show examples of how they can be applied to machine data.

Topics include:

- Introduction to Large Language Models (LLM)
- AI Agents vs Copilots
- Applications of AI to machine data including
    i. Identifying problems
    ii. Summarizing trends and information
    iii. Triaging alerts and removing false positives