Inventor Automation with ML & AI
Language: **Python**

Training Structure

Module 1: Python Programming.
Module 2: Inventor Automation.
Module 3: Machine Learning, AI, and Integration.

Training Highlights

Online Training

Flexible Timings

Trainer: 25 yrs Exp.

Duration: 6 Wks

1 Hour Daily

Basic to Advanced

10 Industry Projs

Certificate

Support after Training

CuttingEdge Tech

List of Projects (Automation)

1. Geometric Calculator
2. Create Drawing Views
3. Batch Processor
4. Title Blocks and Annotations
5. Parametric Parts
6. Assembly Cost Estimation

Module 1: Python Programming

1. Installation and Basics

- Installing Python.
- Installing Python Editors - PyCharm, IDLE.
- Project Explorer, output and error windows.

2. Introduction to programming

- Setting up user interaction and collecting inputs.
- Running Python programs.
- Calculations and output display.
- Arithmetic operators.
- Using the Math library functions.
- Syntax, Comments, User Input, Print results, and control Program Flow.
- Variables: Float, Integer, and String.
- String Variables: Find, Replace, Formatting and Slicing operations.
- Datatypes and Typecasting.

3. List, Tuples, and Loops

- Lists, Tuples, Dictionaries and Sets.
- List comprehensions.
- List Operations - Slicing and Data Extraction.
- String Operations - Slicing and Manipulations.

- Conditionals: If- Elif and If-Else, Nested If.
- Chaining Comparison Operators.
- Loops: For loop, nested For loops.

4. Functions and Modules

- Defining Functions and Arguments.
- Functions: Arguments, Return Statements and values.
- Functions: Optional Arguments.
- Functions: Multiple Return Values.
- Function Help and DocStrings.
- Modules and the Python standard library.
- Importing from modules.
- Creating Aliases.
- Life of variables, global and local variables.
- Errors - syntax, logical and exceptions.
- Exception handling.

5. Exception Handling

- Try Catch Except.
- Debugging Python Functions.
- Adding breakpoints and inspecting values.
- Determine source of error.
- Troubleshooting and fixing errors in the code.

6. OS Functions

- Installing 3rd party packages using pip.
- Performing File, Folder, Path and operations.
- Manipulating file paths and extensions.
- Handling Files, File Filters.
- Text files - read, append and write with practical applications.
- Storing and retrieving data.
- Folders and Folder operations.

7. Tkinter GUI Programming

- Dialogs and mainloop.
- Setting dialog box properties, title, icon, size and location.
- Adding widgets and adjusting their properties and placement.
- Tkinter Datatypes - Double, Integer, and Strings.
- Data Type Conversion - TkInter variables and python variables.
- Labels - static and dynamic.
- Entry Textboxes - storing user input from textboxes into variables.
- Setting default values and last used values in text boxes.
- Button widget - formatting and calling functions.
- Check boxes and radio buttons.

8. Advanced GUI Programming

- Listboxes - single selection and multiple selections.
- Listboxes - adding items static and dynamic.
- Listbox display total count and selection count.
- Listbox - add items from textbox.
- Listbox - remove items.

- Spinner widget - setting range and layout.
- Scale widget - setting range and layout.
- Images - displaying images in a dialog box.

- File selection dialog.
- Single and multiple files.
- Adding file filters.

- Folder selection dialog.
- Selecting all files from folder dialog.
- Adding file filters for folder dialog.
- Opening files in associated application.

- Message boxes - information, query and warning.
- Configuring single line and multiline messages.
- Button configurations and icons.
- Checking message box responses against button configurations.
- Handling multiple dialogs.

Module 2: CAD Automation

9. Getting Started

- ❖ Connect to CAD
- ❖ Getting information from the UI
- ❖ Read-write various properties of the UI

10. Documents Automation

- ❖ Document types
- ❖ Create new files - Part, Drawing and Assembly
- ❖ Open, Close, Save and SaveAs documents
- ❖ Close all documents in the Session
- ❖ Export documents to other formats
- ❖ Activate files in a session
- ❖ Loop through files in the session

11. File Handling

- ❖ Standard file dialogs to select files
- ❖ Setting file filters
- ❖ Industry Project – Batch Processor

12. Managing Sheets in Drawings

- ❖ Creating drawing sheets
- ❖ Accessing sheets in a drawing
- ❖ Counting and extracting sheet info
- ❖ Switching between sheets

13. Drawing Views

- ❖ Create drawing views
- ❖ Industry Project - Creating standard views of 3D models

14. Handling Text in Drawings

- ❖ Access text objects in a drawing document
- ❖ Industry Project - Automatic Title Block Updater Program

15. Parametric Parts

- ❖ Control parametric part
- ❖ Expression and formulas - dimensions and variables
- ❖ Industry Project - Modify features of a parametric shaft with a keyway

16. Assembly

- ❖ Traverse through all components of an assembly
- ❖ Industry Project - Material Estimation for Spray Painting

Module 3: Machine Learning and AI

17. Machine Learning - NumPy

- Arrays.
- One Dimensional Array.
- Multidimensional Array.
- Create Arrays from Data.
- Create array from Ranges.
- Shape.
- Array Intersection.
- Array Difference.
- Sum.
- Slicing Array.

18. Machine Learning - Pandas

- Series.
- DataFrames.
- Dataframe Indexing.
- Dataframe Head, Tail.
- Dataframe Shape.
- Read DataFrame from CSV.

19. Matplotlib Visualization

- Line Plots.
- Sub Plots.
- Plot Properties - Color, Style.
- Grid, xLabel, yLabel.
- Bar Plots.
- Bar SubPlots and Orientation.
- Scatter Plots and Subplots.
- Mixed Plots and Overlapping.
- Markers and LineWidth.
- Exporting Plots.
- Pie Charts.

20. Decision Trees

- Decision Tree Classifiers.
- Dataframe.
- Extracting Features & Labels from a Dataframe.
- Fitting Features & Labels into a decision algorithm.
- Predicting values based on classification.
- Dual Classification and Multiclass classification.
- Reading CSV data into Dataframes.
- Separating input and output.
- Dropping frames from dataframes.
- Label Encoders.
- Fit Transforms.
- Predicting results.

21. Linear Regression Analysis

- Reading a CSV data file.
- Create Linear regression model.
- Fit data columns directly to the algorithm.
- Determine coefficient and intercept.
- Reading inputs data from CSV.
- Predicting output for entire column.
- Exporting output dataframes to CSV.
- Create a scatter plot of the data.

22. K-Means Clustering

- Importing data.
- Determining clusters.
- Determining the cluster to which a point belongs.
- Visualize cluster using scatter plots.
- Visualize cluster centers.

23. How to use ChatGPT for API Development

- Creating smart queries.
- Enhancing queries for best results.
- Refining queries for exploring more APIs.
- ChatGPT Code cleanup and adaptation.

24. Integrate AI and ML in Automation

- ❖ **Capstone Project** Integrate Automation with Machine Learning to create AI-enabled apps.

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- ❖ Inventor Automation with Python + Machine Learning
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