

**Tutorial No. 1**

**Q1. Include the details of the Jetson Nano and Nvidia – AGX Xavier Board in the additional two columns**

| **Sr. No.** | **Parameters** | **Arduino** | **Raspberry Pi 3** | **Raspberry Pi 4** | **Jetson Nano** | **Nvidia - AGX** |
| --- | --- | --- | --- | --- | --- | --- |
| **1** | **Module** |  |  |  |  | **Jetson Xavier NX** |
| **2** | **Controller/Processor** | **Atmega328p** | **Broadcom BCM2837 Quad Core Processor** | **Quad core Cortex-A72** | **Quad Core**  **Cortex-A57 CPU** | **Hexa Core**  **4 cortex-A72 cores**  **2 cortex-A53 cores** |
| **3** | **Processing Bit Size** | **8bit** | **64bit** | **64bit** | **64 Bit** | **64 bit** |
| **4** | **Operating Voltage** | **5V** | **3.3V** | **5V** | **5V 3A** | **12 V** |
| **5** | **Total Numbers of Pins** | **28 (5-Analog) (13-Digital)** | **40 (26-GPIO pins)** | **40 (28-GPIO pins)** | **40 (28- GPIO pins)** | **40 (28 -GPIO pins)** |
| **6** | **PWM Pins** | **Digital i/o 3,5,6,9,10,11** | **GPIO 12, 13 18,19** | **GPIO 12, 13, 18, 19** | **GPIO 32, 33** |  |
| **7** | **Clock Frequency** | **16 mhz** | **1.2 Ghz** | **1.5 Ghz** | **1.43 GHz** | **1.4 GHz** |
| **8** | **Flash memory** | **32 Kb** | **16 Gb** | **-** | **16GB** | **32 GB** |
| **9** | **RAM** | **2KB** | **1GB** | **4GB** | **4 GB LPDDR4** | **8 GB** |
| **10** | **Networking** | **None** | **Ethernet, Wi-Fi, bluetooth** | **Wi-fi, LAN, bluetooth** | **Wi-FI, Ethernet, Bluetooth 4.2** | **Wi-FI, Ethernet, Bluetooth 5.1** |
| **11** | **USB port** | **1** | **4** | **4** | **6** | **8** |
| **12** | **Video Output** | **-** | **1X full size HDMI** | **2x mini HDMI** | **1 HDMI 2.0**  **2 MIPI CSI-2 connector** | **1 HDMI**  **1 Display port** |
| **13** | **Audio Output** | **-** | **Phone jack (Analog**[**3.5 mm)**](https://en.wikipedia.org/wiki/Phone_connector_(audio)) **, HDMI (digital)** | **Phone jack (Analog**[**3.5 mm)**](https://en.wikipedia.org/wiki/Phone_connector_(audio)) **, HDMI (digital)** | **1 3.5 mm Audio jack** | **1 I2S audio Output** |
| **14** | **Weight** | **25 gm** | **45 gm** | **46 gm** | **250 gm** |  |
| **15** | **I/P Power** | **5V, 2.5 ADC** | **5V, 2.5 ADC** | **5V, 3 ADC** | **5V 3A** | **12V - 19V with 10A-20A** |
| **16** | **Cost** | **Rs. 500** | **Rs. 3000** | **Rs. 5000** | **RS. 20,000** | **Rs. 50,000** |

**Q2. Analyze the following application and suggest a suitable portable development board for the same.**

**A Vehicle needs**

1. **6 cameras**
2. **GPS connectivity**
3. **tyre pressure**
4. **temperature measurement**
5. **in-vehicle temperature and**
6. **oxygen monitoring.**

**What would be the approximate cost of the entire system and the power requirement?**

**Ans:**

for this application Jetson Xavier nx module will be the perfect one . It specification states that it can support up to 6 cameras which is also the requirement of our application above. it has 6 -core NVIDIA caramel ARm v8.2 64-bit CPU which is sufficient for image processing capability.

Jetson Xavier nx has 40 pins out of which 28 pins are gpio pins which is sufficient to connect the remaining 5 sensor in above application.

cost:-

1) jetson xavier - 50, 000

2) 6 cameras - 13,000 \* 6 = 78, 000

## [Arducam IMX477 Autofocus and Software-Controlled Focus HQ Camera, 12MP 100° FOV Camera Module Compatible with Nvidia Jetson Nano/Xavier NX, M12 Lens](https://www.amazon.in/Arducam-IMX477-Autofocus-Software-Controlled-Motorized/dp/B08PDZ68D7/ref=sr_1_1?crid=IO78X1SE35H6&keywords=jetson+xavier+nx+camera&qid=1674368548&sprefix=jetson+xavier+nx+camer%2Caps%2C400&sr=8-1)

3) gps sensor = 1500

4) temperature sensor = 230 (<https://www.amazon.in/Robodo-SEN9-Ds18B20-Waterproof-Temperature/dp/B073Q3D7YQ/ref=sr_1_4?crid=1R0WIXHFIS8PE&keywords=sht+temperature+sensor&qid=1674368982&sprefix=sht+tempreture+senso%2Caps%2C528&sr=8-4>)

total cost = Rs. 1,29,730