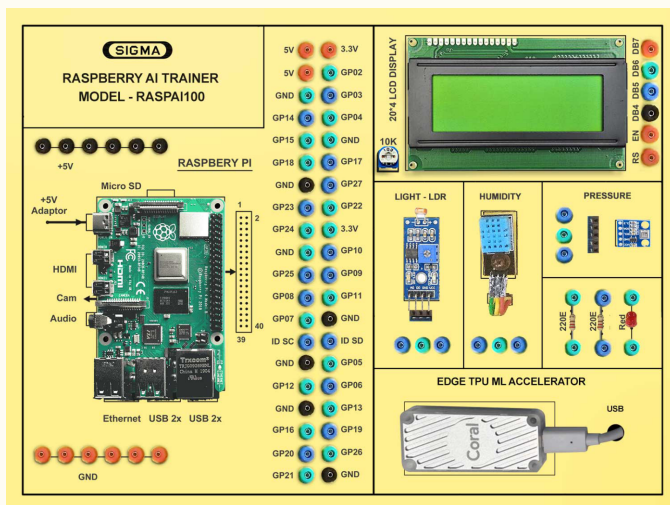




# RASPBERRY ARTIFICIAL INTELLIGENCE TRAINER MODEL- RASPAI100

This trainer has been designed with a view to provide practical and experimental knowledge of Artificial Intelligence (AI) with Raspberry Micro Controller for hardware and software programming.



**Hardware  
Trainer**



**Software  
OS, Drivers,  
Codes**

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**Dealer:-**

## SPECIFICATIONS

### 1. Raspberry Microcontroller Board – Pi-4

1. Processor : 64bit, ARMv7
2. RAM - 1 GB
3. Memory - 32GB
4. OS: Open Source Linux
5. Connectivity:  
Dual-Band 2.4/5.0 GHz Wireless LAN  
Bluetooth 5.0, Gigabit Ethernet  
USB Interface – USB 2.0 – 2 Ports, USB 3.0 – 2 Ports,
6. Video and Sound  
2 × micro HDMI Interface ports (up to 4Kp60 supported)
7. Power - 5V, 3A DC via USB-C Connector

### 2. Sensors:

1. Temperature and Humidity– DHT11
2. Ambient Light Sensor – LDR
3. Ambient Pressure Sensor – BMP180

### 3. Modules and Hardware:

1. 20 X 4 - LCD Display
2. LEDs and Resistors
3. 2 mm interconnection Sockets

### 4. AI GPU Accelerator

1. Google Edge TPU ML accelerator
2. 4 TOPS total peak performance
3. 2 TOPS per watt
4. USB 3.0 (USB 3.1 Gen 1) Type - C socket

## 5. Accessories:

- |     |  |                   |
|-----|--|-------------------|
| 1.  | 2 mm interconnection Sockets   | : On Board        |
| 2.  | 2 mm Banana Jumper Cable   | : 20 Nos          |
| 3.  | 2mm Banana Jack to Single pin jumpers                                    | : 2 Nos           |
| 4.  | USB to Micro USB Cable   | : 2 Nos           |
| 5.  | Ethernet Cable   | : 1 No            |
| 6.  | HDMI to HDMI Cable   | : 1 No            |
| 7.  | VGA 15 pin Male to HDMI Converter  | : 1 No            |
| 8.  | Power Supply Adaptor   | : 5V, 4A DC       |
| 9.  | SD Memory Card with Codes for All Experiments                            | : 32 GB - 2 No    |
| 10. | 16 GB Pen Drive  | : 1No             |
|     | with Software, Library, Drivers, Codes, Soft Copy of Manual & Mobile App |                   |
| 11. | Printed Practical Manual   | : 1 No            |
| 12. | E-Books for AI Subject   | : 10 Nos          |
| 13. | Mp4 Video Class for AI Subjects  | : 100 Nos         |
| 14. | Power Supply   | : 230V AC, 50 Hz  |
| 15. | Operating Conditions   | : 0-40 °C, 85% RH |
| 16. | Mains Cord   | : 1 No – On Board |

## 6. Cabinet and PCB

The complete circuit diagram is screen printed on component side of the PCB with circuit and Parts at the same place. The PCB with components on front side is fitted in elegant wooden box having lock and key arrangement. The acrylic cover is fitted on PCB to safeguard parts. It works on 230 V AC Supply.

## EXPERIMENTS

### A. Basic Experiments of Raspberry Controller

1. To understand theory and working of Artificial Intelligence
2. To understand Operating System for Artificial Intelligence
3. To understand Protocols used for Artificial Intelligence
4. To understand USB, HDMI, Display Port Interface of Artificial Intelligence
5. To understand Ethernet Cable Interface for Artificial Intelligence
6. To understand micro SD Card Interface for Artificial Intelligence
7. To understand that how to connect 20 x 4 LCD Display to Artificial Intelligence
8. To understand Libraries and Algorithms used for Artificial Intelligence
9. To determine Air Humidity & Temperature using DHT11
10. To measure Air Quality using Sensor Mq135
11. To measure Soil Moisture using Soil Moisture Sensor

### B. Practical Experiments

AI experiments are divided in four categories as below

1. Artificial Intelligence - AI
2. Machine Learning – ML
3. Deep Learning – DL
4. Natural Language Processing – NLP

#### 1. Artificial Intelligence –AI - Experiments

1. Introduction to Artificial Intelligence - What is Artificial Intelligence
2. To understand theory of Block diagram and its internal Structure of AI
3. To understand History of Artificial Intelligence
4. To understand Fundamentals of Artificial Intelligence
5. To understand theory of Basic of AI and its architecture
6. To understand AI Programming Language – C, C++, Python and R
7. To understand AI Protocols
8. To understand Glossary of Technical words
9. To understand AI Applications in following Areas :
  - a. Natural Language Processing – NLP
  - b. Internet of Things – IOT
  - c. Preventive Maintenance
  - d. Cyber Security
  - e. Agriculture and Food Industry
  - f. Remote Healthcare Monitoring and Telemedicine
  - g. Environment Monitoring and Forecast
  - h. Warehouse and Logistics Monitoring
  - i. Retail Analysis
  - j. Intelligent Traffic Management
  - k. Energy Monitoring and Control
  - l. Home and Building Automation

10. To understand **algorithms** used for applications in AI :
  - a. TensorFlow – To make AI Frame work
  - b. Keras - For High Performance Numerical Computation
  - c. PyTorch
  - d. GoogleAI
  - e. Amazon web services - AWS
  - f. Caffe
  - g. Anaconda Navigator
  
11. To understand **software** used for AI :
  - a. Linux OS
  - b. NVIDIA JetPack having Board support package - BSP
  - c. NVIDIA CUDA
  - d. cuDNN
  - e. TensorRT
  - f. Anaconda Navigator
  - g. Jupyter Notebook
  - h. Computer Vision
  - i. GPU computing
  - j. Multimedia Processing
  
12. To understand **Libraries** for applications in AI :
  - a. numpy
  - b. pandas
  - c. scikit-learn
  - d. matplotlib
  - e. seaborn
  - f. pycuda
  - g. cv2
  - h. caffe
  - I. torch
  - j. pytorch
  - k. TensorRt
  
13. To understand **Mathematics** used for AI :
  - a. Linear Algebra – Linear Equations, Matrixs, Vectors
  - b. Calculus – Differentiation, Integration, Gradient Descent,
  - c. Statistics – Population, Parameter, Sample, Variable, Probability

14. To understand realtime image processing applications using Computer Vision – CV
15. To understand Minimax Algorithm in Artificial Intelligence
16. To understand Generative AI
17. To understand ChatGPT Applications
18. To understand Virtual Reality – VR and Augmented Reality AR
19. To understand OpenAI - Speech To Text converter
20. To understand LangChain
21. To understand Hill Climbing Algorithm in Artificial Intelligence
22. To demonstrate OpenAI
23. To demonstrate Virtual Reality – VR and Augmented Reality AR

## **2. Machine Learning - ML – Experiments**

24. To understand theory of [Supervised Learning](#)
  - a. Linear Regression
  - b. Logistic Regression
  - c. Gradient Descent
  - d. Decision Tree
  - e. Random Forest
  - f. Bagging & Boosting
  - g. K Nearest Neighbors – KNN
  - h. Bayesian Linear Regression
  - i. Non-Linear Regression
  - j. Support Vector Machine
25. To understand theory of [Unsupervised Learning](#)
  - a. K-Means
  - b. Hierarchical Clustering
26. To install and understand Anaconda Dashboard
27. To demonstrate Machine Learning Framework Experiment using [TensorFlow](#)
28. To demonstrate Machine Learning Framework Experiment using [PyTorch](#)
29. To demonstrate Machine Learning Framework Experiment using [Keras](#)
30. To demonstrate Supervised Learning for
  - a. Linear Regression
  - b. Logistic Regression
31. To demonstrate Unsupervised Learning for
  - a. Hierarchical Clustering
  - b. K-Means

32. To understand theory of following Applications using OpenCV and Machine Learning
  - a. Face Detection and Tracking
  - b. Face Recognition
  - c. Emotion Recognition
  - d. Gesture Recognition
  - e. Smile Detection
  - f. Vehicle Detection
  - g. Object Detection using Yolo algorithm
  - h. Drowsiness Detection
  - i. License Plate Detection
  - j. Fingerprint Recognition
  - k. Text identification
  - l. Traffic Sign Recognition
  - m. Motion Detection
  - n. Character Recognition
  - o. Edge Detection through Image processing
  - p. Handwritten Digit Classification using CNN
  - q. Leaf Disease Detection and Classification
  - r. Pattern Recognition
  - s. Fire Detection
  - t. Weather Forecasting
  
33. To understand theory of Real Time Sensors Interface using Machine Learning
34. To understand theory of Reinforcement Learning
35. To understand theory of Ensemble Learning
36. To understand theory of Gaussian Mixture Model – GMM
37. To understand theory of Support Vector Machine - SMM
38. To understand theory of MLOps – Machine Learning Operations
39. To understand theory of DevOps - Developments and Operations
40. To understand theory of PCA - Principal Component Analysis
41. To understand theory of Cost Function
42. To understand theory of Text Classification Using Naive
43. To understand theory of Back propagation and Gradient Descent

### **3. Deep Learning - DL – Experiments**

44. To understand theory of Neural Networks - Overview and Representation
45. To understand theory of Convolutional Neural Networks - CNN
46. To understand theory of Recurrent Neural Networks
47. To understand theory of Deep Neural Networks - DNNs
48. To understand theory of Multiple Neural Networks in parallel for applications
49. To understand theory of Preventive Maintenance
50. To understand theory of Activation Function
51. To understand theory of Loss Function
52. To understand theory of Real Time Image Processing Application using computer vision.
53. To understand theory of Real Time Speech Processing and Audio Segmentation
54. To demonstrate Neural Networks
55. To demonstrate Convolutional Neural Networks

### **4. Natural Language Processing – NLP – Experiments using Deep Learning**

56. To understand theory of audio processing
57. To understand theory of AI Voice Assistance
58. To understand theory of AI Chatbot
59. To understand theory of Audio Fingerprinting
60. To understand theory of Music Recommendation
61. To understand theory of Speech Recognition
62. To understand theory of Sentiment Analysis
63. To understand theory of Dialog Flow – Chatbot
64. To understand theory of Text Classification
65. To understand theory of Machine Translation
66. To understand theory of Named Entity Recognition
67. To demonstrate AI Voice Assistance using NLP
68. To demonstrate AI Chatbot using NLP
69. To demonstrate Speech Recognition using NLP
70. To demonstrate Text Classification using NLP
71. To demonstrate Computer Vision
72. To demonstrate ChatGPT Applications



## CLASS ROOM TRAINING – ONLINE AND OFFLINE

The training includes Single user Classroom / laboratory teaching, learning and simulation software module. The content has easy explanation of various complex topics with animation and simulation for ease of student learning. It also supports learning through videos, graphs, charts, along with mandatory rich content and theory to understand fundamental concepts, interactive learning objects, FAQ, MCQ etc. The content is supplied in digital online access or license protection.

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