



BPI-FPGA Two-ways communicate with SPI

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Environment

Hardware :

1. FPGA:Efinix T20F256 DK FPGA
2. Banana Pi M64

Software :

1. Efinity 2019.3
2. BPI-M64 Raspbian 9.4 Kernel 3.10 and install WiringPi*

* how to install WiringPi in last page

Banana-Pi M64 feature

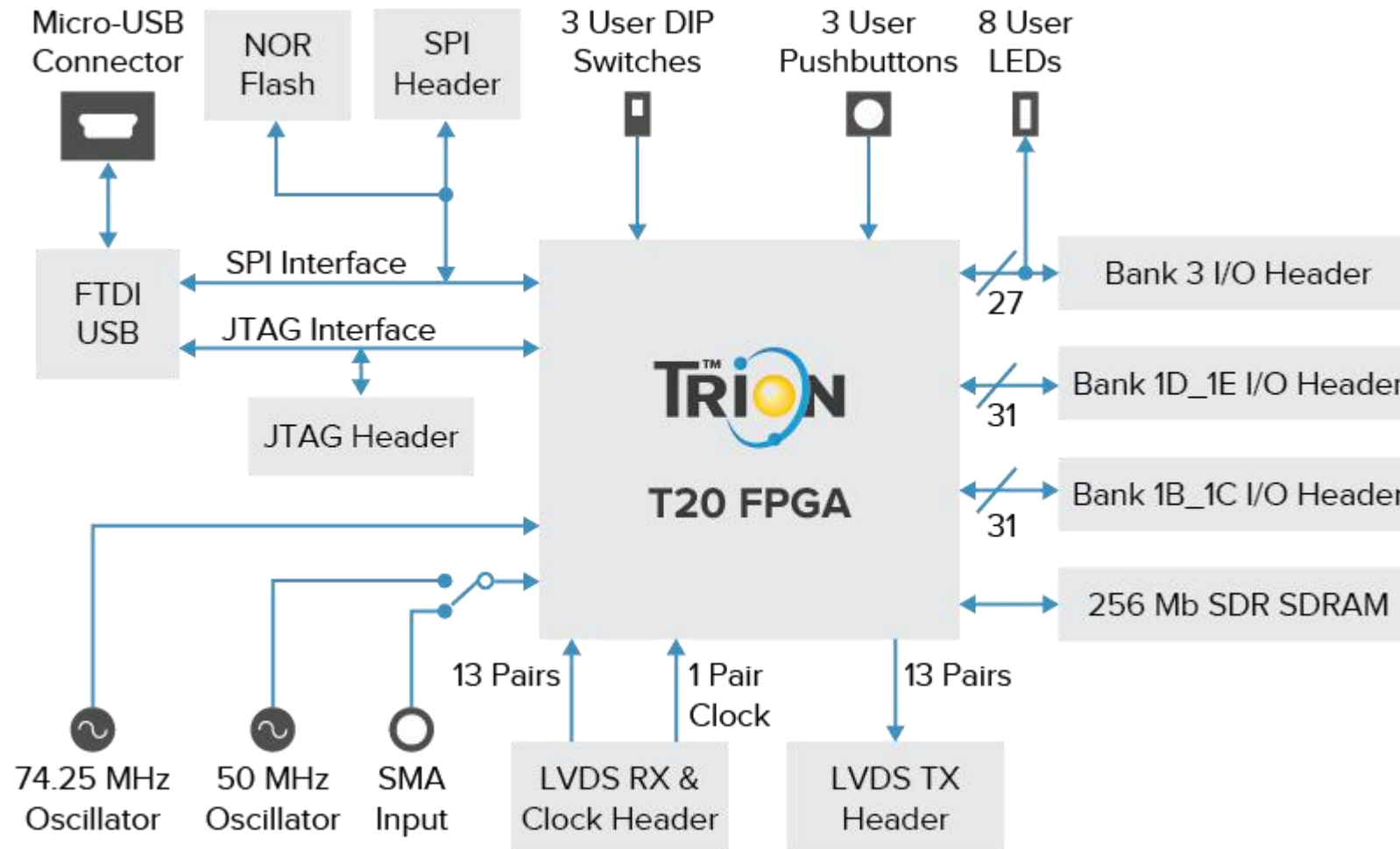


- 64 Bit Quad Core ARM Cortex A53 1.2 Ghz CPU
- Dual core Mali 400 MP2 GPU
- 2G DDR3 SDRAM
- MicroSD slot supports up to 256GB expansion
- 8G eMMC flash (option 16/32/64G)
- CSI camera intface and DSI display interface support
- 10/100/1000 Mb Ethernet port
- (3) USB 2.0 hosts and (1) USB otg port
- 4K high-definition video playback
- 4K x 2K HDMI port and multi-channel audio output
- WIFI&Bluetooth 4.0 with 802.11BGN onboard
- 3.5mm Stereo Output mini-jack with microphone support
- Built-in 3.7V Lithium Battery Charging Circuit
- Hardware security enables trustzone security system,
- Digital Rights Management (DRM),
- information encryption/decryption, secure boot, secure JTAG and secure efuse

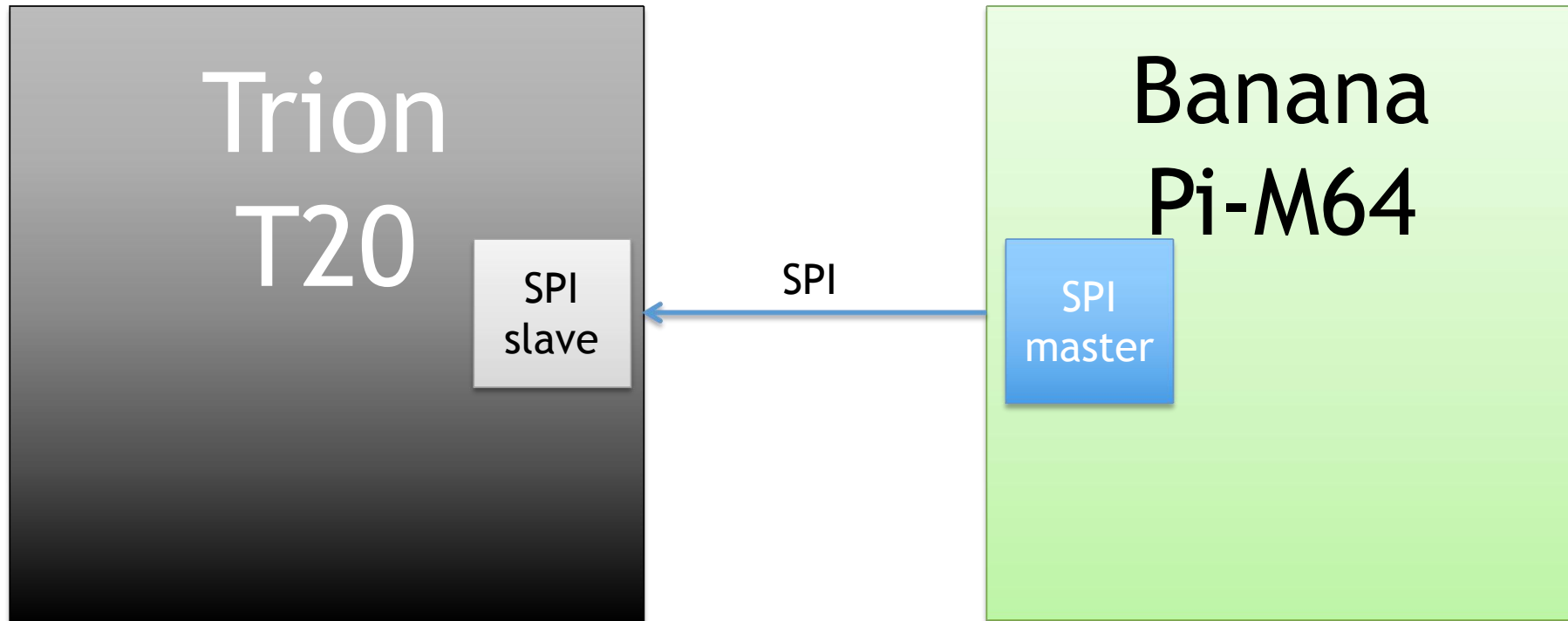
BPI-M64 Raspbian Version

- open the BPI terminal
- `uname -a`

T20 Development Board Block Diagram



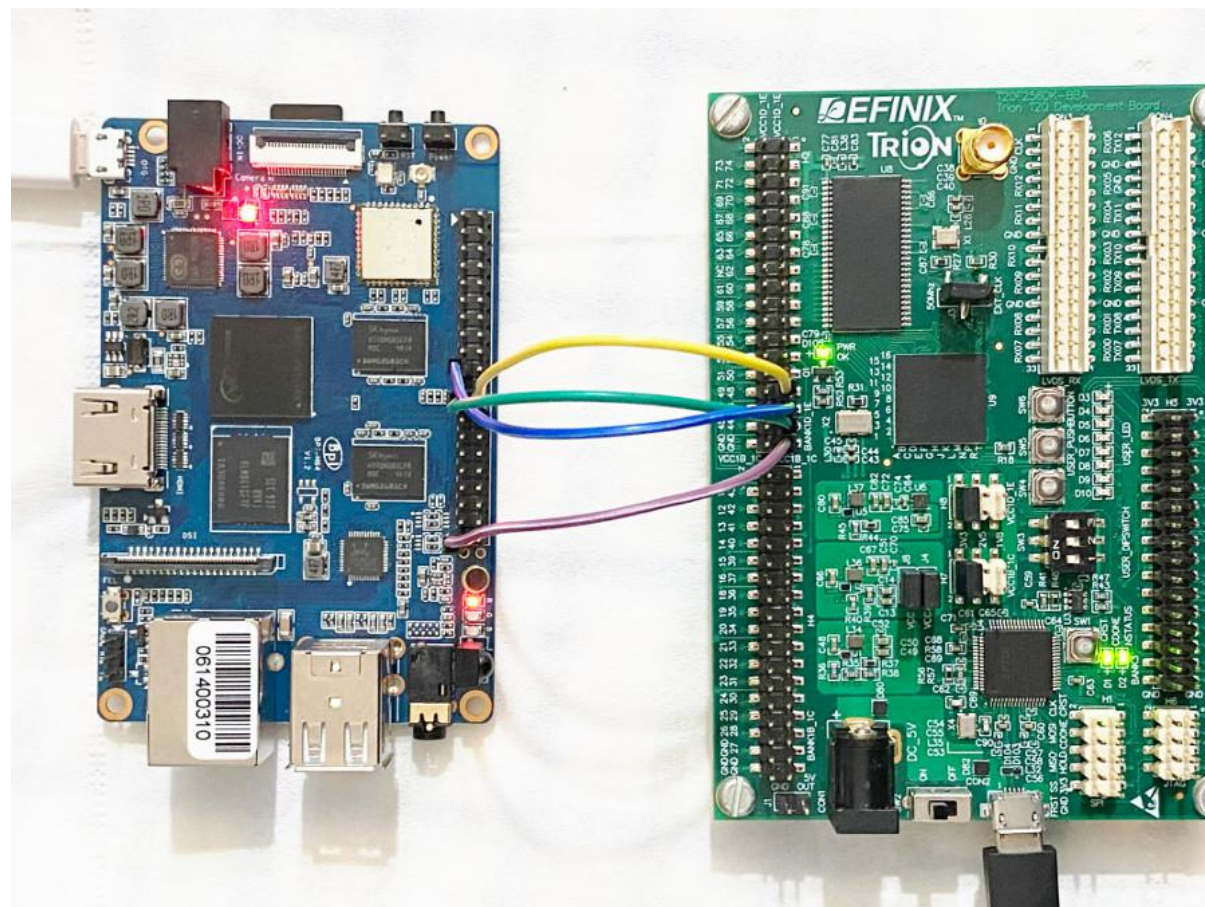
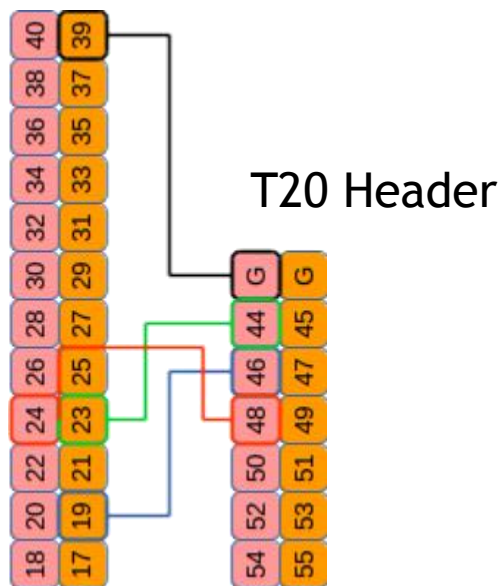
Two way communication with SPI between Trion FPGA and Banana Pi



Connect with BananaPi and FPGA

	BananaPi-M64	Efinix T20 DK
MOSI	: GPIO19	GPIO46 (H2-31)
SPI_CLK	: GPIO23	GPIO44 (H2-33)
SPI_SS	: GPIO24	GPIO48 (H2-29)
GND	: GPIO39	GND (H2-35)

BananaPi-M64
GPIO Header



ubuntu remote shell with BPI

- open the terminal in ubuntu
- `ssh pi@10.0.1.20`
- input the pi account password
- 10.0.1.20 is BPI IP address, you must change it with your BPI-M64 Pi address

How to run

BananaPi:



1. cd xx/xx (the path of spi.c)
2. gcc -o spi spi.c -lwiringPi
3. sudo ./spi

Efinix T20 DK:

1. download bitstream in Debugger in Efinity 2019.3
2. setup trigger:

Trigger Setup Capture Setup

Trigger Mode Basic Only ▾

  Trigger Condition Global 'AND' ▾

Name	Operator	Radix	Value	
spi_slave/spi_...	==	Bin	R (0-to-1 tran...	probe1

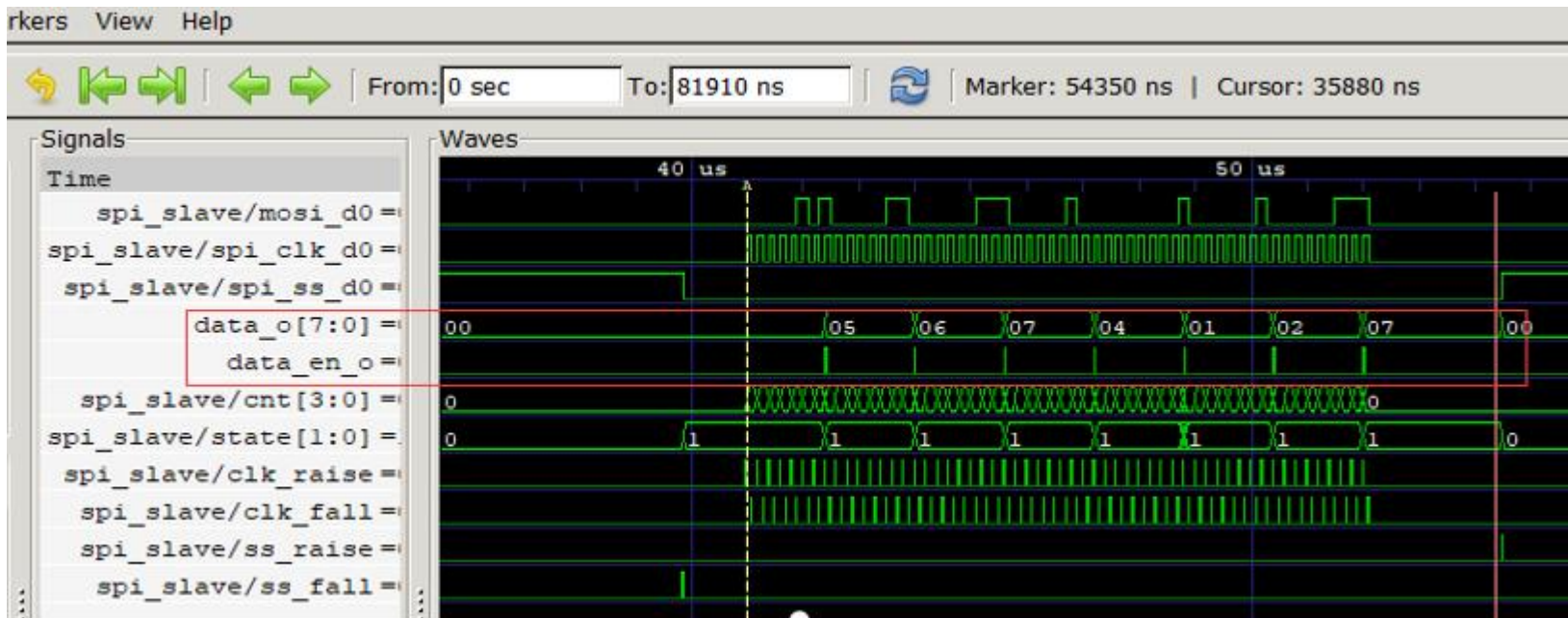
- 3.click "run"

Result-Win10

the data of BananaPi sending:

```
char send_data[10]={5,6,7,4,1,2,7,8,9,10};  
wiringPiSPIDataRW(0,send_data,7);
```

the received data is 0x05,0x06,0x07,0x04,0x01,0x02,0x07 in FPGA

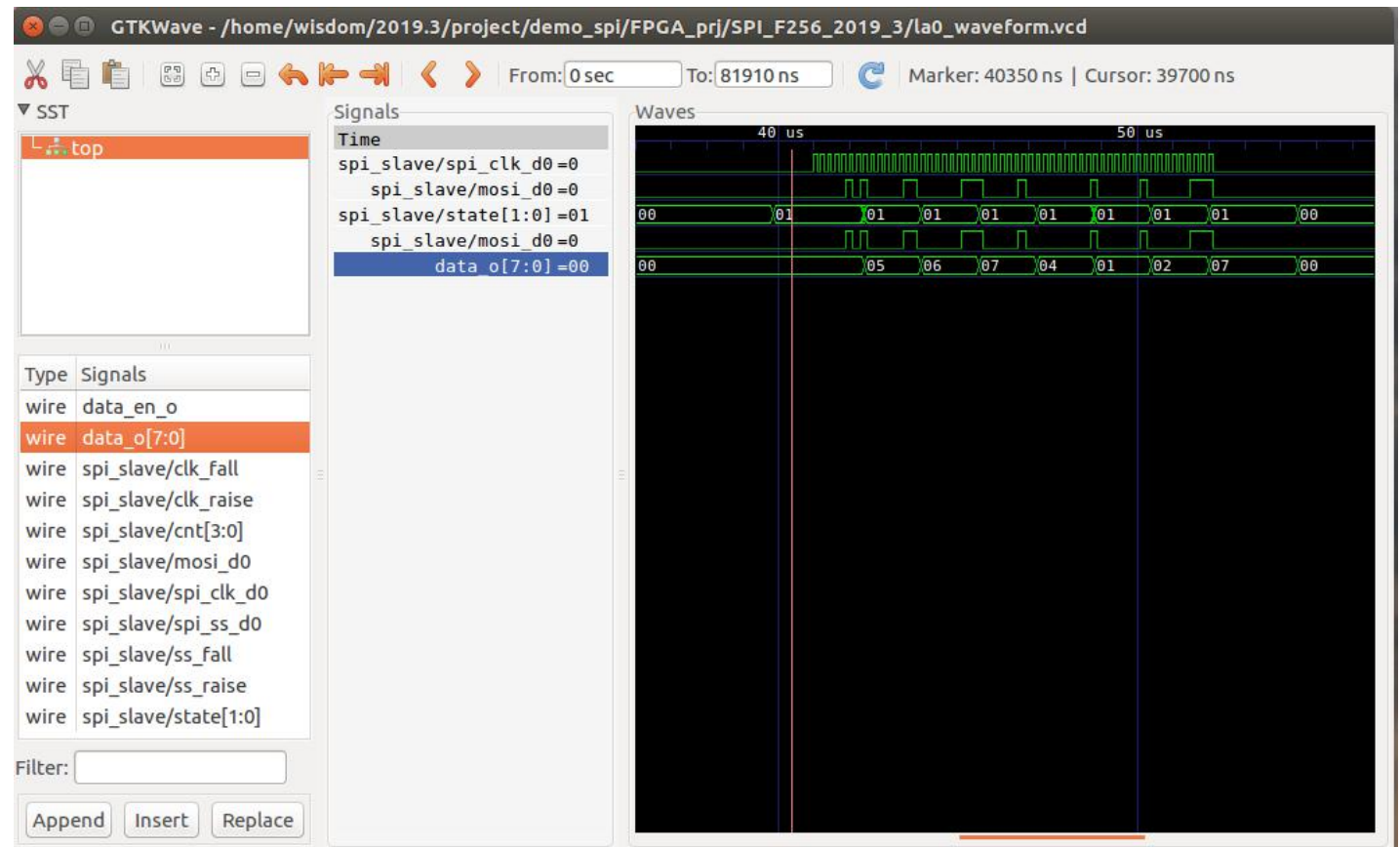


Result- Ubuntu16

the data of BananaPi sending:

```
char send_data[10]={5,6,7,4,1,2,7,8,9,10};  
wiringPiSPIDataRW(0,send_data,7);
```

the received data is
0x05,0x06,0x07,0x04,0x01,0x02,
0x07 in FPGA



How to install WiringPi

1.download BPI-wiringPi:

<https://github.com/BPI-SINOVOIP/BPI-files/blob/master/SD/BPI-ROOT/bpi-wiringpi.tgz>

2.Extract to root:

```
tar xvf bpi-wiringpi.tgz -C /
```