WIRELESS COMMUNICATION BETWEEN TWO EMBEDDED SYSTEMS

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Abstract— Many applications require wireless connectivity to seamlessly convey information generally from remote data acquisition node to the central data collection node. This can be achieved by variety of standards available today depending upon distance and transfer rate requirement.

We have used embedded system as ZYNQ SoC (Zedboard). And for wireless connectivity we have used a wifi module (ESP8266). As for a truthful communication a end user suitable framework has to be developed for Zedboard along with a PC side software to for a integrated communication system.

We have used a SPI protocol to have connection between WIFI module and Zedboard. A common WIFI network has been created for connecting the nodes to have a communication.

A UDP protocol packet transfer software has been develop to on PC to send and receive data. Similarly WIFI module is programmed for receiving and transmitting in UDP packets.

A framework for zedboard has been develop in a way to store and transfer the data into the desired location (memory location created using arrays) specified by the user.

Hence a wireless communication has been developed using a WIFI as a wireless medium along with a Zedboard and PC as a embedded system for end users.

I. INTRODUCTION

This doc Wireless communication between two embedded systems, can be loosely defined as a network of small, low-cost, low-power, ubiquitous electronic devices where sensing data and communicating information occur without direct human intervention. Each device functions as a "smart node" in the network by sensing information and performing low-level signal processing to filter signals from noise and to reduce the bandwidth needed for node-to-node communications. The nodes need to communicate with a centralized "cloud" in a secure manner to protect, store and process data, and bounce actionable information down to humans.

Many times we feel a need to transfer data from one device to another which have different connection mechanisms, making them incompatible. It seems to be impossible to transfer data between two non compatible devices. Like a device has a WiFi interface but not the USB interface, and another device has USB but not WiFi. So how will you transmit data between these two devices?

The data could be transmitted through a third device (like laptop) which has both WiFi as well as USB connectivity. But the task becomes lengthy, as you first have to copy data from USB to your laptop and then transfer if to the other device through WiFi.

For latest development in the direction of embedded system and wireless network, this technology proposes a new idea in which data can be transferred from a USB device to a WiFi enabled

device through an embedded kit. Hence a 3-step process is optimized to a 1-step process. Due to the USB device having no WiFi connectivity and WiFi device having no USB port, the embedded system is used to bridge the devices and transfer the data between the two. The Linux operating system can load the drivers of WiFi and USB. Based on this model, we can implement this USB WiFi Bridge.

II. BLOCK DIAGRAM
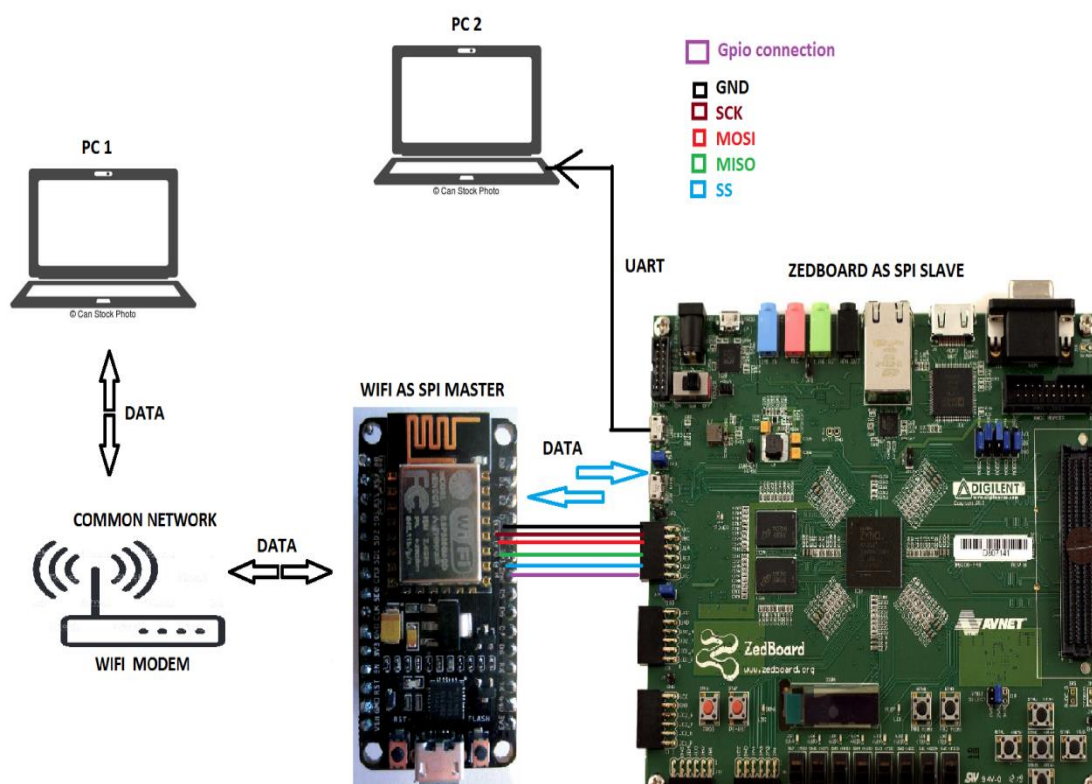
Block diagram

In this project we are going to implement a UART,,SPI protocol in ZYNQ SoC which is present on Zedboard. Also we are going to program a RF module i.e WIFI to serve as a wireless transceiver as this wifi use IEEE 802.11.b,g,n standard protocol for transmission. We have a similar device on the other side to have a communication link between the two RF transreceiver.

The ZYNQ SoC has two uart from which one is dedicated to the usb to uart bridge in ZEDboard so we can use the uart1 to display various message and data. And for connecting ZEDboard with the wifi we have use SPI protocol using PMOD connections on Zedboard .

III.   FRAME FORMAT

In telecommunications, a frame is data that is transmitted between network points as a unit complete with addressing and necessary protocol control information. Aframe is usually transmitted serial bit by bit and contains a header field and a trailer field that "frame" the data.
A frame is a digital data transmission unit in computer networking and telecommunication. A frame typically includes frame synchronization features consisting of a sequence of bits or symbols that indicate to the receiver, the beginning, and end of the payload data within the stream of symbols or bits it receives.
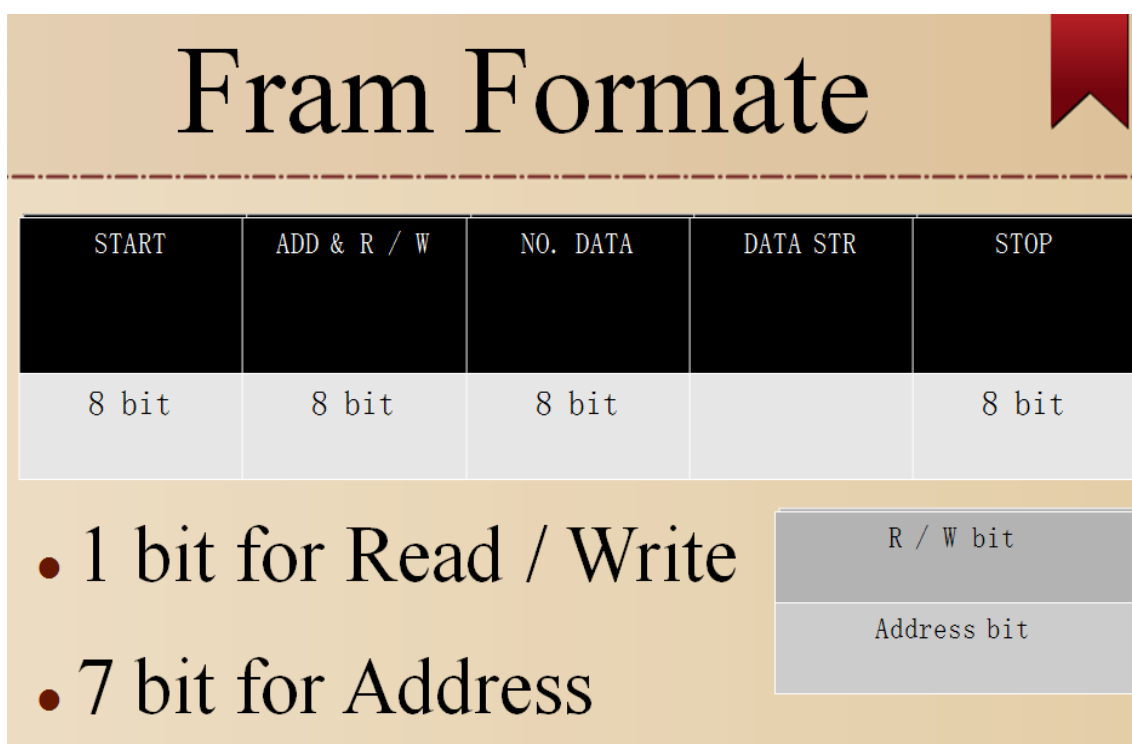
IV.   RESULT

Frame detection and data abstraction from the frame at the zedboard side. Frame detection and data abstraction from the frame at the esp8266 wifi side. The data integrity test performed 1000 times to test the data corruption with respect to number of transmission.
We have build a successful data transmission between the two embedded system with a self defined frame format.
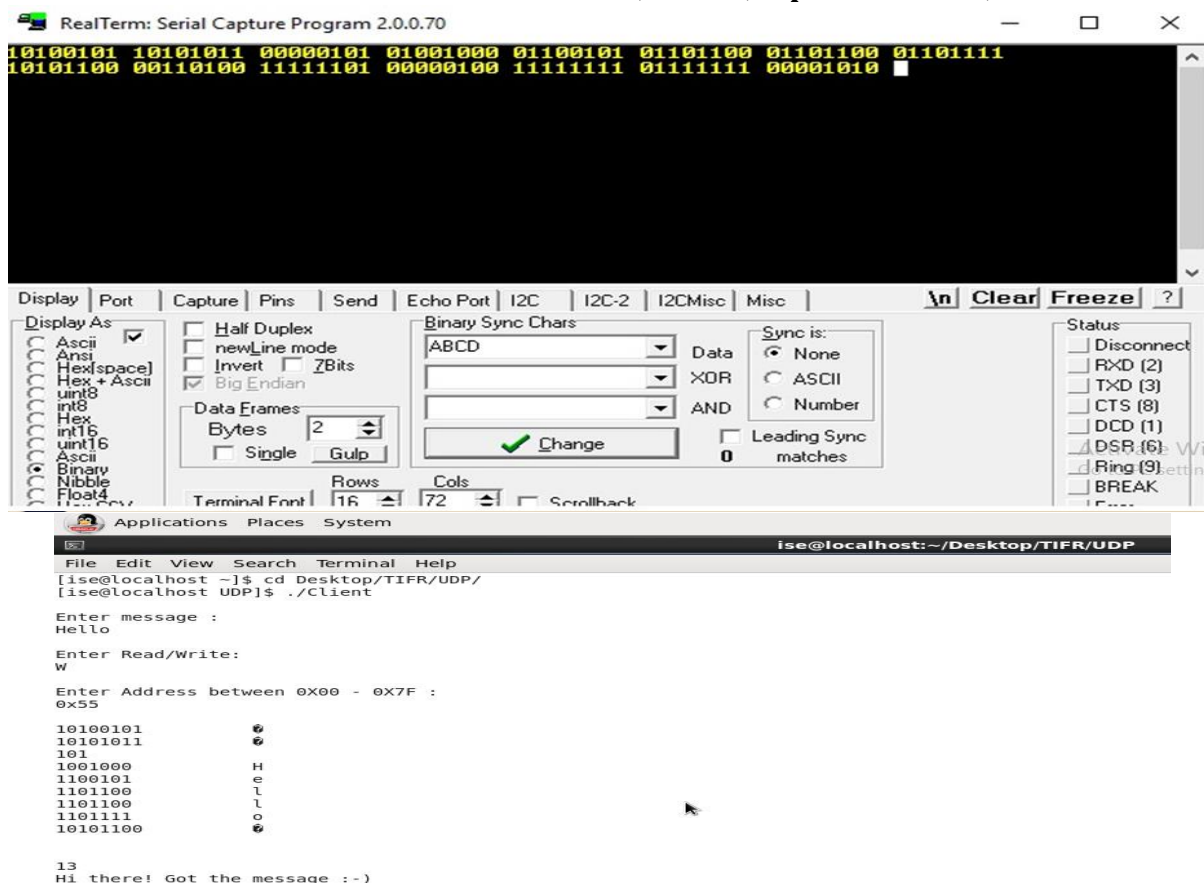
V. CONCLUSIONS

We have developed a framework for data read and write to a node embedded system. The user will be able to read and write the from/to a specific memory address location on the node system. User can easily control the nodes. We have form a frame format for a data transmission .These frame format contains start byte,address and read write byte,data length byte, data and stop byte. Both the the zedboard and the wifi is programmed for the fragmentation od data from the frame. We have used SPI protocol for zedboard and wifi communication for synchronous and faster data rate. And lastly with the guidance of our sponsored project guide and college guide we were able to complete this project successfully.

VI. REFERENCES

[1] Zedboard user guide.

[2] Zynq user guide.

[3] http://zedboard.org/forums/training

[4] esp8266 datasheet

[5] http://github.com/esp8266/Arduino