Lab 03 - USB

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E/20/157

CO326 – Industrial Networks

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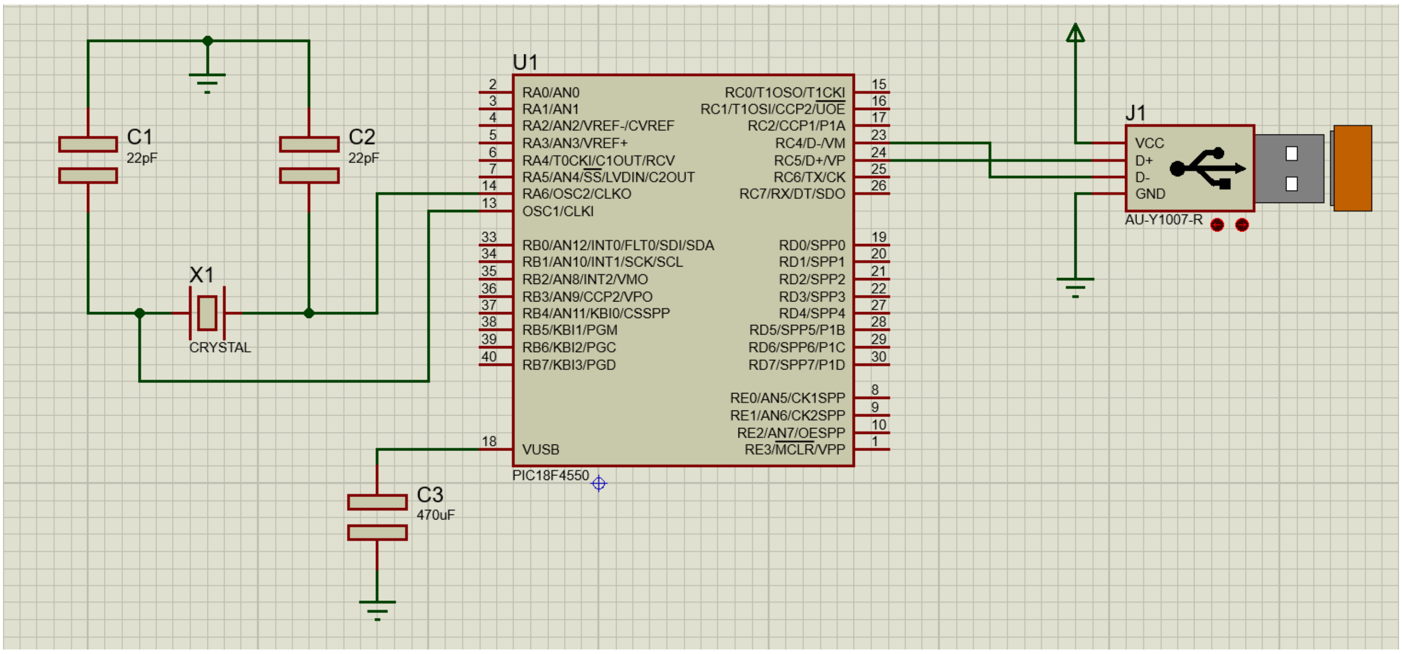
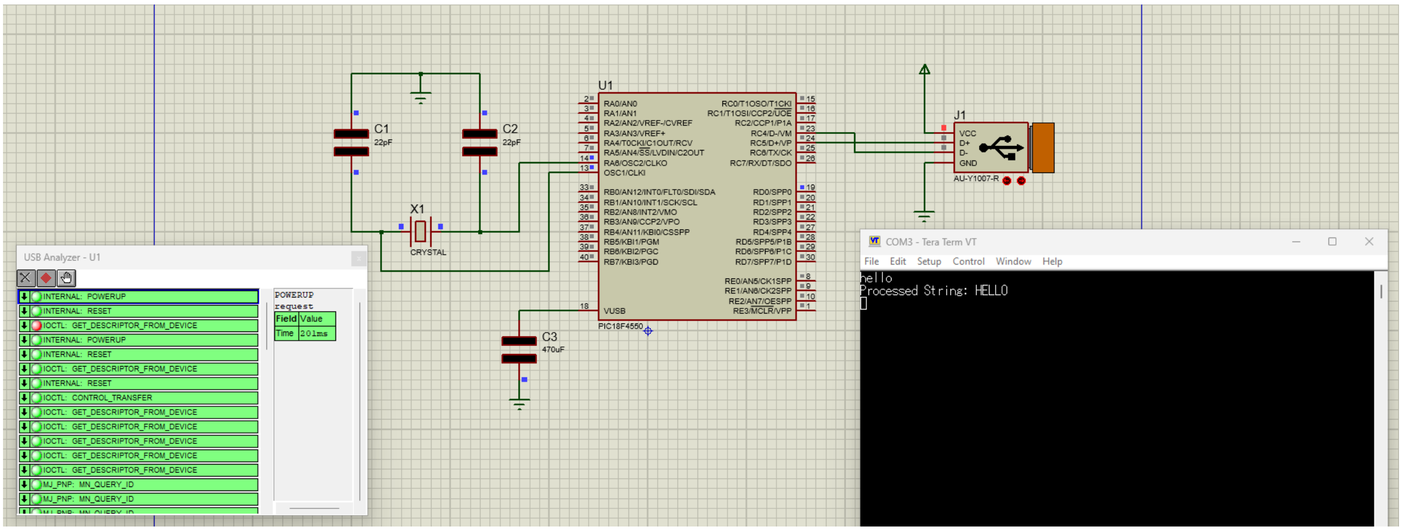


Figure 1: Proteus Setup



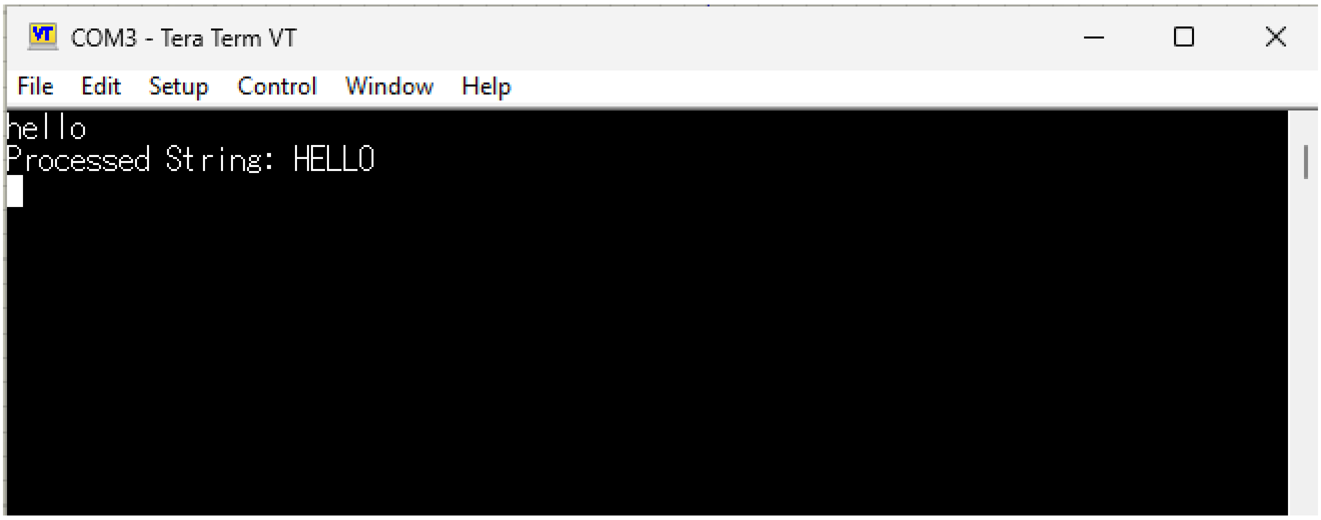
```
INTERNAL:  POWERUP
INTERNAL:  RESET
IOCTL:  GET_DESCRIPTOR_FROM_DEVICE
INTERNAL:  POWERUP
INTERNAL:  RESET
IOCTL:  GET_DESCRIPTOR_FROM_DEVICE
INTERNAL:  RESET
IOCTL:  CONTROL_TRANSFER
IOCTL:  GET_DESCRIPTOR_FROM_DEVICE
IOCTL:  GET_DESCRIPTOR_FROM_DEVICE
IOCTL:  GET_DESCRIPTOR_FROM_DEVICE
IOCTL:  GET_DESCRIPTOR_FROM_DEVICE
IOCTL:  GET_DESCRIPTOR_FROM_DEVICE
MJ_PNP:  MN_QUERY_ID
MJ_PNP:  MN_QUERY_ID
```

POWERUP
request

Field	Value
Time	201ms

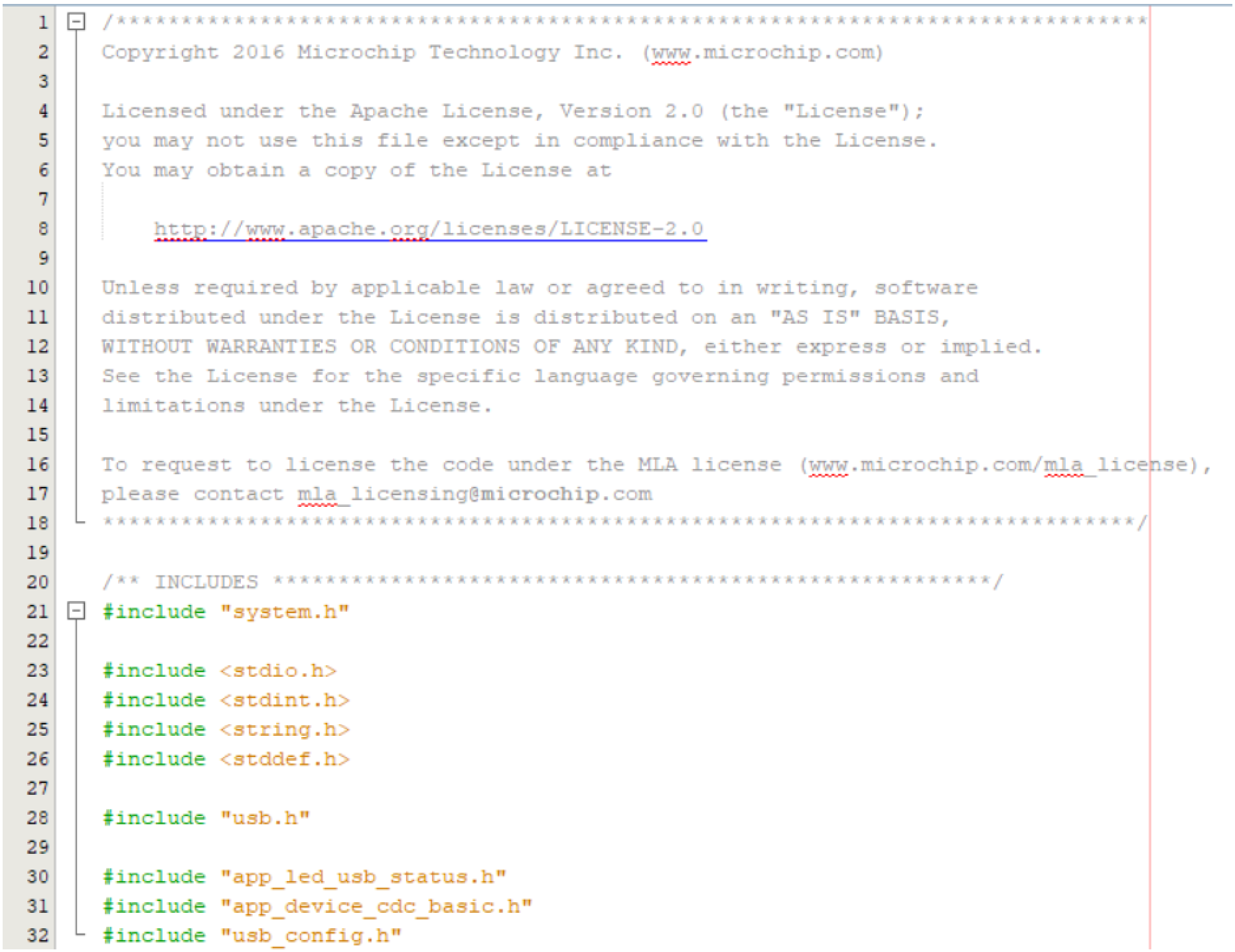
```
hello
Processed String: HELLO
```

Figure 2: Working Setup



```
hello
Processed String: HELLO
```

Figure 3: Tera Term Terminal



```
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please contact mla_licensing@microchip.com
*******************************************************************************/

/** INCLUDES *******************************************************/
#include "system.h"

#include <stdio.h>
#include <stdint.h>
#include <string.h>
#include <stddef.h>

#include "usb.h"

#include "app_led_usb_status.h"
#include "app_device_cdc_basic.h"
#include "usb_config.h"
```
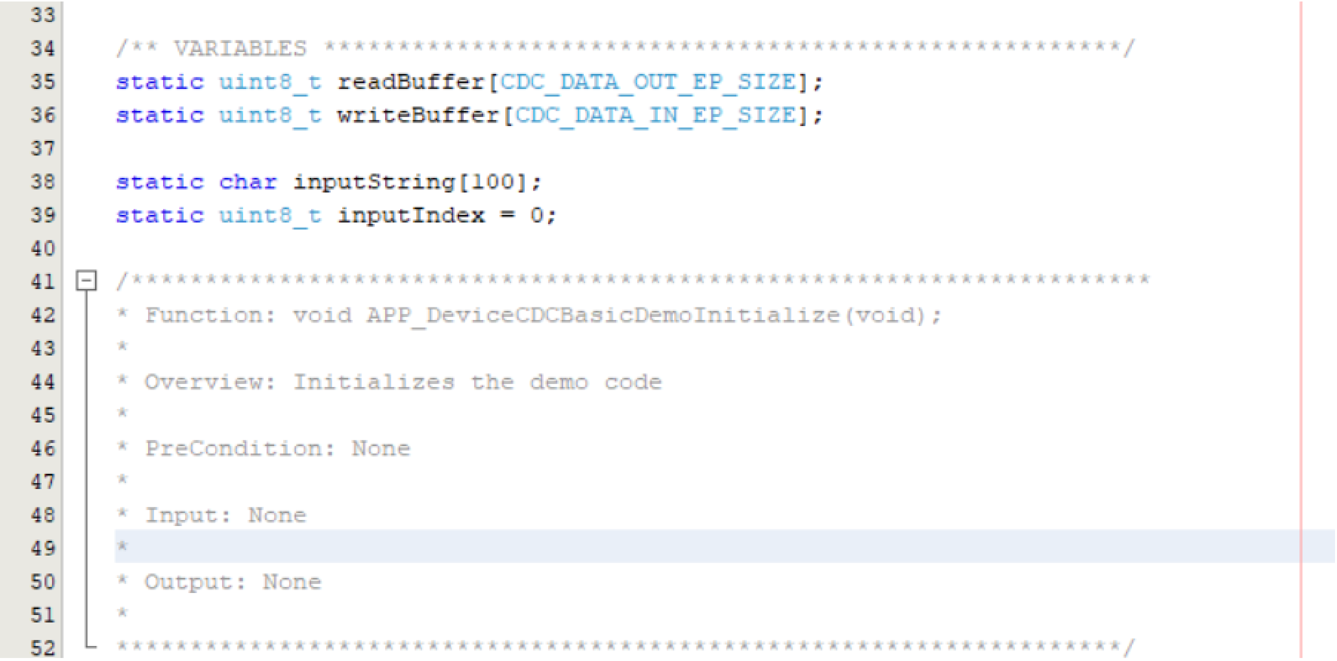
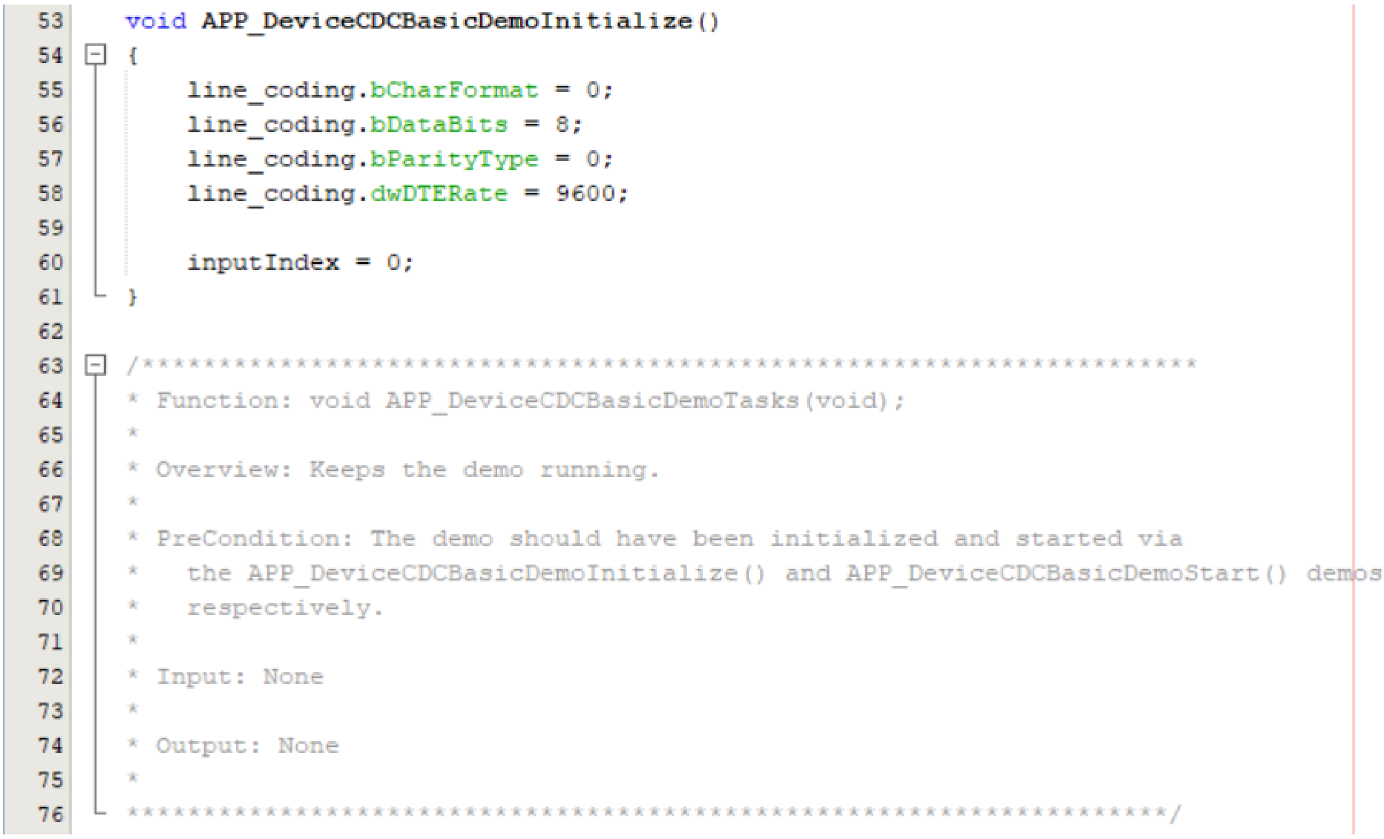
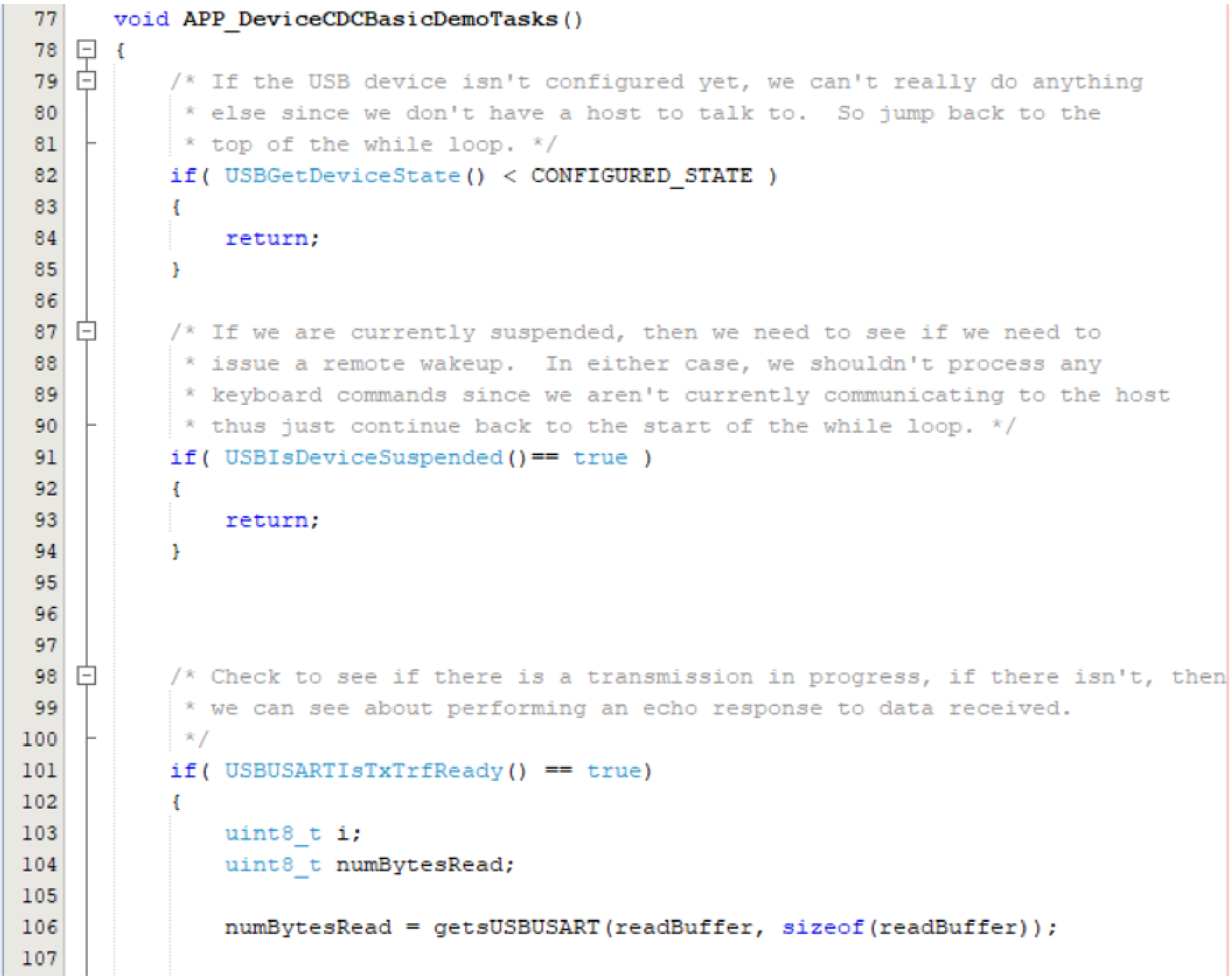



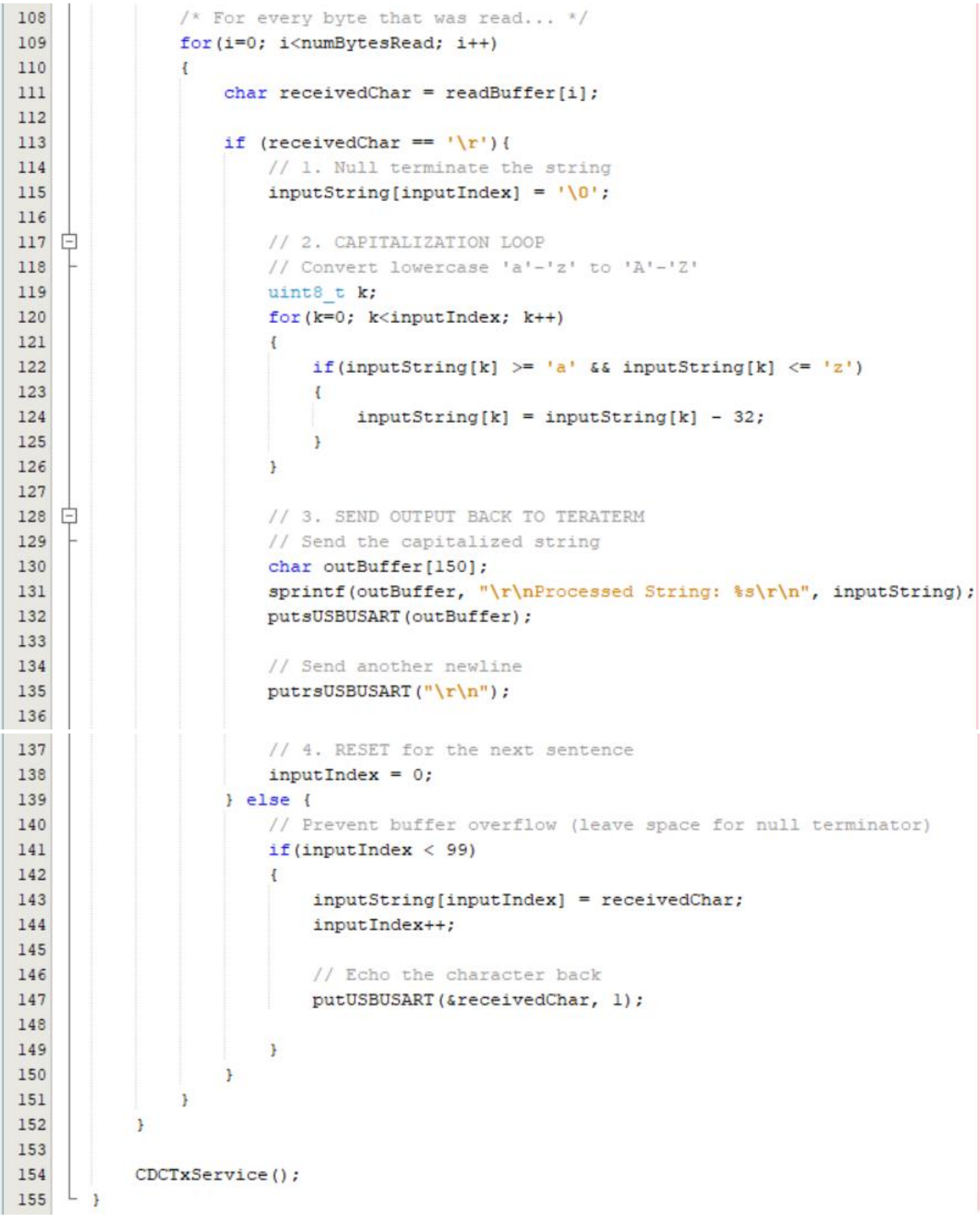
```

/** VARIABLES ******************************************************/
static uint8_t readBuffer[CDC_DATA_OUT_EP_SIZE];
static uint8_t writeBuffer[CDC_DATA_IN_EP_SIZE];

static char inputString[100];
static uint8_t inputIndex = 0;

/*********************************************************************
* Function: void APP_DeviceCDCBasicDemoInitialize(void);
*
* Overview: Initializes the demo code
*
* PreCondition: None
*
* Input: None
*
* Output: None
*
********************************************************************/
```



```c
void APP_DeviceCDCBasicDemoInitialize()
{
    line_coding.bCharFormat = 0;
    line_coding.bDataBits = 8;
    line_coding.bParityType = 0;
    line_coding.dwDTERate = 9600;

    inputIndex = 0;
}

/*********************************************************************
* Function: void APP_DeviceCDCBasicDemoTasks(void);
*
* Overview: Keeps the demo running.
*
* PreCondition: The demo should have been initialized and started via
*   the APP_DeviceCDCBasicDemoInitialize() and APP_DeviceCDCBasicDemoStart() demos
*   respectively.
*
* Input: None
*
* Output: None
*
********************************************************************/
```



```c
void APP_DeviceCDCBasicDemoTasks()
{
    /* If the USB device isn't configured yet, we can't really do anything
     * else since we don't have a host to talk to.  So jump back to the
     * top of the while loop. */
    if( USBGetDeviceState() < CONFIGURED_STATE )
    {
        return;
    }

    /* If we are currently suspended, then we need to see if we need to
     * issue a remote wakeup.  In either case, we shouldn't process any
     * keyboard commands since we aren't currently communicating to the host
     * thus just continue back to the start of the while loop. */
    if( USBIsDeviceSuspended()== true )
    {
        return;
    }



    /* Check to see if there is a transmission in progress, if there isn't, then
     * we can see about performing an echo response to data received.
     */
    if( USBUSARTIsTxTrfReady() == true)
    {
        uint8_t i;
        uint8_t numBytesRead;

        numBytesRead = getsUSBUSART(readBuffer, sizeof(readBuffer));

```



```c
        /* For every byte that was read... */
        for(i=0; i<numBytesRead; i++)
        {
            char receivedChar = readBuffer[i];

            if (receivedChar == '\r'){
                // 1. Null terminate the string
                inputString[inputIndex] = '\0';

                // 2. CAPITALIZATION LOOP
                // Convert lowercase 'a'-'z' to 'A'-'Z'
                uint8_t k;
                for(k=0; k<inputIndex; k++)
                {
                    if(inputString[k] >= 'a' && inputString[k] <= 'z')
                    {
                        inputString[k] = inputString[k] - 32;
                    }
                }

                // 3. SEND OUTPUT BACK TO TERATERM
                // Send the capitalized string
                char outBuffer[150];
                sprintf(outBuffer, "\r\nProcessed String: %s\r\n", inputString);
                putsUSBUSART(outBuffer);

                // Send another newline
                putrsUSBUSART("\r\n");

                // 4. RESET for the next sentence
                inputIndex = 0;
            } else {
                // Prevent buffer overflow (leave space for null terminator)
                if(inputIndex < 99)
                {
                    inputString[inputIndex] = receivedChar;
                    inputIndex++;

                    // Echo the character back
                    putUSBUSART(&receivedChar, 1);

                }
            }
        }
    }

    CDCTxService();
}
```

Figure 4: MPLAB Code : app_device_cdc_basic.c