

### 3-Month Learning Plan: Python, NumPy, OpenCV, TensorFlow

#### Week 1: Python Basics

Topics:

- Functions, Loops, Lists, Dictionaries
- File I/O, Exception Handling

Evaluation:

- Task: Build a text-based calculator
- Task: Create a contact book using a dictionary

#### Week 2: OOP + Intermediate Python

Topics:

- Classes, Objects, Modules
- Lambda, map, filter

Evaluation:

- Task: Student result system using classes
- Task: Simulate sensor data and save to file

#### Week 3: NumPy + Pandas Basics

Topics:

- NumPy arrays, slicing, math
- Pandas: DataFrames, reading/filtering CSV

Evaluation:

- Task: Analyze mock weather data
- Task: Convert lists to NumPy and perform stats

#### Week 4: Mini Projects with Python + Pandas

Topics:

- Data logger with Matplotlib
- CSV file processing and visualization

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Evaluation:

- Project: Sensor dashboard using CSV and Pandas

#### Week 5: OpenCV Setup + Image Basics

Topics:

- Load, save, show images
- Draw shapes, color conversions

Evaluation:

- Task: Build a simple drawing app

#### Week 6: Image Processing + Contours

Topics:

- Blur, threshold, edge detection
- Find and draw contours

Evaluation:

- Project: Shape/edge counter app

#### Week 7: Video Capture + Face Detection

Topics:

- Webcam input, real-time frames
- Haar cascades for face detection

Evaluation:

- Project: Webcam-based face detection

#### Week 8: OpenCV Real Projects + Masking

Topics:

- Bitwise operations

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- Object tracking and masking

Evaluation:

- Project: Virtual paint app with object tracking

#### Week 9: TensorFlow Basics + MNIST

Topics:

- Supervised learning, neural nets
- Model creation and training

Evaluation:

- Project: MNIST digit recognizer with basic model

#### Week 10: Custom Image Classifier

Topics:

- Load and preprocess dataset
- Build, train, evaluate custom model

Evaluation:

- Project: Image classifier (bugs, coins, etc.)

#### Week 11: TensorFlow + OpenCV Integration

Topics:

- Pass OpenCV frames into TensorFlow model
- Live prediction from webcam

Evaluation:

- Project: Real-time webcam object recognizer

#### Week 12: Model Deployment + Final Review

Topics:

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- Export model, TFLite overview

- Flask dashboard + ESP32 overview

Evaluation:

- Project: Host ML model or create final integration with OpenCV/TensorFlow