



### CADVertex Solutions

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## Inventor Automation with ML & AI

Language: **VB.Net or CSharp**

### Training Structure

- Module 1:** VB.Net or CSharp 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 Update
5. Parametric Parts
6. Assembly Cost Estimation

## **Module 1: VB.Net or CSharp.Net Programming**

### **1. Installing Visual Studio**

- Installing Visual Studio Community version.
- Setting the default language.
- Customizing the layout.
- Solution Explorer, Toolbox and the Properties windows.

### **2. Introduction to Programming**

- Selecting a project template.
- Setting up user interaction and collecting inputs.
- Variable types - Double, Integer, and String.
- Acquiring user input from textboxes into variables.
- Calculations and display outputs.
- Using the .Net Math library functions.
- Various files and their meaning in the project structure.
- Separating source code from the executable.

### **3. Creating a Windows Forms Application**

- Setting dialog box properties.
- Adding controls: Button, TextBox, Label, Checkbox, RadioButton.
- Adding images to PictureBox and other controls.
- Aligning text and images on controls.
- Composite controls: ListBox and ComboBox.
- Adjusting various properties for each type of control.

### **4. Arrays and Loops**

- Filling arrays and reading array elements.
- Filling ListBoxes with array elements.
- ForEach loop.

### **5. Functions and Subroutines**

- Arguments.
- Return Types.
- Return Values in Functions.
- Function Overloading.

### **6. Multi-Form Projects**

- Adding Forms to a project.
- Form Constructor and object variables.
- Form objects and invoking Forms.
- Exchanging data between Forms.

## 7. Object Oriented Programming

- Creating a class.
- Adding member functions.
- Public and Private methods.
- Adding member variables.
- Encapsulation.
- Polymorphism.

## Module 2: CAD Automation

### 8. Getting Started

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

### 9. 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

### 10. File Handling

- ❖ Standard file dialogs to select files
- ❖ Setting file filters
- ❖ [Industry Project](#) – Batch Processor

### 11. Managing Sheets in Drawings

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

### 12. Drawing Views

- ❖ Create drawing views
- ❖ [Industry Project](#) - Creating standard views of 3D models

### **13. Handling Text in Drawings**

- ❖ Access text objects in a drawing document
- ❖ [Industry Project](#) - Automatic Title Block Updater Program

### **14. 2D objects in Drawings**

- ❖ Creating 2D objects in a drawing document

### **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. Python and IDE Installation**

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

### **18. Python 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.

## **19. List, Tuples, and Loops**

- Lists, Tuples, Dictionaries and Sets.
- 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.

## **20. Functions and Modules**

- Defining Functions and Arguments.
- Functions: Arguments, Return Statements and values.
- Functions: Multiple Return Values.
- Function Help and DocStrings.
- Modules and the Python standard library.
- Importing from modules.
- Creating Aliases.

## **21. Exception Handling**

- Errors - syntax, logical and exceptions.
- Exception handling.
- Try Catch Except.
- Debugging Python Functions.
- Adding breakpoints and inspecting values.
- Determine source of error.
- Troubleshooting and fixing errors in the code.

## **22. 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.

## **23. Machine Learning - NumPy**

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

## **24. Machine Learning - Pandas**

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

## **25. 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.

## **26. Decision Trees**

- Decision Tree Classifiers.
- 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 and Predicting results.

## 27. 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.

## 28. K-Means Clustering

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

## 29. 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.

## 30. Integrate AI and ML in Automation

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

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**Other eBooks and Training Programs from CADVertex:**

- ❖ CATIA Automation: VB.Net or CSharp or Python
- ❖ SolidWorks Automation: VB.Net or CSharp or Python
- ❖ Solid Edge Automation: VB.Net or CSharp or Python
- ❖ Inventor Automation: VB.Net or CSharp or Python
  
- ❖ NX Open: VB.Net or CSharp with Win Forms
- ❖ NX Open: VB.Net or CSharp with Block UI Styler
- ❖ Knowledge Fusion
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- ❖ [Revit API – Plugin creation using CSharp and Python, Dynamo](#)
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- ❖ cMayoCAD: Learn to build a new CAD program from scratch using a Geometric Modeling Kernel and CSharp
  
- ❖ Machine Learning for Engineers with Python
- ❖ CATIA Automation with Python and Machine Learning
- ❖ NX Automation and Machine Learning with Python
- ❖ Solid Edge Automation with Python + Machine Learning
- ❖ SolidWorks Automation with Python + Machine Learning
- ❖ Inventor Automation with Python + Machine Learning
- ❖ Fast track course in Python with Machine Learning for VB.Net experts
- ❖ Fast track course in Python with Machine Learning for CSharp experts

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