Project Specification :

- Required Minimum File Transfer Speed for WiFI/Ethernet to SD Card is : 1 Mbps Minimum.
- IDE : Arduino IDE
- Compiler : Arduino GNU 1.8 with ESP32 Library
- File System : FAT32
- Hardware: SD Card Shield and RPI3 with FTPSERVER Running on It.
- All Source Code must be in C Language & Well Commented to understand.
- MCU: ESP32 WROOM

Development Kit : ESP32 DevKitC

Project Description:

RPI based FTPServer/Phone App based FTPServer will Transfer file either by WiFI/Ethernet to the MicroSD Card (Size upto 32GB) attached to the ESP32 WROOM Module using SPI Interface. After File Transfer WiFI would be Disabled. In case of File Transfer it would be again Enabled by Firmware.
This Saved File on the SDcard would be read by ESP32 in specific number of byte on each input button Event and same data would be transfer on UART interface by Second Button Event.
On each button Press File Read Pointer (32-bit Variable) would be Saved on EEPROM/FLASH Memory, So In case of Power up it will read file from the point where it was when Power Fail.
ESP32 Would ON/OFF 8 Individual LED with some msDelay(100) based on LED number Received through UART RECEIVE Command. UART RECEIVE BUFFER WOULD be OF 8 BYTE.

You need to provide Wifi Connection and Setup methedology say Setting SSID , PWD an all.

A.) SD card Function to Be Implement:

SD_Initialize();
Description : Initialize SD Card Library Parameters for both Hardware and Software Point of View

1. SD_Detect();

Description : It Detects the SD card is There Or Not. It will give SD Card Total Storage Size and its Free Space data.

Return : True if SD detected and False if not.

2. SD_Exist(Filename/Directory Name);

Tests whether a file or directory exists on the SD card

Return : True if file/Dir exist and False if not.

3. SD_mkDir/File(Filename/Directory Name);

Create Directory / FIle with Given Name , If It is not there it will create it/Will Give Error.

Return : True if Success and False if not.

4. SD_rmDir/File(Filename/Directory Name);
Remove Directory / FIle with Given Name , If It is not there it will Simply Give Error Code.

Return : True if File/Dir Removed and False if not.

5. SD_CopyFile(Path1,Path2);
Copy File/Dir From Path1 to Path2. Path can be Local Pendrive one Directory to other Directory.
Path1: E:/Bhupendra/Test.bmp = File in PenDrive,
Path2: E:/Ramana/Test.bmp = File in SD Card,
Copied or Copying File Can be in Directory Or may be outside.

Return : True if File/Dir Copied and False if not

6. SD_ReadFile(Byte address, buf, Len, Filename);
Read Number of Byte from File and Save it to the RAM Buffer, Buffer Array Length[500].Every Call of this Function will auto increment File Pointer to the Next Read Byte Array.It Automatically starts from File Origin if File Reading is Complete. When Complete File read is done it should Set One Flag every time.

Normally Byte Address would be Zero. It indicates from where it will start to read bytes in given files. It is kind of jump address from which address we are reading numbers of bytes.
If Byte Address is 1, then it will start to read byte from the first byte.
If Byte Address is 0, then it will going to read read in sequence. No any Address Jump.

Return : Return Number of Byte read and Zero if Error.

NOTE: File read end flag must be set every time.

7. SD_WriteFile(buf,Len, Filename);
Write Number of Byte from Buffer and Save it to the File, Buffer Array Length[500].Every Call of this Function will auto increment File Pointer to the Next Write Byte Array.

Return : Return Number of Byte write and Zero if Error.

8. Get_File_Size(Filename)

Return : Return Size of file in Bytes , Zero if Error.

Note : Data Integrity of transfer file should be checked with CRC Checksum. However, It can be disable by commenting CRC Function and Check , if it has Considerable effect on file transfer Speed.

Global Interrupt Flag must be set on each SD card Insert detect.

TEST CASES:

1. Transfer 5MB Size of .bmp File from Rpi FTPServer to SD Card. Check SD Card image in PC to verify Same File with Complete image is Stored or Not. Check Time Required to Copy. Repeat above transfer with Mobile Phone App. (Check this all - 3 Times)

2. On Every Key Press Read 500 byte from file into buffer and Send it on UART till file Completes and start again. (Check this - 3 Times)

3. Read file from in Between , I.e. Start Byte Address = 20,000, read till End of File and Cross Check the UART data with Data in File on respective Address.
(Check this - 3 Times)

4. On Press of Key, Save one long Global Variable (File Pointer) and one unsigned int variable into MCU Internal EEPROM memory. At each power ON, it should read data from EEPROM and Store into concern variable.

NOTE:
You Need to take care all File handling Related Stuff, So There is no any File Corrupt or Data Corruption Occur.
You Can also Put CRC Check to verify file is Properly transferred Or Not.

You Need to Provide Support for at least 3 Month In case of Some Issue/Bugs with your Code / Testcases without any charges and in client`s timeline.