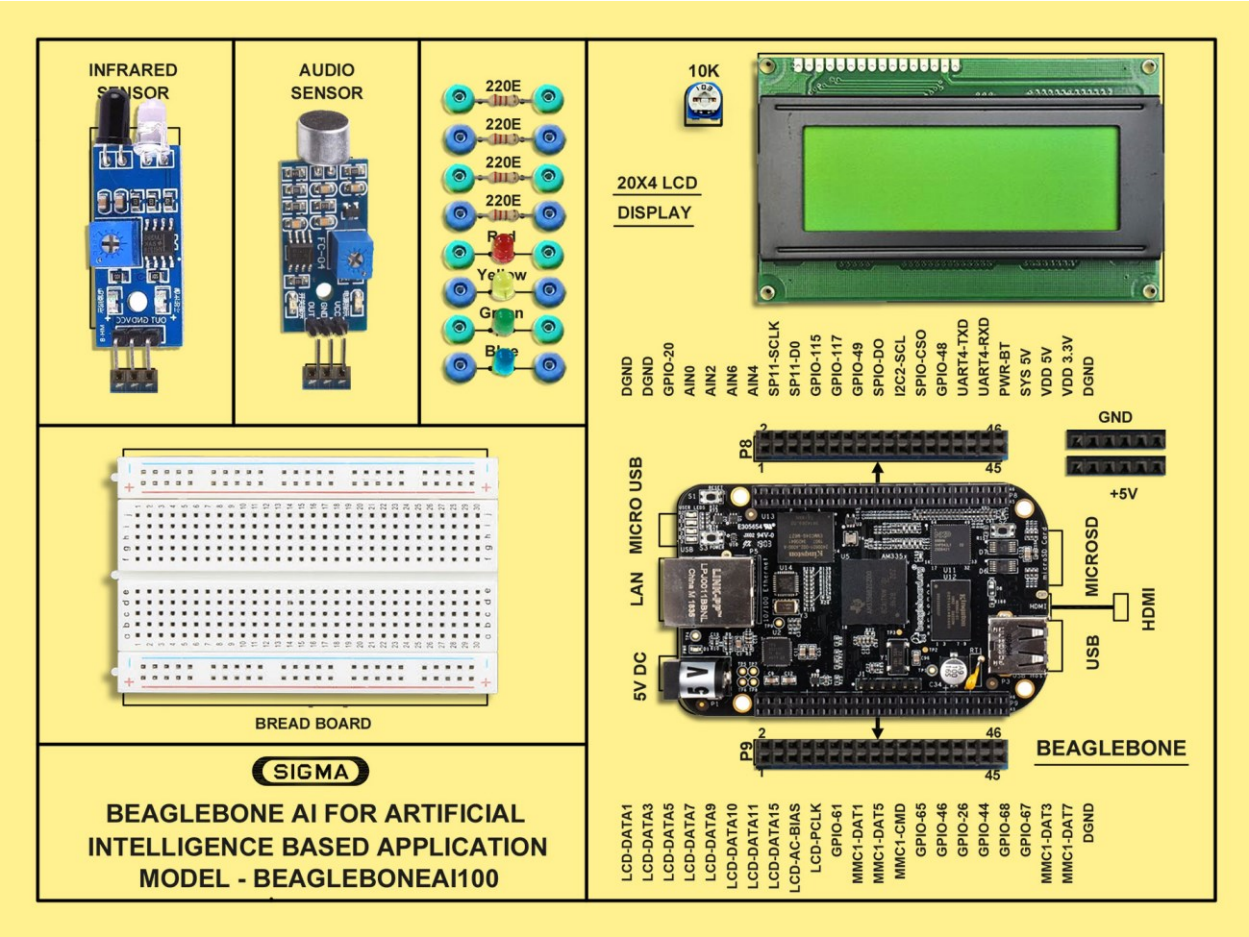
BEAGLEBONE AI MICROCONTROLLER TRAINER

MODEL - BEAGLEBONEAI100

This trainer has been designed with a view to provide practical and experimental knowledge of Artificial Intelligence based applications with BeagleBone AI Microcontroller.



SPECIFICATIONS

1. Hardware

Following Parts and Modules are assembled on Single PCB of size – 14”x11”

1. BeagleBone AI Board

1. CPU: Texas Instruments Sitara AM5729 (featuring Dual Arm® Cortex®-A15 microprocessor subsystem running at 1.5GHz,
2. Dual C66 DSP, Four ARM Cortex-M4,
3. Four Programmable Real-time Units (PRUs)
4. Four Embedded Vision Engine
5. 4x Embedded Vision Engines (EVEs))
6. RAM: 1GB RAM
7. Storage: 16GB onboard eMMC flash with high-speed interface
8. USB: USB Type-C for power and superspeed dual-role controller; and USB type-A host
9. Connectivity: Gigabit Ethernet, 2.4/5GHz WiFi, and Bluetooth
10. Display: micro HDMI
11. Software: Debian GNU/Linux
12. Additional USB-A host port
13. Headers compatible with many BeagleBone® Cape add-on boards
14. Zero-download out-of-box software experience

2. Sensors:

1. Infrared Obstacle Sensor
2. Light LDR Sensor
3. Temperature & Humidity Sensor
4. Atmosphere

3. Modules and Hardware:

1. 20 X 4 - LCD Display
2. LEDs and Different Resistors
3. Breadboard - 400 Points for testing different Sensors and circuits

2. Accessories

1.	Memory Card	: 32 GB SD Card
2.	USB Cable	: 2 No
3.	Ethernet Cable	: 1 No
4.	HDMI to Mini HDMI Connector Cable	: 1 No
5.	Power Supply Adaptor	: +5V DC, 2A
6.	Jumper wires -2 mm	: 50 Nos.
7.	Pen Derive with Software, Library, Driver, Codes, Soft Copy of Manual	: 16 GB
8.	Printed Practical Manual	: 1 No.
9.	E-Books for IOT Subject	: 10 Nos. in PDF Format
10.	Mp4 Video Class for IOT Subject	: 40 Nos
11.	Excitation accessories for each sensor	

3. 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. Theory Experiments of BeagleBone AI Micro controller

1. To understand theory and working of BeagleBone AI Micro controller.
2. To understand Operating system of BeagleBone Micro controller.
3. To understand 20 x 4 LCD Display Interface.
4. To understand Communication Protocols-UART,I2C,SPI,and RS485
5. To understand USB Interface for BeagleBone AI Micro controller.
6. To understand Ethernet Cable Interface for BeagleBone AI Micro controller
7. To understand microSD Card Interface for BeagleBone AI Micro controller

B. Practical Experiments

8. TI Deep Learning API implementation on BeagleBone AI
9. Using Beagle Bone AI with CM-550 for Color Tracking
10. The Trill Bar Sensor Playing demo of Bela cape on the Beagle Bone AI
11. Digital Signal Processing using BeagleBone AI
12. Object Detection and Image processing using BeagleBone AI
13. Implementing Image classification using BeagleBone AI
14. 3D sensing with stereo cameras for human-like perception using BeagleBone AI
15. Deep learning-based visual localization using BeagleBone AI
16. Implementing Tensor Flow Lite and TVM semantic segmentation models in BeagleBone AI
17. Making personnel protective equipment detector using BeagleBone AI