Simple steps for FPGA Based ML Edge

For this project we used an FPGA development board called the Xilinx Kria KV260. This board is a vision algorithm compatible board.

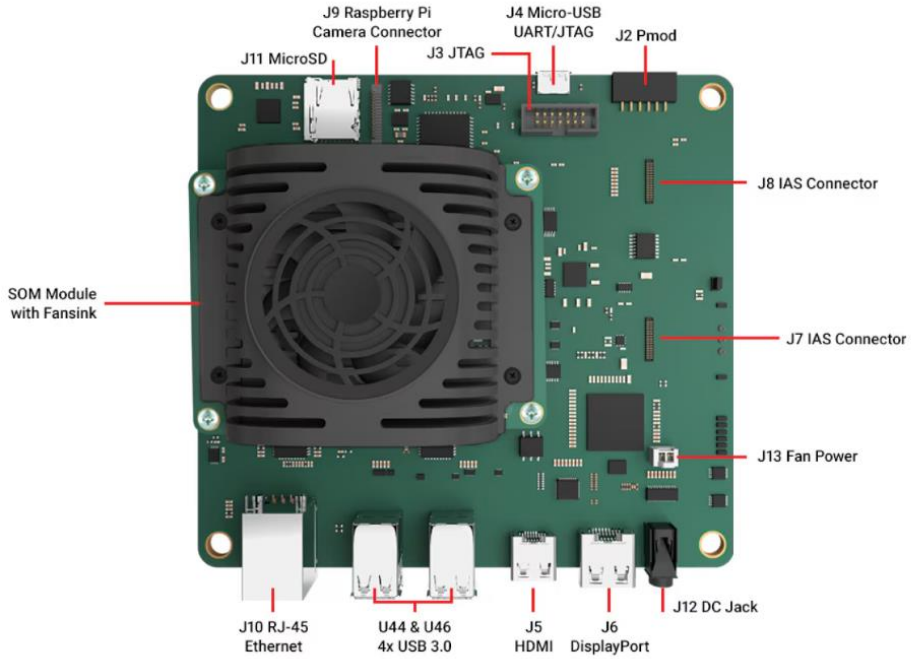


Image by AMD

To set up this board you need to follow a few steps.

These steps are mentioned on the AMD website but there are a few things different that we faced that we have added to this document.

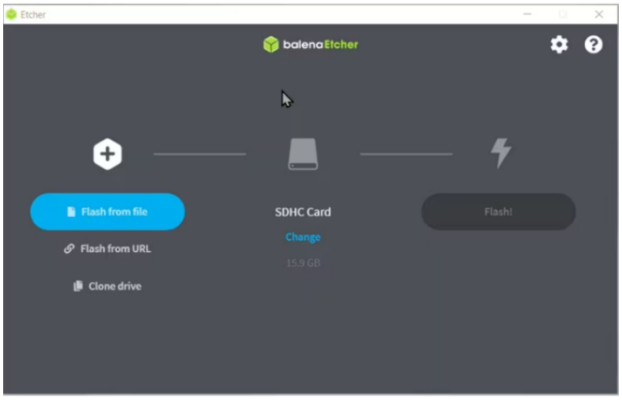
For the steps mentioned by AMD for Kria KV260 you can follow this link: Setup_Guide

We will also be mentioning all the steps that we have taken here.

1. We started by unboxing the contents of the starter kit which include but not limited to:
    a. Xilinx Kria KV260 board as shown above: Xilinx_board
    b. The power supply, make sure you get the power supply (12V, 3A) as the board itself does not come with it.
    c. MicroSD card [16GB UHS-1]
    d. Micro-USB to USB-A cable
    e. AR1335 IAS camera module or a USB webcam also works.
    f. Ethernet cable
    g. HDMI cable to connect to a monitor.

(if you have a monitor, it makes a few of the tasks easier but we will still be using SSH for the most part)

2. Next, we need to setup the SD card with an Image.
   You can download the image available on the AMD website from here (as of 2024): Kria_image
   Also download the Balena Etcher to flash the SD card with the Image: https://www.balena.io/etcher/4



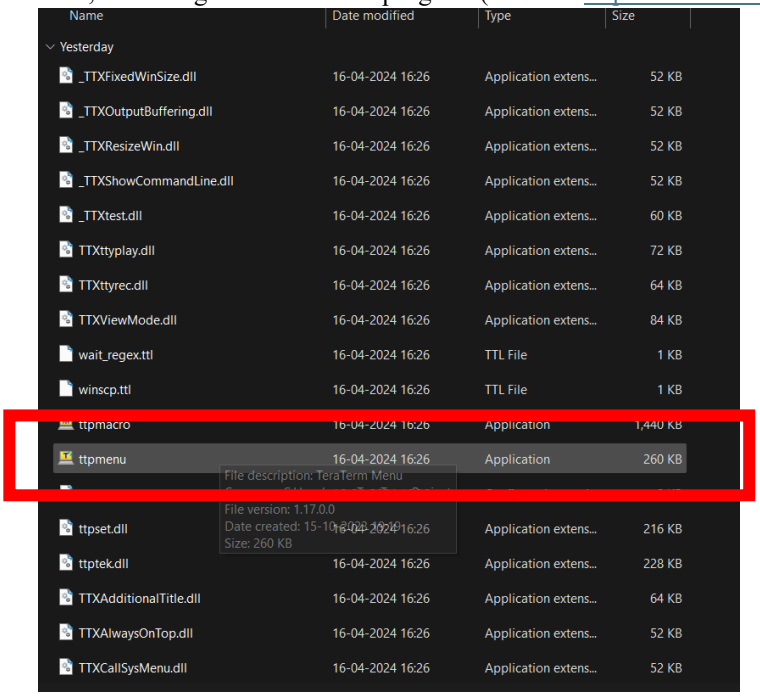
Once you open Balena, select the image and the storage device which is the SD card and then click on flash.

This should take a few minutes.

3. For this step we start connecting all the cables into the FPGA only, DO NOT START CONNECTING AC POWER OR USB CABLE TO LAPTOP/DESKTOP.
    a. Insert the SD card in slot j11. (Slots are mentioned on the board)
    b. Connect the micro-USB to USB A cable into the j4 slot.
    c. Connect the camera to port U44 or U46.
    d. Connect the power supply to the DC jack (j12), but don't connect it to the AC supply yet.

    At this point you can also connect an HDMI for the monitor and a keyboard, mouse to be used with the monitor.

4. We start booting our board now.
    a. Start by connecting the USB A cable into the desktop/laptop and check which COM port appears when you connect the cable in the device manager (control panel).
    b. "The Starter Kit uses an FTDI USB to COM port device that requires the FTDI virtual COM port driver to be installed on your machine. If the driver is not already installed on your host machine or Windows has not automatically installed it, go to the following link: https://ftdichip.com/drivers/vcp-drivers/" *(credit AMD website linked above)*
    c. Now, we configure the terminal program (teraterm https://tera-term.en.softonic.com/, PuTTy).



    d. Baud rate = 115200, Data bits = 8, Stop bits = 1, Flow control = None, Parity = None
    e. Then connect the power supply to the AC power source, and Linux UART response can be seen on the terminal program interface.
    f. Once booting is done, you will be prompted to enter the username and password.
    Possible username: petalinux, ubuntu
    If it is ubuntu, then password is also ubuntu. After entering the password, you will be prompted to change the password. If it is petalinux, as soon as you enter it, you will be prompted to enter a new password.
    g. We then switch to root user using the following command "sudo su -l root."
    h. Verify DNS connectivity by using this command "ping 8.8.8.8". If you don't get a response, then check if you have properly connected the ethernet cable to the ports and your modem or source.

(for Mac and linux, steps are different, and they are mentioned in the AMD link provided above)