Computer Interface Course Project Report

4th Year Computer Engineering

Project Title: [RFID Attendance System]

Team ID: [B1]

Team Members:

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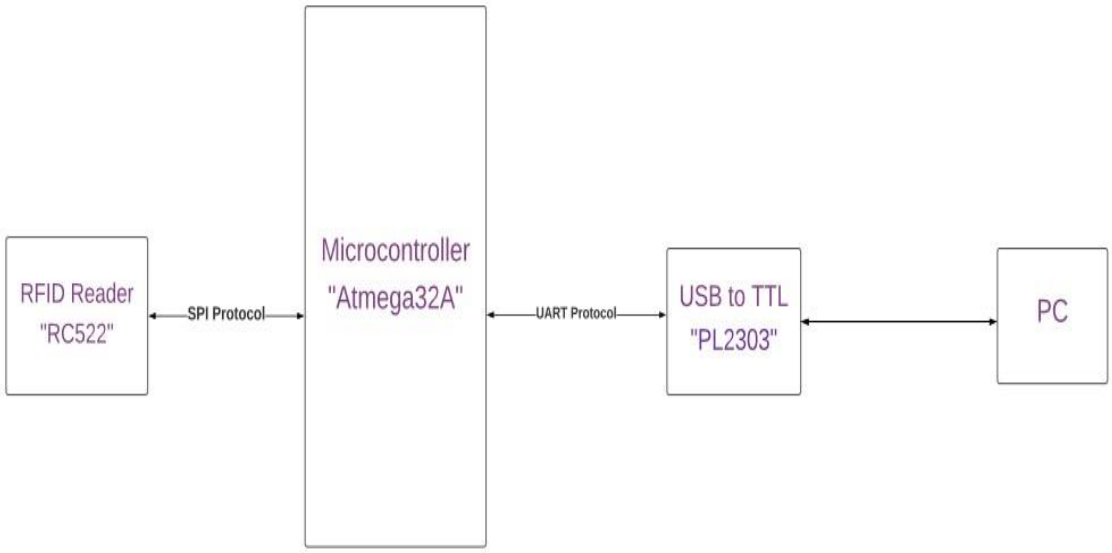
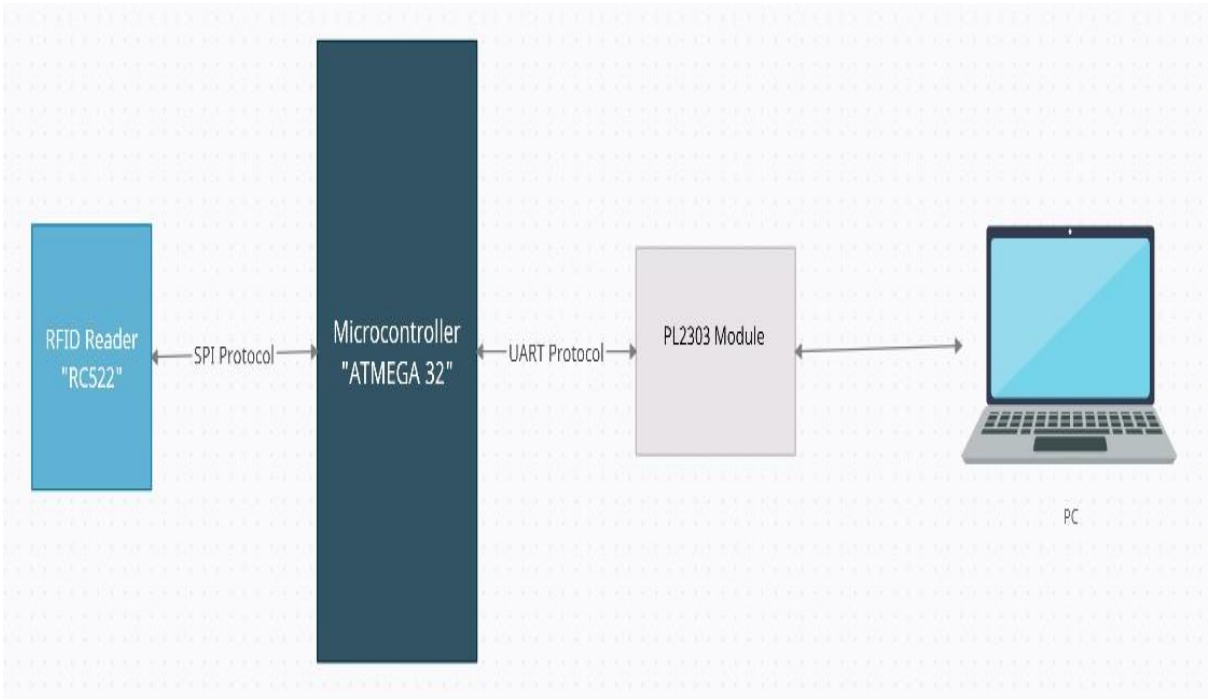
1. Project Objective:

Attendance is an action of particular person being present on event at work or an educational institution, Taking attendance manually consumes more time, effort and error therefore an automated attendance system can be very helpful. Our System allows the user that carries an RFID Tag which has a distinct ID to register his/her ID in the system, later on the user can scan his/her RFID tag ,the RFID reader reads the ID ,the ID is then extracted from the database with his full information like, name, his picture marking the attendance of the person carrying the tag

2. System Block Diagram:

2.1 Block Diagram:

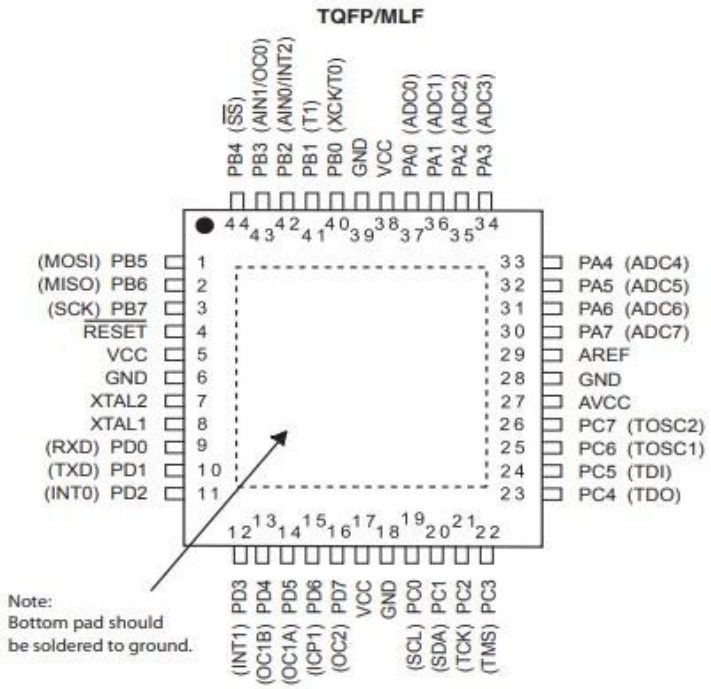


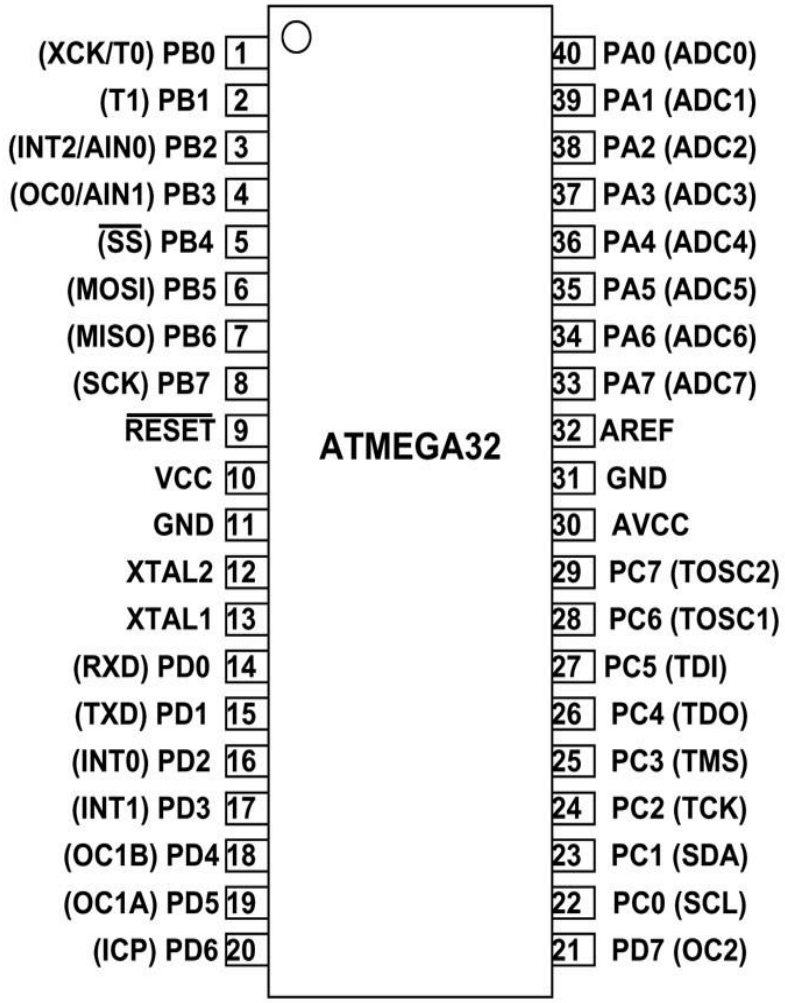


2.2 Block Diagram Description:

1- Atmega32A:

The ATmega32A is a low power, CMOS 8-bit microcontrollers based on the AVR® enhanced RISC architecture, The ATmega32A is a 40/44-pins device with 32 KB Flash, 2 KB SRAM and 1 KB EEPROM. By executing instructions in a single clock cycle, the devices achieve CPU throughput approaching one million instructions per second (MIPS) per megahertz, allowing the system designer to optimize power consumption versus processing speed. The ATmega32A provides two way in the system





Pin Descriptions:

VCC: Digital supply voltage GND

:Ground.

Port A (PA7:PA0): Port A serves as the analog inputs to the A/D Converter. Port A also serves as an 8-bit bi-directional I/O port, if the A/D Converter is not used. Port pins can provide internal pull-up resistors (selected for each bit). The Port A output buffers have symmetrical drive characteristics with both high sink and source capability. When pins PA0 to PA7 are used as inputs and are externally pulled low, they will source current if the internal pull-up resistors are activated. The Port A pins are tri-stated when a reset condition becomes active, even if the clock is not running.

Port B (PB7:PB0): Port B is an 8-bit bi-directional I/O port with internal pullup resistors (selected for each bit). The Port B output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port B pins that are externally pulled low will source current if the pull-up resistors are activated. The Port B pins are tri-stated when a reset condition becomes active, even if the clock is not running.

Port C (PC7:PC0): Port C is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port C output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port C pins that are externally pulled low will source current if the pull-up resistors are activated. The Port C pins are tri-stated when a reset condition becomes active, even if the clock is not running. If the JTAG interface is enabled, the pull-up resistors on pins PC5(TDI), PC3(TMS) and PC2(TCK) will be activated even if a reset occurs. The TD0 pin is tri-stated unless TAP states that shift out data are entered. Port C also serves the functions of the JTAG interface.

Port D (PD7:PD0): Port D is an 8-bit bi-directional I/O port with internal pullup resistors (selected for each bit). The Port D output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port D pins that are externally pulled low will source current if the pull-up resistors are activated. The Port D pins are tri-stated when a reset condition becomes active, even if the clock is not running.

RESET : Reset Input. A low level on this pin for longer than the minimum pulse length will generate a reset, even if the clock is not running. Shorter pulses are not ensured to generate a reset.

XTAL1 : Input to the inverting Oscillator amplifier and input to the internal clock operating circuit. 2.2.9 XTAL2 Output from the inverting Oscillator amplifier.

AVCC: AVCC is the supply voltage pin for Port A and the A/D Converter. It should be externally connected to VCC, even if the ADC is not used. If the ADC is used, it should be connected to VCC through a low-pass filter.

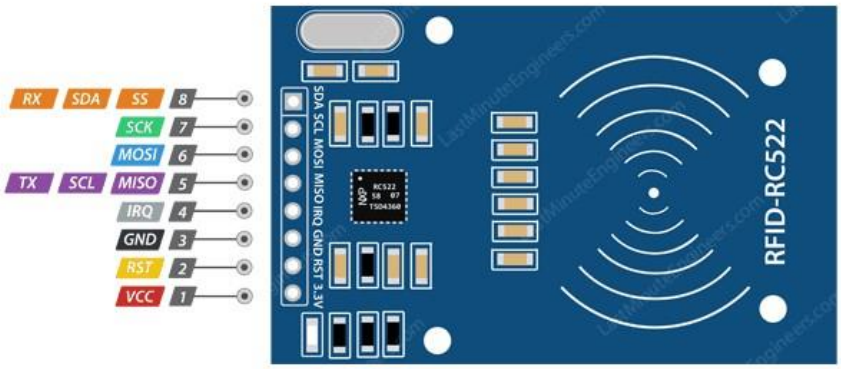
AREF : AREF is the analog reference pin for the A/D Converter 2-

RFID Reader RC522:

RFID or Radio Frequency Identification system consists of two main components, a transponder/tag attached to an object to be identified, and a Transceiver also known as interrogator/Reader. A Reader consists of a Radio Frequency module and an antenna which generates high frequency electromagnetic field. On the other hand, the tag is usually a passive device, meaning it doesn't contain a battery. Instead it contains a microchip that stores and processes information, and an antenna to receive and transmit a signal.

To read the information encoded on a tag, it is placed in close proximity to the Reader (does not need to be within direct line-of-sight of the reader). A Reader generates an electromagnetic field which causes electrons to move through the tag's antenna and subsequently power the chip.

The powered chip inside the tag then responds by sending its stored information back to the reader in the form of another radio signal. This is called backscatter. The backscatter, or change in the electromagnetic/RF wave, is detected and interpreted by the reader which then sends the data out to a computer or microcontroller.



VCC supplies power for the module. This can be anywhere from 2.5 to 3.3 volts. You can connect it to 3.3V output from your Arduino. Remember connecting it to 5V pin will likely destroy your module!

RST is an input for Reset and power-down. When this pin goes low, hard power-down is enabled. This turns off all internal current sinks including the oscillator and the input pins are disconnected from the outside world. On the rising edge, the module is reset.

GND is the Ground Pin and needs to be connected to GND pin on the Arduino.

IRQ is an interrupt pin that can alert the microcontroller when RFID tag comes into its vicinity.

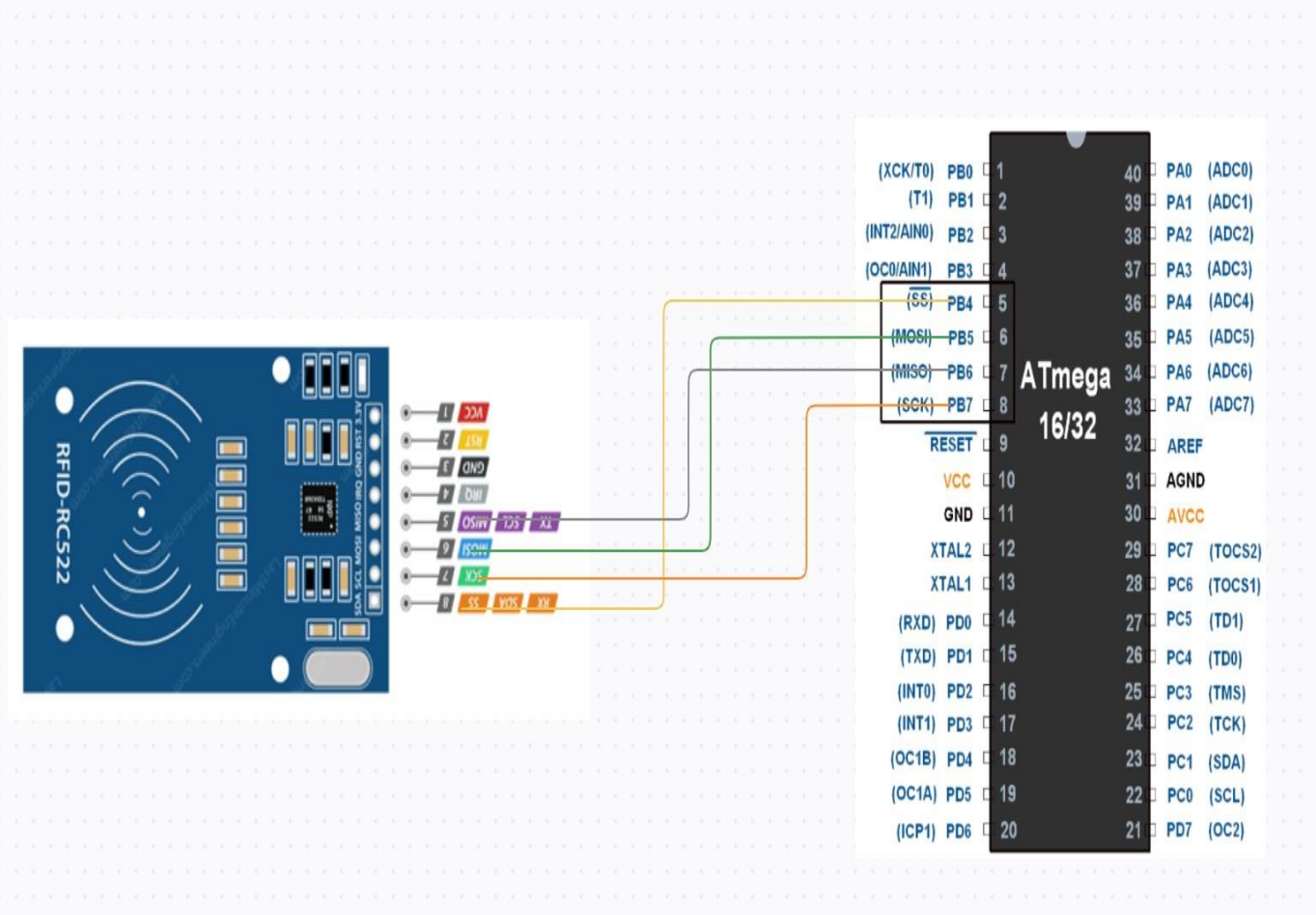
MISO / SCL / Tx pin acts as Master-In-Slave-Out when SPI interface is enabled, acts as serial clock when I2C interface is enabled and acts as serial data output when UART interface is enabled.

is SPI input to the RC522 module.

SCK (Serial Clock) accepts clock pulses provided by the SPI bus Master i.e. Arduino.

SS / SDA / Rx pin acts as Signal input when SPI interface is enabled, acts as serial data when I2C interface is enabled and acts as serial data input when UART interface is enabled. This pin is usually marked by encasing the pin in a square so it can be used as a reference for identifying the other pins.

RC522 Interfacing with Atmega32:



2- PL2303 Module USB to TTL:

Serial communication means transferring a single bit at a time. We can connect a mouse, a modem, a printer, a plotter, another PC, dongles, etc. But its usage (both software and hardware) is a secret to users. But it is not difficult to understand how to connect devices to it and how to program it.

RS-232 used for data exchange between the devices. It specifies common voltage and signal level, common pin wire configuration and minimum, amount of control signals. As mentioned above this standard was designed with specification for electromagnetically teletypewriter and modem system

But with the new PC and laptops, there is no RS232 protocol and DB9 connector. We have to use serial to the USB connector. There are various serial to USB connectors available e.g. CP2102, FT232RL, CH340, etc. PL2303 Module USB to TTL, it's a small USB to TTL serial tool, using the PL2303 chip. You can use it to connect some serial device to your PC via USB port.

Specification

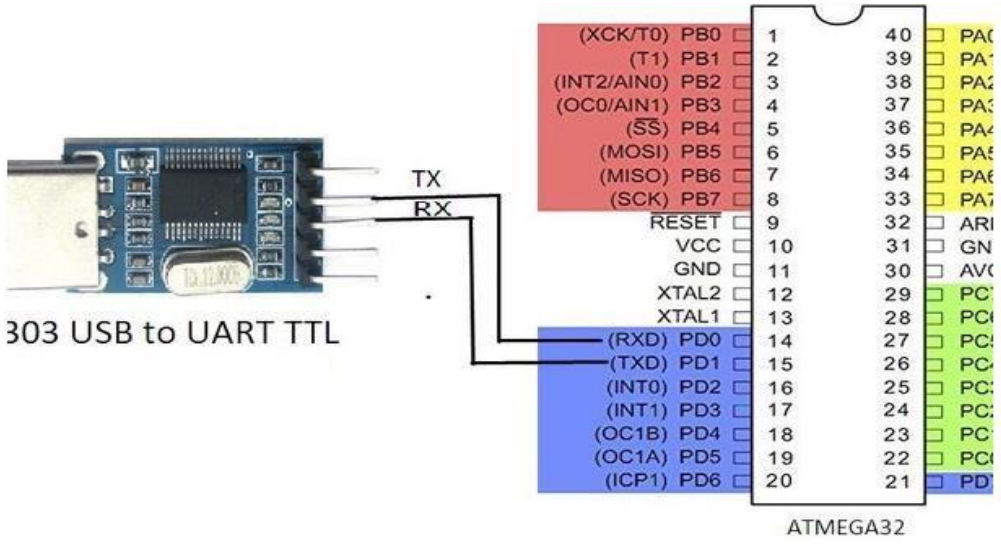
Module Type : AdapterBoard

Size : 4.6 x 1.5 x 1.1cm

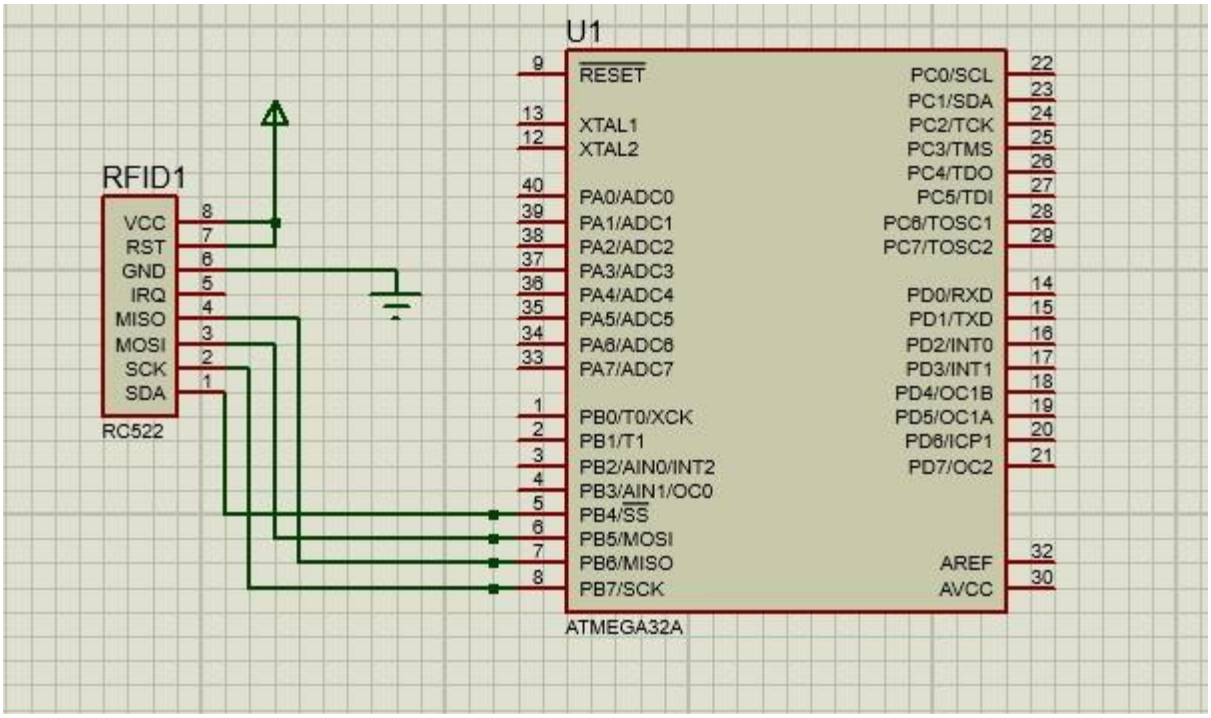
Operation Level : Digital 5V

Power Supply : External 5V

PL2303 Interfacing with Atmega32:



3. Schematic Diagram (Circuit Diagram):



4. List Of Components:

SN	Item Type	Item Code Name	Purpose	Quantity
1	Microcontroller	Atmega32	Receives the ID from the RFID reader and sends it to the database to get the full information related to that ID	1
2	RFID	RC522	Reads the RFID card	1
3	RFID Card	RFID Card	Each card carries a distinct ID	4
4	USB to RS232	PL2303 Module USB to TTL	Provides serial interface to the GUI	1
5				
6				
7				
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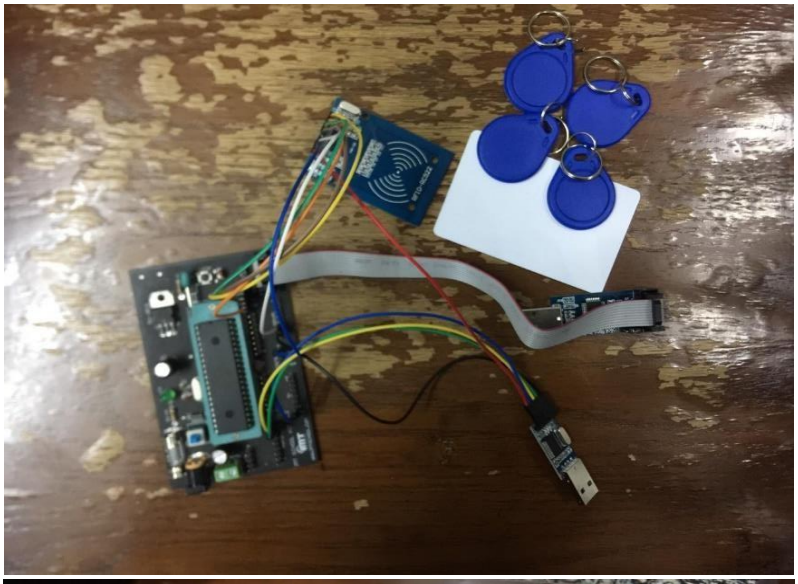
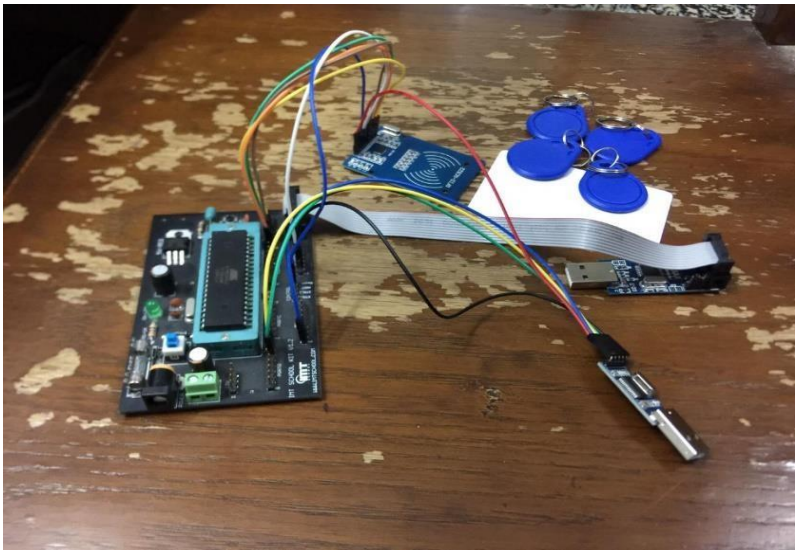
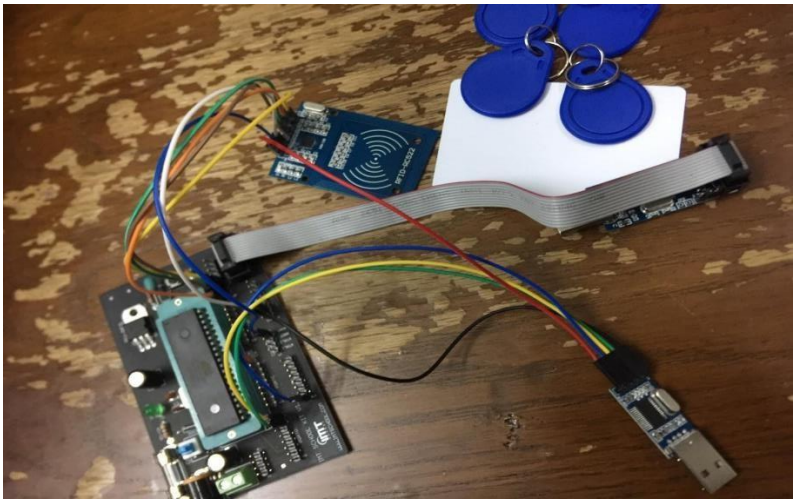
19				
20				

5. Real-Time Hardware Photo:







6. Source Code:

6.1 Hardware-side source code:

1. Embedded-C Source code

```
7   /*
8   * main.c
9   */
10
11   #include <avr/io.h>
12   #include <util/delay.h>
13   #include "utils.h"
14   #include "spi.h"
15   #include "mfrc522.h"
16   #include "uart.h"
17   uint16 readSuccess;
18   uint8 defcard[][4] = {
     {0xC6,0xFD,0xC5,0x32},{0x32,0xD7,0x0F,0xB} };
19   uint8 N = 4;                          //Variable to store the number of
     RFID cards/tags we will use
20   uint8 readcard[4]; //stores the UID of current tag which is read
21   uint8 version;
22   uint8 req_mode;  //initialize
23   uint8 str[MAX_LEN];
24   uint8 ID[32]="";
25   //uint8_t reg;
26   unsigned char getid();
27   unsigned char SelfTestBuffer[64];
```

```
28    void array_to_string(unsigned char *array, unsigned char len,char
      *buffer);
29    unsigned char numbers[4]={'1','2','3','4'};
30    unsigned char string[]="";
31    int main()
32    {
33    unsigned char byte;
34
35  _delay_ms(50);
36
37    //LCDWriteStringXY(2,0,"RFID Reader");
38    //LCDWriteStringXY(5,1,VERSION_STR);
39
40
41    array_to_string(numbers,4,string);
42    UART_init();
43    //UART_sendByte('s');
44    spi_init();
45    _delay_ms(1000);
46
47    //init reader
48    mfrc522_init();
49
50          //check version of the reader
51          byte = mfrc522_read(VersionReg);
52          if(byte == 0x92)
53          {
```

```
54              UART_sendString("MIFARE RC522v2");
55              UART_sendString("Detected");
56              }
57              else if(byte == 0x91 || byte==0x90)
58              {
59              UART_sendString("MIFARE RC522v1");
60              UART_sendString("Detected");
61              }
62              else
63              {
64              UART_sendString("No reader found");
65              }
66
67     byte = mfrc522_read(ComIEnReg);
68     mfrc522_write(ComIEnReg,byte|0x20); 69  byte =
       mfrc522_read(DivIEnReg);
70  mfrc522_write(DivIEnReg,byte|0x80);
71
72  _delay_ms(1500);
73
74
75  while(1){
76
77                  byte = getid();
78                  _delay_ms(1000);
79                  if(byte == CARD_FOUND)
80                  {
```

```
81              UART_sendString(ID);
82              }
83              }
84              }
85              unsigned char getid()
86              {
87              unsigned char status;
88              status = mfrc522_request(PICC_REQALL, str);
89              if (status == ERROR)
90              {
91              return 0;
92              }
93              if (!((SPSR & (1 << SPIF))))
94              {
95              return 0;
96              }
97
98
99
100             for (int i = 0; i < 4; i++)
101             {
102             readcard[i] = spi_recieve(); //storing the
    UID of the tag in readcard
103
104         }
105         array_to_string(readcard,N,ID);
106         UART_sendString(ID);
```

```
107         mfrc522_reset();
108
109         return 1;
110         }
111         void array_to_string(unsigned char *array, unsigned char
            len,char *buffer)
112         {
113         for (unsigned int i = 0; i < len; i++)
114         {
115         unsigned char nib1 = (array[i] >> 4) & 0x0F;
116         unsigned char nib2 = (array[i] >> 0) & 0x0F; 117
            buffer[i*2+0] = nib1  < 0xA ? '0' + nib1  : 'A' + nib1  - 0xA;
118             buffer[i*2+1] = nib2  < 0xA ? '0' + nib2  :
    'A' + nib2  - 0xA;
119             }
120             buffer[len*2] = '\0';
121             }
122             /*
123             * spi_config.h
124             */
125
126
127   #ifndef SPI_CONFIG_H_
128   #define SPI_CONFIG_H_
129
130    #include <avr/io.h>
131    /*
```

```
132     * Set to 1, SPI will work in master mode
133     * else in slave mode
134     */
135     #define SPI_CONFIG_AS_MASTER  1
136
137
138     /*
139     * Config SPI pin diagram
140     */
141     #define SPI_DDR                 DDRB
142     #define SPI_PORT            PORTB
143     #define SPI_PIN                 PINB
144     #define SPI_MOSI            PB5
145     #define SPI_MISO            PB6
146     #define SPI_SS              PB4
147     #define SPI_SCK                 PB7
148
149
150
151     #endif /* SPI_CONFIG_H_ */
152     /*
153     * spi.h
154     */
155
156
157   #ifndef SPI_H_
158   #define SPI_H_
```

```
159
160  #include "spi_config.h"
161  #include <stdint.h>
162
163  void spi_init();
164  uint8_t spi_transmit(uint8_t data);
165  unsigned char spi_recieve();
166
167  #define ENABLE_CHIP() (SPI_PORT &= (~(1<<SPI_SS)))
168  #define DISABLE_CHIP() (SPI_PORT |= (1<<SPI_SS))
169
170
171
172
173    #endif /* SPI_H_ */
174    /*
175    * spi.c
176    */
177    #include "spi.h"
178
179 #if SPI_CONFIG_AS_MASTER

180
181          void spi_init()
182          {
183          SPI_DDR = (1<<SPI_MOSI)|(1<<SPI_SCK)|(1<<SPI_SS);
184          SPCR = (1<<SPE)|(1<<MSTR)|(1<<SPR0);
     //pre-scaler 16
```

```
185         }
186
187
188         uint8_t spi_transmit(uint8_t data)
189         {
190         SPDR = data;
191         while(!(SPSR & (1<<SPIF)));
192         return SPDR;
193         }
194         unsigned char spi_recieve()
195         {
196         while(!(SPSR & (1<<SPIF)));
197         return SPDR;
198         }
199         #else
200         void spi_init()
201         {
202         SPI_DDR = (1<<SPI_MISO);
203         SPCR = (1<<SPE);
204         }
205
206
207 {
208                 while(!(SPSR & (1<<SPIF)));
209           return SPDR;
210 }
211
```

```
212
213
214     #endif
215     /**********************************************************
    ***************************
216     *
217     * Module: UART
218     *
219     * File Name: uart.h
220     *
221     * Description: Header file for the UART AVR driver
222     *
223
            ***********************************************************
    ************************/
224
225     #ifndef UART_H_
226     #define UART_H_
227
228     #include "micro_config.h"
229     #include "std_types.h"
230     #include "common_macros.h"
231
232     /*******************************************************
    ***************************
233     *                  Preprocessor Macros                *
234
```

```
 *******************************************************
 ************************/
#ifndef F_CPU
#define F_CPU 8000000UL //1MHz Clock frequency
#endif


/* UART Driver Baud Rate */
#define USART_BAUDRATE 9600

  /*******************************************************
 ****************************
 *                  Functions Prototypes
 *
 *******************************************************
 ************************/
void UART_init(void);

void UART_sendByte(const uint8 data);

uint8 UART_recieveByte(void);

void UART_sendString(const uint8 *Str);

void UART_receiveString(uint8 *Str); // Receive until #

```

```
256    #endif /* UART_H_ */
257    /*******************************************************
   ************************
258    *
259    * Module: UART
260    *
261    * File Name: uart.c
262    *
263    * Description: Source file for the UART AVR driver
264    *
265
   ***********************************************************
   ***********************/
266
267 #include "uart.h"
268
269 #define BAUD_PRESCALE (((F_CPU / (USART_BAUDRATE * 8UL))) -
   1)
270
271  /*******************************************************
   ***************************
272  *                Functions Definitions                *
273
   ***********************************************************
   ***********************/
274          void UART_init(void)
275          {
276          /* U2X = 1 for double transmission speed */
```

```
277         UCSRA = (1<<U2X);
278         /************************** UCSRB Description
    **************************
279         * RXCIE = 0 Disable USART RX Complete Interrupt Enable
280         * TXCIE = 0 Disable USART Tx Complete Interrupt Enable
281         * UDRIE = 0 Disable USART Data Register Empty Interrupt
            Enable
282         * RXEN  = 1 Receiver Enable
283         * RXEN  = 1 Transmitter Enable
284         * UCSZ2 = 0 For 8-bit data mode
285         * RXB8 & TXB8 not used for 8-bit data mode
286
    ********************************************************
    ***************/
287         UCSRB = (1<<RXEN) | (1<<TXEN);
288
289         /************************** UCSRC Description
    **************************
290         * URSEL   = 1 The URSEL must be one when writing the
            UCSRC
291         * UMSEL   = 0 Asynchronous Operation
292         * UPM1:0  = 00 Disable parity bit
293         * USBS    = 0 One stop bit
294         * UCSZ1:0 = 11 For 8-bit data mode
295         * UCPOL   = 0 Used with the Synchronous operation only
296
        ********************************************************
    ***************/
```

```
297             UCSRC = (1<<URSEL) | (1<<UCSZ0) | (1<<UCSZ1);
298
299         /* First 8 bits from the BAUD_PRESCALE inside UBRRL and last
            4 bits in UBRRH*/
300         UBRRH = BAUD_PRESCALE>>8;
301         UBRRL = BAUD_PRESCALE;
302         }
303
304           void UART_sendByte(const uint8 data)
305           {
306           /* UDRE flag is set when the Tx buffer (UDR) is empty and
            ready for
307           * transmitting a new byte so wait until this flag is set to one */
308           while(BIT_IS_CLEAR(UCSRA,UDRE)){}
309           /* Put the required data in the UDR register and it also clear the
            UDRE flag as
310           * the UDR register is not empty now */
311           UDR = data;
312           /************************** Another Method
    **************************
313           UDR = data;
314           while(BIT_IS_CLEAR(UCSRA,TXC)){} // Wait until the
            transimission is complete TXC = 1
315           SET_BIT(UCSRA,TXC); // Clear the TXC flag
316           ************************************************
    ******************/  317 }
318
319             uint8 UART_recieveByte(void)
```

```
320             {
321             /* RXC flag is set when the UART receive data so wait until
                this
322             * flag is set to one */
323             while(BIT_IS_CLEAR(UCSRA,RXC)){}
324             /* Read the received data from the Rx buffer
    (UDR) and the RXC flag
325             will be cleared after read this data */
326             return UDR;
327             }
328
329                void UART_sendString(const uint8 *Str)
330                {
331                uint8 i = 0;
332                while(Str[i] != '\0')
333                {
334                UART_sendByte(Str[i]);
335                i++;
336                }
337                /************************** Another Method
    **************************
338                while(*Str != '\0')
339                {
340                UART_sendByte(*Str);
341                Str++;
342                }
343                ************************************************
```

```
**********/
344             }
345
346             void UART_receiveString(uint8 *Str)
347             {
348             uint8 i = 0;
349             Str[i] = UART_recieveByte();
350             while(Str[i] != '#')
351             {
352             i++;
353             Str[i] = UART_recieveByte();
354             }
355             Str[i] = '\0';
356             }
357             /*****************************************************
                ****
   ***************************
358             *
359             * Module: Micro - Configuration
360             *
361             * File Name: Micro_Config.h
362             *
363             * Description: File include all Microcontroller libraries
364             *
365
   ************************************************************
   ************************/
```

```
366
367 #ifndef MICRO_CONFIG_H_
368 #define MICRO_CONFIG_H_
369
370 #ifndef F_CPU
371 #define F_CPU 8000000UL //1MHz Clock frequency
372 #endif
373
374 #include <avr/io.h>
375 #include <avr/interrupt.h>
376 #include <util/delay.h>
377
378  #endif /* MICRO_CONFIG_H_ */
379  /*************************************************************
   ***************************
380  *
381  * Module: Common - Macros
382  *
383  * File Name: Common_Macros.h
384  *
385  * Description: Commonly used Macros
386  *
387  * Author: Mohamed Tarek
388  *
389
   ************************************************************
   ************************/
```

```
390
391 #ifndef COMMON_MACROS
392 #define COMMON_MACROS
393
394 /* Set a certain bit in any register */
395 #define SET_BIT(REG,BIT) (REG|=(1<<BIT))
396
397 /* Clear a certain bit in any register */
398 #define CLEAR_BIT(REG,BIT) (REG&=(~(1<<BIT)))
399
400 /* Toggle a certain bit in any register */
401 #define TOGGLE_BIT(REG,BIT) (REG^=(1<<BIT))
402
403 /* Rotate right the register value with specific number of rotates */
404 #define ROR(REG,num) ( REG= (REG>>num) | (REG<<(8num)) )
405
406 /* Rotate left the register value with specific number of rotates */
407 #define ROL(REG,num) ( REG= (REG<<num) | (REG>>(8num)) )
408
409 /* Check if a specific bit is set in any register and return true if yes */
410 #define BIT_IS_SET(REG,BIT) ( REG & (1<<BIT) )
411
412 /* Check if a specific bit is cleared in any register and return true if yes */
413 #define BIT_IS_CLEAR(REG,BIT) ( !(REG & (1<<BIT)) ) 414
415   #endif
416   /*************************************************************
   ***************************
```

```
417     *
418     * Module: Common - Platform Types Abstraction
419     *
420     * File Name: std_types.h
421     *
422     * Description: types for AVR
423     *
424
    ************************************************************
    ************************/
425
426   #ifndef STD_TYPES_H_
427   #define STD_TYPES_H_
428
429   /* Boolean Data Type */
430   typedef unsigned char bool;
431
432   /* Boolean Values */
433   #ifndef FALSE
434   #define FALSE       (0u)
435   #endif
436   #ifndef TRUE
437   #define TRUE        (1u)
438   #endif
439
440   #define HIGH        (1u)
441   #define LOW         (0u)
```

```
442
443   typedef unsigned char        uint8;        /*         0 .. 255           */
444   typedef signed char          sint8;        /*
    -128 .. +127          */
445   typedef unsigned short       uint16;       /*         0 .. 65535         */
446   typedef signed short         sint16;       /*
    -32768 .. +32767        */
447   typedef unsigned long        uint32;       /*         0 .. 4294967295    */
448   typedef signed long          sint32;       /* -
    2147483648 .. +2147483647    */
449   typedef unsigned long long   uint64;       /*
    0..18446744073709551615  */
450   typedef signed long long     sint64;
451   typedef float                float32;
452   typedef double               float64;
453
454    #endif /* STD_TYPE_H_ */
455    /*
456    * mfrc522_cmd.h
457    *
458    * Copyright 2013 Shimon <shimon@monistit.com>
459    *
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```

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472     * Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston,
473     * MA 02110-1301, USA.
474     *
475     *
476     */
477
478 #ifndef MFRC522_CMD_H_ 479
#define MFRC522_CMD_H_
480
481   //command set
482   #define Idle_CMD                    0x00
483   #define Mem_CMD                         0x01
484   #define GenerateRandomId_CMD 0x02
485   #define CalcCRC_CMD                     0x03
486   #define Transmit_CMD          0x04
487   #define NoCmdChange_CMD                 0x07
488   #define Receive_CMD                     0x08
489   #define Transceive_CMD              0x0C
490   #define Reserved_CMD                0x0D
491   #define MFAuthent_CMD               0x0E
```

```
492 #define SoftReset_CMD                   0x0F
493
494
495
496 #endif /* MFRC522_CMD_H_ */
/*
 *  mfrc522_reg.h
 *
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```

```
Boston,
*  MA 02110-1301, USA.
 *
 *
 */


#ifndef MFRC522_REG_H_
#define MFRC522_REG_H_
//Page 0 ==> Command and Status
#define Page0_Reserved_1  0x00
#define CommandReg                0x01
#define ComIEnReg                 0x02
#define DivIEnReg                 0x03
#define ComIrqReg                 0x04
#define DivIrqReg                 0x05
#define ErrorReg                  0x06
#define Status1Reg                0x07
#define Status2Reg                0x08
#define FIFODataReg                     0x09
#define FIFOLevelReg              0x0A
#define WaterLevelReg             0x0B
#define ControlReg                0x0C
#define BitFramingReg             0x0D
#define CollReg                         0x0E
#define Page0_Reserved_2          0x0F

//Page 1 ==> Command
#define Page1_Reserved_1          0x10
```

```
#define ModeReg                 0x11
#define TxModeReg               0x12
#define RxModeReg               0x13
#define TxControlReg            0x14
#define TxASKReg                0x15
#define TxSelReg                0x16
#define RxSelReg                0x17
#define RxThresholdReg          0x18
#define DemodReg                0x19
#define Page1_Reserved_2        0x1A
#define Page1_Reserved_3        0x1B
#define MfTxReg                 0x1C
#define MfRxReg                 0x1D
#define Page1_Reserved_4        0x1E
#define SerialSpeedReg          0x1F

//Page 2 ==> CFG
#define Page2_Reserved_1        0x20
#define CRCResultReg_1          0x21
#define CRCResultReg_2          0x22
#define Page2_Reserved_2        0x23
#define ModWidthReg             0x24
#define Page2_Reserved_3        0x25
#define RFCfgReg                0x26
#define GsNReg                  0x27
#define CWGsPReg                0x28
#define ModGsPReg               0x29
#define TModeReg                0x2A
#define TPrescalerReg           0x2B
```

```
#define TReloadReg_1            0x2C
#define TReloadReg_2            0x2D
#define TCounterValReg_1        0x2E
#define TCounterValReg_2        0x2F

//Page 3 ==> TestRegister
#define Page3_Reserved_1        0x30
#define TestSel1Reg                 0x31
#define TestSel2Reg                 0x32
#define TestPinEnReg            0x33
#define TestPinValueReg         0x34
#define TestBusReg              0x35
#define AutoTestReg                 0x36
#define VersionReg              0x37
#define AnalogTestReg           0x38
#define TestDAC1Reg                 0x39
#define TestDAC2Reg                 0x3A
#define TestADCReg              0x3B
#define Page3_Reserved_2        0x3C
#define Page3_Reserved_3        0x3D
#define Page3_Reserved_4        0x3E
#define Page3_Reserved_5        0x3F



497 #endif /* MFRC522_REG_H_ */
/*
*  mfrc522.h
 *
```

```
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 *
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 *  MA 02110-1301, USA.
 *
 *
 */

#ifndef MFRC522_H_
#define MFRC522_H_
```

```
#include <stdint.h>

#include "mfrc522_cmd.h" #include
"mfrc522_reg.h"

#define CARD_FOUND          1
#define CARD_NOT_FOUND 2
#define ERROR                     3

#define MAX_LEN                    16

//Card types
#define Mifare_UltraLight  0x4400
#define Mifare_One_S50              0x0400
#define Mifare_One_S70              0x0200
#define Mifare_Pro_X                0x0800
#define Mifare_DESFire              0x4403

// Mifare_One card command word
# define PICC_REQIDL        0x26            // find the antenna area does not
enter hibernation
# define PICC_REQALL        0x52            // find all the cards antenna area
# define PICC_ANTICOLL      0x93              // anticollision
# define PICC_SElECTTAG     0x93              // election card
# define PICC_AUTHENT1A     0x60              // authentication key A
# define PICC_AUTHENT1B     0x61              // authentication key B
# define PICC_READ          0x30            // Read Block
# define PICC_WRITE         0xA0            // write block
```

```
# define PICC_DECREMENT      0xC0            // debit # define
PICC_INCREMENT      0xC1            // recharge
# define PICC_RESTORE       0xC2            // transfer block data to the buffer
# define PICC_TRANSFER      0xB0            // save the data in the buffer
# define PICC_HALT          0x50            // Sleep

void mfrc522_init(); void
mfrc522_reset();
void mfrc522_write(uint8_t reg, uint8_t data); uint8_t
mfrc522_read(uint8_t reg);
uint8_t mfrc522_request(uint8_t req_mode, uint8_t * tag_type);
uint8_t mfrc522_to_card(uint8_t cmd, uint8_t *send_data, uint8_t
send_data_len, uint8_t *back_data, uint32_t
*back_data_len);



498 #endif /* MFRC522_H_ */
/*
*  mfrc522.c
 *
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 *
```

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Software
*  Foundation, Inc., 51 Franklin Street, Fifth Floor,
Boston,
*  MA 02110-1301, USA.
 *
 *
 */
#include "mfrc522.h"
#include "spi.h"


void mfrc522_init()
{       uint8_t byte;
mfrc522_reset();
mfrc522_write(TModeReg,
0x8D);
mfrc522_write(TPrescalerR
eg, 0x3E);
mfrc522_write(TReloadReg
```

```
_1, 30);
mfrc522_write(TReloadReg
_2, 0);
mfrc522_write(TxASKReg,
0x40);
mfrc522_write(ModeReg,
0x3D);

            byte = mfrc522_read(TxControlReg);
          if(!(byte&0x03))
        {
                mfrc522_write(TxControlReg,byte|0x03);
        }
}
void mfrc522_write(uint8_t reg, uint8_t data)
{
        ENABLE_CHIP();        spi_transmit((reg<<1)&0x7E);
spi_transmit(data);
         DISABLE_CHIP();
}
uint8_t mfrc522_read(uint8_t reg)
{       uint8_t data;         ENABLE_CHIP();
spi_transmit(((reg<<1)&0x7E)|0x80);         data =
spi_transmit(0x00);         DISABLE_CHIP();
           return data;
}
void mfrc522_reset()
{
```

```
        mfrc522_write(CommandReg,SoftReset_CMD);
}
uint8_t mfrc522_request(uint8_t req_mode, uint8_t * tag_type) {
        uint8_t  status;
    uint32_t backBits;//The received data bits

    mfrc522_write(BitFramingReg, 0x07);//TxLastBists =
BitFramingReg[2..0]       ???

        tag_type[0] = req_mode;
    status = mfrc522_to_card(Transceive_CMD, tag_type, 1, tag_type,
&backBits);

            if ((status != CARD_FOUND) || (backBits != 0x10))
    {
            status = ERROR;
    }

        return status;
}  uint8_t mfrc522_to_card(uint8_t cmd, uint8_t *send_data, uint8_t
send_data_len, uint8_t *back_data, uint32_t
*back_data_len)
{
    uint8_t status = ERROR;
uint8_t irqEn = 0x00;     uint8_t
waitIRq = 0x00;     uint8_t lastBits;
uint8_t n;     uint8_t tmp;     uint32_t
i;
    switch (cmd)
```

```
    {       case MFAuthent_CMD:       //Certification cards close
                {
                        irqEn = 0x12;
                      waitIRq = 0x10;
break;
                }
                        case Transceive_CMD: //Transmit FIFO data
                {
                      irqEn = 0x77;
waitIRq = 0x30;             break;
                }
                default:
break;
    }

    //mfrc522_write(ComIEnReg, irqEn|0x80); //Interrupt request
    n=mfrc522_read(ComIrqReg);
    mfrc522_write(ComIrqReg,n&(~0x80));//clear all interrupt bits
    n=mfrc522_read(FIFOLevelReg);
    mfrc522_write(FIFOLevelReg,n|0x80);//flush FIFO data
        mfrc522_write(CommandReg, Idle_CMD); //NO action; Cancel
the current cmd???

        //Writing data to the FIFO     for (i=0;
i<send_data_len; i++)
    {
                      mfrc522_write(FIFODataReg, send_data[i]);
        }
```

```
        //Execute the cmd
mfrc522_write(CommandReg, cmd);     if (cmd ==
Transceive_CMD)
   {
                    n=mfrc522_read(BitFramingReg);
                     mfrc522_write(BitFramingReg,n|0x80);
        }

        //Waiting to receive data to complete   i = 2000; //i according to
the clock frequency adjustment, the operator M1 card maximum waiting
time
25ms???
do
   {
                  //CommIrqReg[7..0]
 //Set1 TxIRq RxIRq IdleIRq HiAlerIRq LoAlertIRq ErrIRq TimerIRq
      n = mfrc522_read(ComIrqReg);        i--;
   }
   while ((i!=0) && !(n&0x01) && !(n&waitIRq));
        tmp=mfrc522_read(BitFramingReg);
             mfrc522_write(BitFramingReg,tmp&(~0x80));

   if (i != 0)     {
      if(!(mfrc522_read(ErrorReg) & 0x1B))          //BufferOvfl Collerr
CRCErr ProtecolErr
      {
         status = CARD_FOUND;           if (n
& irqEn & 0x01)
```

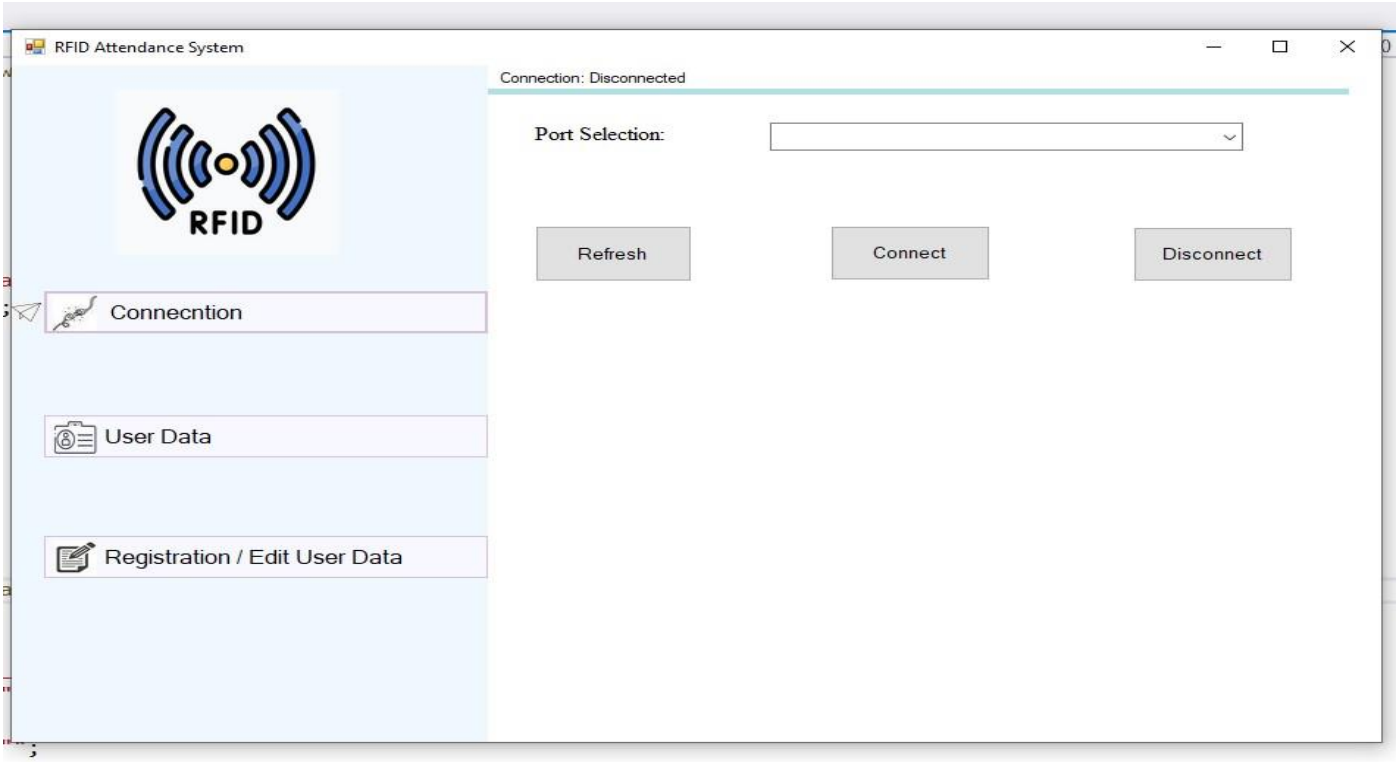
```
        {
                        status = CARD_NOT_FOUND;
//??
                }

        if (cmd == Transceive_CMD)
        {       n = mfrc522_read(FIFOLevelReg);         lastBits =
mfrc522_read(ControlReg) & 0x07;        if (lastBits)
          {
                        *back_data_len = (n-1)*8 + lastBits;
                }
else        {
                        *back_data_len = n*8;
                }

          if (n == 0)
          {
                        n = 1;
                }
          if (n > MAX_LEN)
          {
                        n = MAX_LEN;
                }

                        //Reading the received data in FIFO
          for (i=0; i<n; i++)
          {
                        back_data[i] =
```

```
mfrc522_read(FIFODataReg);
                                }
        }       }
else    {
                        status = ERROR;
                }

  }

  //SetBitMask(ControlReg,0x80);          //timer stops
  //mfrc522_write(cmdReg, PCD_IDLE);

  return status; 499 }
```

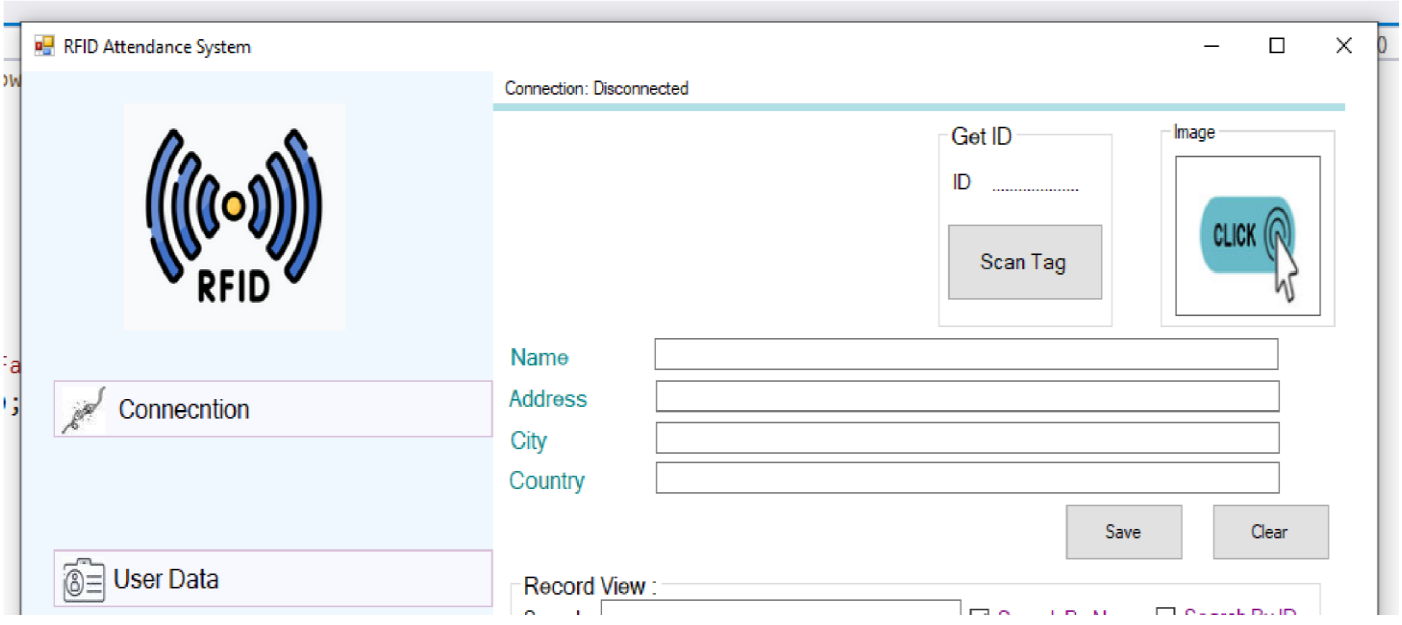
2. PC-side source code:

1) GUI Application:

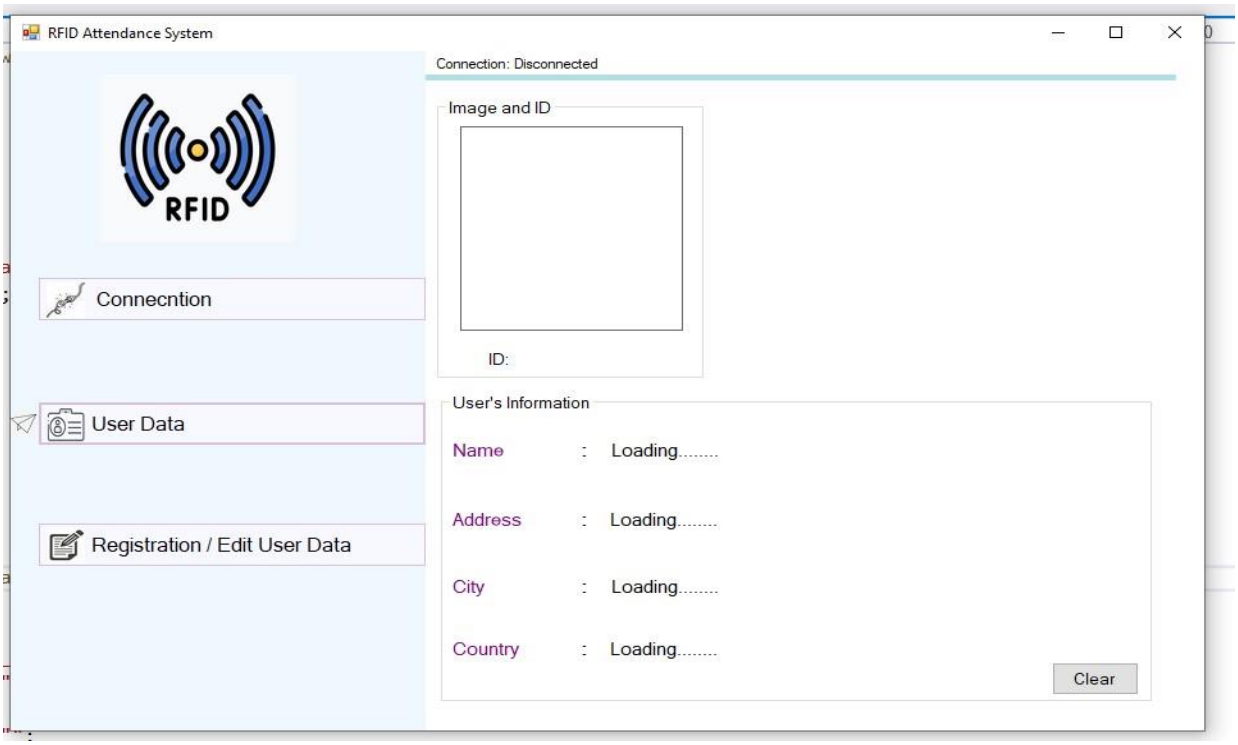
1. Connection Window:



2. Registration/edit Window:



3. User Data Window:



2) GUI Source Code:

```
using System; using
System.IO; using
System.Collections.Generi
c; using
System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using
System.Threading.Tasks
; using
System.Windows.Forms
; using System.IO.Ports;
using MySql.Data.MySqlClient;



namespace RFID_Attendence_System_B1
{
    public partial class Form1 : Form
    {
        private MySqlConnection Connection = new
MySqlConnection("server=localhost; user=root; password=;
database=rfid_user_data");
        private MySqlCommand MySQLCMD = new
MySqlCommand();        private MySqlDataAdapter
```

```
MySQLDA = new MySqlDataAdapter();        private
DataTable DT = new DataTable();
        private string Table_Name = "rfid_user_data_table"; //
your table name        private int Data;        int idrecieved =
0;
        private bool
LoadImagesStr = false;
private string IDRam;
private string
IMG_FileNameInput;
private string StatusInput =
"Save";        private string
SqlCmdSearchstr;        public
static string StrSerialIn;
private bool GetID = false;
private bool ViewUserData =
false;


        SerialPort port =
null;        string
data_rx = "";        bool
flag_st = false;
        public Form1()
        {
            InitializeComponent();
refresh_com();
        }
        private void Form1_Load(object sender, EventArgs e)
        {
```

```
            PanelRegisterationandEditUserData.Visible = false;
            paneluserdata.Visible = false;
            panelconn.Visible = true;

        }
        private void panel1_Paint(object sender, PaintEventArgs e)
        {

        }

        private void label1_Click(object sender, EventArgs e)
        {

        }

        private void connectionbutton_Click(object sender, EventArgs e)
        {
            pictureBox2.Top = connectionbutton.Top;
PanelRegisterationandEditUserData.Visible = false;
            paneluserdata.Visible = false;
            panelconn.Visible = true;
        }

        private void userdatabutton_Click(object sender, EventArgs e)
        {
            if (TimerSerialIn.Enabled == false)
            {
```

```
            MessageBox.Show("Failed to open User Data !!!Click the
Connection menu then click the Connect button.", "Information");
            MessageBox.Show("Connection failed !!!Please check that the
server is ready !!!",
"Error Message", MessageBoxButtons.OK,
MessageBoxIcon.Error);              return;
          }

          else
          {
             StrSerialIn = "";
ViewUserData = true;
             pictureBox2.Top = userdatabutton.Top;
             PanelRegisterationandEditUserData.Visible = false;
             paneluserdata.Visible = true;
panelconn.Visible = false;
             ShowDataUser();
           }
       }

       private void regbutton_Click(object sender, EventArgs e)
       {
          StrSerialIn = "";
          ViewUserData = false;



          pictureBox2.Top = regbutton.Top;
```

```
            PanelRegisterationandEditUserData.Visible = true;
            paneluserdata.Visible = false;
            panelconn.Visible = false;




            ShowData();
        }
        private void connect()
        {
            port = new SerialPort(comboBox1.SelectedItem.ToString());
          //  port.DataReceived += new
SerialDataReceivedEventHandler(TimerSerialIn_Tick);

            port.BaudRate = 9600;
port.DataBits = 8;
            port.StopBits = StopBits.One;

try
{
                if (!port.IsOpen)
                {
                    port.Open();
                    MessageBox.Show("Open");
                    TimerSerialIn.Start();
                }
            }
            catch (Exception ex)
```

```
            {


            }
        }
        private void disconnect()
        {
try
{
            if (port.IsOpen)
            {
                port.Close();
                MessageBox.Show("Close");
                label1connstatus.Text = "Connection Stauts : Disconnected";
label1connstatus.ForeColor = Color.Red;
                TimerSerialIn.Stop();
            }
        }
        catch (Exception ex)
        {


        }
    }
    private void refresh_com()
    {
        comboBox1.DataSource = SerialPort.GetPortNames();
    }
    private void DataReceiveHandler(object sender,
SerialDataReceivedEventArgs e)
```

```
        {
            SerialPort sp = (SerialPort)sender;
            string indata = "";
            try
            {
                indata = sp.ReadExisting();
            }
            catch (Exception E) { }
int idx_end =
indata.IndexOf(';');
            if ((idx_end >= 0) && (flag_st == true))
            {
                flag_st = false;
                data_rx += indata.Substring(0, idx_end);
            }

            int idx_start = indata.IndexOf('@');
            if (idx_start >= 0)
            {
                flag_st = true;
data_rx = "";
                if (indata.Length > (idx_start + 1))
                {
                    data_rx += indata.Substring((idx_start + 1),
(indata.Length - 1));                    int idx = data_rx.IndexOf(';');
                    if (idx >= 0)
                    {
                        data_rx = data_rx.Substring(0, idx);
```

```
                }

}
}
        if (flag_st)
        {
           data_rx += indata;
        }









    }
    private void ShowData()
    {
       try
       { Connection.Open();
       }
       catch (Exception ex)
       { MessageBox.Show("Connection failed !!!Please888check that the
server is ready !!!",
"Error Message", MessageBoxButtons.OK,
MessageBoxIcon.Error);              return;
       }

try
       {
```

```
            if (LoadImagesStr == false)
            {
               MySQLCMD.CommandType = CommandType.Text;
               MySQLCMD.CommandText = "SELECT * FROM " +
Table_Name + " WHERE ID
LIKE '" + labelid.Text.Substring(5, labelid.Text.Length - 5) + "'";
               MySQLDA = new
MySqlDataAdapter(MySQLCMD.CommandText, Connection);
               DT = new DataTable();
               Data = MySQLDA.Fill(DT);

               if (Data > 0)
               {
                  dataGridView1.DataSource = null;
dataGridView1.DataSource = DT;
                  dataGridView1.SelectedColumns[2].DefaultCellStyle.Format
= "c";                    dataGridView1.DefaultCellStyle.ForeColor =
Color.Black;                    dataGridView1.ClearSelection();
               }
else
               { dataGridView1.DataSource = DT; }

            }
else
{
               MySQLCMD.CommandType = CommandType.Text;
               MySQLCMD.CommandText = "SELECT Images FROM " +
Table_Name + " WHERE ID LIKE '" + IDRam + "'";
```

```
                MySQLDA = new
MySqlDataAdapter(MySQLCMD.CommandText, Connection);
                DT = new DataTable();
                Data = MySQLDA.Fill(DT);



                DataRow row = DT.Rows[0];

                if (Data > 0)

{
                    byte[] ImgArray = (byte[])row["Images"];

                    var lmgStr = new MemoryStream(ImgArray);
                    PictureBoxImagePreview.Image =
Image.FromStream(lmgStr);
PictureBoxImagePreview.SizeMode = PictureBoxSizeMode.Zoom;
lmgStr.Close();
                   //}
                }

                LoadImagesStr = false;
            }

        }
        catch (Exception ex)
        {
```

```
            MessageBox.Show("Failed to load Database !!!" + ex.Message,
"Error Message");
            Connection.Close();
            return;
        }



        DT = null;
        Connection.Close();
    }

    private void ShowDataUser()
    {
        try
        {
            Connection.Open();
        }

        catch (Exception ex)
        {
            MessageBox.Show("Show data userConnection failed !!! Please
check that the server is ready !!!", "Error Message",
MessageBoxButtons.OK, MessageBoxIcon.Error);                return;
        }

try
        {
```

```
            // idrecieved = Int32.Parse(StrSerialIn);
             MySQLCMD.CommandType = CommandType.Text;
             MySQLCMD.CommandText = "SELECT * FROM " +
Table_Name + " WHERE ID
LIKE '"  + labelid.Text.Substring(5,labelid.Text.Length-5) + "'";
             MySQLDA = new
MySqlDataAdapter(MySQLCMD.CommandText, Connection);
             DT = new
DataTable();              Data =
MySQLDA.Fill(DT);
if (Data > 0)
             {
                byte[] ImgArray =
(byte[])DT.Rows[0]["Images"];                MemoryStream
lmgStr = new MemoryStream(ImgArray);

                PictureBoxImagePreview.Image = Image.FromStream(lmgStr);

                lmgStr.Close();

                labelid.Text = DT.Rows[0]["ID"].ToString();
LabelName.Text = DT.Rows[0]["Name"].ToString();
                LabelAddress.Text = DT.Rows[0]["Address"].ToString();
                LabelCity.Text = DT.Rows[0]["City"].ToString();
                LabelCountry.Text = DT.Rows[0]["Country"].ToString();
             }
```

```
else
{
                MessageBox.Show("ID not found !!! Please register your ID.",
"Information Message");
            }



        }

        catch (Exception ex)
        {
            MessageBox.Show("Show data user Failed to load Database !!!" +
ex.Message, "Error Message");
            Connection.Close();
            return;
        }



        DT = null;
        Connection.Close();
    }

    private void ClearInputUpdateData()
    {
        TextBoxName.Text = "";
        LabelGetID.Text = "_________";
```

```
            TextBoxAddress.Text = "";
            TextBoxCity.Text = "";
            TextBoxCountry.Text = "";
            PictureBoxImageInput.Image =
Properties.Resources.rsz_1click_here_button_with_cursor_icon_vector_2339
4642;
        }



        /*private void data_rx_handler(object sender,
SerialDataReceivedEventArgs e)
        {
            SerialPort sp =
(SerialPort)sender;            string
temp = sp.ReadExisting();
if (temp.Contains("@"))
            {
                data_rx = "";
flag_st = true;
            }
            else if (temp.Contains(";"))
            {
                flag_st = false;
                MessageBox.Show(data_rx);


            }
            else if (temp.Contains("%"))
            {
```

```
        //whatever.
    }
    if (flag_st)
    {
        data_rx += temp;
    }
}
*/

private void refreshbutton_Click(object sender, EventArgs e)
{
    refresh_com();
}

private void connectbutton_Click(object sender, EventArgs e)
{
    connect();
}

private void disconnectb_Click(object sender, EventArgs e)
{
    disconnect();
}

private void pictureBox1_Click(object sender, EventArgs e)
{

}
```

```
        private void PanelRegisterationandEditUserData_Paint(object sender,
    PaintEventArgs e)
        {

        }

        private void groupBox2_Enter(object sender, EventArgs e)
        {

        }

        private void groupBox3_Enter(object sender, EventArgs e)
        {

        }

        private void panelconn_Paint(object sender, PaintEventArgs e)
        {

        }

        private void ButtonSave_Click(object sender, EventArgs e)
        {


           byte[] arrImage;
           MemoryStream mstream = new MemoryStream();
```

```
        if (TextBoxName.Text == "")

        {
            MessageBox.Show("Name cannot be empty !!!", "Error Message",
MessageBoxButtons.OK,
MessageBoxIcon.Error);              return;
        }

        if (TextBoxAddress.Text == "")
        {
            MessageBox.Show("Address cannot be empty !!!", "Error
Message",
MessageBoxButtons.OK,
MessageBoxIcon.Error);              return;
        }

        if (TextBoxCity.Text == "")
        {
            MessageBox.Show("City cannot be empty !!!", "Error Message",
MessageBoxButtons.OK,
MessageBoxIcon.Error);              return;
        }

        if (TextBoxCountry.Text == "")
        {
            MessageBox.Show("Country cannot be empty !!!", "Error
Message",
```

```
MessageBoxButtons.OK,
MessageBoxIcon.Error);                return;
            }



            if (StatusInput == "Save")
            {
                if (IMG_FileNameInput != "")
                {

PictureBoxImageInput.Image.Save(mstream,
System.Drawing.Imaging.ImageFormat.Jpeg
);                    arrImage =
mstream.GetBuffer();
                }
else
{
                    MessageBox.Show("The image has not been selected !!!", "Error
Message",
MessageBoxButtons.OK,
MessageBoxIcon.Error);                    return;
                }

                try
                {
                    Connection.Open();
                }
```

```
            catch (Exception ex)
            {
                MessageBox.Show("Connection failed !!! Please check that the
server is ready !!!",
"Error Message", MessageBoxButtons.OK,
MessageBoxIcon.Error);                    return;
            }


try
            {
                MySQLCMD = new MySqlCommand();
                {
                    var withBlock = MySQLCMD;
withBlock.CommandText = "INSERT INTO " + Table_Name + "
(Name, ID,
Address, City, Country, Images) VALUES (@name, @ID, @address, @city,
@country,
@images)";
                    withBlock.Connection = Connection;
withBlock.Parameters.AddWithValue("@name", TextBoxName.Text);
withBlock.Parameters.AddWithValue("@id", LabelGetID.Text);
withBlock.Parameters.AddWithValue("@address", TextBoxAddress.Text);
withBlock.Parameters.AddWithValue("@city", TextBoxCity.Text);
withBlock.Parameters.AddWithValue("@country", TextBoxCountry.Text);
withBlock.Parameters.AddWithValue("@images", arrImage);
withBlock.ExecuteNonQuery();
                }
```

```
                MessageBox.Show("Data saved successfully", "Information");
                IMG_FileNameInput = "";
                ClearInputUpdateData();
            }

            catch (Exception ex)
            {
                MessageBox.Show("Data failed to save !!!" + ex.Message,
"Error Message");
                Connection.Close();
                return;
            }


            Connection.Close();
        }

        else
        {
            if (IMG_FileNameInput != "")
            {

PictureBoxImageInput.Image.Save(mstream,
System.Drawing.Imaging.ImageFormat.Jpeg
);                  arrImage =
mstream.GetBuffer();
```

```
try
                {
                   Connection.Open();
                }

                catch (Exception ex)
                {
                   MessageBox.Show("Connection failed !!! Please check that
the server is ready
!!!", "Error Message", MessageBoxButtons.OK,
MessageBoxIcon.Error);                    return;
                }

try
                {
                   MySQLCMD = new MySqlCommand();
                   {
                      var withBlock = MySQLCMD;
                      withBlock.CommandText = "UPDATE " + Table_Name +
" SET
Name=@name,ID=@id,Address=@address,City=@city,Country=@country,
Images=@images
WHERE ID=@id ";
                         withBlock.Connection = Connection;
withBlock.Parameters.AddWithValue("@name", TextBoxName.Text);
withBlock.Parameters.AddWithValue("@id", LabelGetID.Text);
withBlock.Parameters.AddWithValue("@address", TextBoxAddress.Text);
```

```
withBlock.Parameters.AddWithValue("@city", TextBoxCity.Text);
withBlock.Parameters.AddWithValue("@country", TextBoxCountry.Text);
withBlock.Parameters.AddWithValue("@images", arrImage);
withBlock.ExecuteNonQuery();
                    }

                    MessageBox.Show("Data updated successfully",
"Information");
                    IMG_FileNameInput = "";
                    ButtonSave.Text = "Save";
                    ClearInputUpdateData();
                }
                catch (Exception ex)
                {
                    MessageBox.Show("Data failed to Update !!!" + ex.Message,
"Error Message");

Connection.Close();
return;
                }


                Connection.Close();
            }
else
{
try
                {
```

```
            Connection.Open();
        }

        catch (Exception ex)
        {
            MessageBox.Show("Connection failed !!! Please check that
the server is ready
!!!", "Error Message", MessageBoxButtons.OK,
MessageBoxIcon.Error);                    return;
        }

try
        {
            MySQLCMD = new MySqlCommand();
            {
                var withBlock = MySQLCMD;
                withBlock.CommandText = "UPDATE " + Table_Name +
" SET
Name=@name,ID=@id,Address=@address,City=@city,Country=@country
WHERE ID=@id ";                    withBlock.Connection = Connection;
withBlock.Parameters.AddWithValue("@name", TextBoxName.Text);
withBlock.Parameters.AddWithValue("@id", LabelGetID.Text);
withBlock.Parameters.AddWithValue("@address", TextBoxAddress.Text);
withBlock.Parameters.AddWithValue("@city", TextBoxCity.Text);
withBlock.Parameters.AddWithValue("@country", TextBoxCountry.Text);
withBlock.ExecuteNonQuery();
            }
```

```
                MessageBox.Show("Data updated successfully",
"Information");
                ButtonSave.Text = "Save";
                ClearInputUpdateData();
            }

            catch (Exception ex)
            {
                MessageBox.Show("Data failed to Update !!!" + ex.Message,
"Error Message");
                Connection.Close();
                return;
            }

            Connection.Close();
        }



        StatusInput = "Save";
      }
      PictureBoxImagePreview.Image = null;
      ShowData();
    }

    private void buttonclear_Click(object sender, EventArgs e)
    {
```

```
            labelid.Text = "ID : _________";
    LabelName.Text = "Waiting...";
            LabelAddress.Text = "Waiting...";
            LabelCity.Text = "Waiting...";
            LabelCountry.Text = "Waiting...";
            PictureBoxImagePreview.Image = null;
        }

        private void LabelName_Click(object sender, EventArgs e)
        {

        }

        private void label1_Click_1(object sender, EventArgs e)
        {

        }

        private void labelid_Click(object sender, EventArgs e)
        {

        }

        private void ButtonClearForm_Click(object sender, EventArgs e)
        {
            ClearInputUpdateData();
        }
```

```
        private void ButtonScanID_Click(object sender, EventArgs e)
        {
            if (TimerSerialIn.Enabled == true)
            {
                PanelReadingTagProcess.Visible = true;
                GetID = true;
                ButtonScanID.Enabled = false;
            }

else
{
                MessageBox.Show("Failed to open User Data !!! Click the
Connection menu then click the Connect button.", "Error Message");
            }

        }

        private void PictureBoxImageInput_Click(object sender, EventArgs e)
        {
            OpenFileDialog OpenFileDialog1 = new OpenFileDialog();
            OpenFileDialog1.FileName = "";
            OpenFileDialog1.Filter = "JPEG (*.jpeg;*.jpg)|*.jpeg;*.jpg";

            if (OpenFileDialog1.ShowDialog(this) ==
System.Windows.Forms.DialogResult.OK)
            {
                IMG_FileNameInput = OpenFileDialog1.FileName;
                PictureBoxImageInput.ImageLocation = IMG_FileNameInput;
```

```
        }

    }

    private void CheckBoxByName_CheckedChanged(object sender,
EventArgs e)
    {
        if (CheckBoxByName.Checked == true)
        {
            CheckBoxByID.Checked = false;
        }
        if (CheckBoxByName.Checked == false)
        {
            CheckBoxByID.Checked = true;
        }

    }

    private void CheckBoxByID_CheckedChanged(object sender,
EventArgs e)
    {
        if (CheckBoxByID.Checked == true)
        {
            CheckBoxByName.Checked = false;
        }

        if (CheckBoxByID.Checked == false)
        {
```

```
            CheckBoxByName.Checked = true;
        }

    }

    private void label15_Click(object sender, EventArgs e)
    {

    }

    private void TextBoxSearch_TextChanged(object sender, EventArgs e)
    {
        if (CheckBoxByID.Checked == true)
        {
            if (TextBoxSearch.Text == null)
            {
                SqlCmdSearchstr = "SELECT Name, ID, Address, City, Country
FROM " +
Table_Name + " ORDER BY Name";
            }

else
{
                SqlCmdSearchstr = "SELECT Name, ID, Address, City, Country
FROM " +
Table_Name + " WHERE ID LIKE'" + TextBoxSearch.Text + "%'";
            }
        }
```

```
        if (CheckBoxByName.Checked == true)
        {
            if (TextBoxSearch.Text == null)
            {
                SqlCmdSearchstr = "SELECT Name, ID, Address, City, Country
FROM " +
Table_Name + " ORDER BY Name";
            }

else
{
                SqlCmdSearchstr = "SELECT Name, ID, Address, City, Country
FROM " +
Table_Name + " WHERE Name LIKE'" + TextBoxSearch.Text + "%'";
            }

        }
try
        {
            Connection.Open();
        }

        catch (Exception ex)
        {
            MessageBox.Show("Connection failed !!! Please check that the
server is ready !!!",
"Error Message", MessageBoxButtons.OK, MessageBoxIcon.Error);
            return;
```

```
        }


try
{
        MySQLDA = new MySqlDataAdapter(SqlCmdSearchstr,
Connection);
        DT = new
DataTable();        Data =
MySQLDA.Fill(DT);
if (Data > 0)
        {
          dataGridView1.DataSource = null;
dataGridView1.DataSource = DT;
          dataGridView1.DefaultCellStyle.ForeColor = Color.Black;
dataGridView1.ClearSelection();
        }

else
        {
          dataGridView1.DataSource = DT;
        }

        }

        catch (Exception ex)
        {
```

```
            MessageBox.Show("Failed to search" + ex.Message, "Error
Message");              Connection.Close();
        }
        Connection.Close();


    }

    private void dataGridView1_CellContentClick(object sender,
DataGridViewCellEventArgs e)
    {

    }

    private void dataGridView1_CellMouseDown(object sender,
DataGridViewCellMouseEventArgs e)
    {
try
        {
            if (AllCellsSelected(dataGridView1) == false)
            {
                if (e.Button == MouseButtons.Left)
                {
                    // dataGridView1.CurrentCell =
this.songsDataGridView.Columns[e.Colum
nIndex];                    int i;
                    if (e.RowIndex >= 0)
                    {
                        i = dataGridView1.CurrentRow.Index;
```

```
                    LoadImagesStr = true;
                    IDRam =
dataGridView1.Rows[i].Cells["ID"].Value.ToString();
ShowData();
                }
            }

        }

    }

    catch (Exception ex)
    {
        return;
    }
}
private bool AllCellsSelected(DataGridView dgv)
{
    bool AllCellsSelectedRet = default;
    AllCellsSelectedRet = dataGridView1.SelectedCells.Count ==
dataGridView1.RowCount
*
dataGridView1.Columns.GetColumnCount(DataGridViewElementStat
es.Visible);          return AllCellsSelectedRet;
}


 /*private void TimerTimeDate_Tick(object sender, EventArgs e)
```

```
        {
            LabelDateTime.Text = "Time " &
DateTime.Now.ToString("HH:mm:ss") & "  Date " &
DateTime.Now.ToString("dd MMM, yyyy");
        }*/

        private void deleteToolStripMenuItem_Click(object sender, EventArgs
e)
        {
            if (dataGridView1.RowCount == 0)
            {
                MessageBox.Show("Cannot delete, table data is empty", "Error
Message");/* TODO
ERROR: Skipped
SkippedTokensTrivia */
return;
            }
            if (dataGridView1.SelectedRows.Count == 0)
            {
                MessageBox.Show("Cannot delete, select the table data to be
deleted", "Error Message");
                return;
            }

            try
            {
                Connection.Open();
            }
```

```
        catch (Exception ex)
        {
            MessageBox.Show("Connection failed !!! Please check that the
server is ready !!!",
"Error Message", MessageBoxButtons.OK,
MessageBoxIcon.Error);              return;
        }

try
        {
            if (AllCellsSelected(dataGridView1) == true)
            {
                MySQLCMD.CommandType = CommandType.Text;
                MySQLCMD.CommandText = "DELETE FROM " +
Table_Name;
                MySQLCMD.Connection = Connection;
                MySQLCMD.ExecuteNonQuery();
            }
            foreach (DataGridViewRow row in dataGridView1.SelectedRows)
            {
                if (row.Selected == true)
                {

                    String Text = row.DataBoundItem.ToString();
                    MySQLCMD.CommandType = CommandType.Text;
                    MySQLCMD.CommandText = "DELETE FROM " +
Table_Name + " WHERE ID='" + Text + "'";
                    MySQLCMD.Connection = Connection;
```

```
                MySQLCMD.ExecuteNonQuery();
            }
        }

    }



    catch (Exception ex)
    {
        MessageBox.Show("Failed to delete" + ex.Message, "Error
Message");              Connection.Close();
    }

    PictureBoxImagePreview.Image = null;
    Connection.Close();
    ShowData();
}

private void selectAllToolStripMenuItem_Click(object sender,
EventArgs e)
{
    dataGridView1.SelectAll();
}

private void clearSelectionToolStripMenuItem_Click(object sender,
EventArgs e)
{
```

```
            dataGridView1.ClearSelection();
PictureBoxImagePreview.Image = null;
        }

        private void refreshToolStripMenuItem1_Click(object sender,
EventArgs e)
        {
            ShowData();
        }

        private void TimerSerialIn_Tick(object sender, EventArgs e)
        {
try
            {
                StrSerialIn = port.ReadExisting();
//idrecieved = Int32.Parse(StrSerialIn);
                label1connstatus.Text = "Connection Status : Connected";
label1connstatus.ForeColor = Color.Green;
                if (StrSerialIn != "")
                {
                    if (GetID == true)
                    {
                        LabelGetID.Text =
StrSerialIn;                        GetID = false;
                        if (LabelGetID.Text != "________")
                        {
                            PanelReadingTagProcess.Visible = false;
                            IDCheck();
```

```
                }
            }

            if (ViewUserData == true)
            {
                ViewData();
            }
        }
    }
    catch (Exception ex)
    {
        TimerSerialIn.Stop();
disconnect();
        label1connstatus.Text = "Connection Status : Disconnect";
        //PictureBoxStatusConnect.Image =
global::My.Resources.Disconnect;
        MessageBox.Show("Failed to connect !!!Microcontroller is not
detected.", "Error
Message");
        connectbutton_Click(sender,
e);          return;
    }
}
private void IDCheck()
{
try
    {
        Connection.Open();
```

```
        }
        catch (Exception ex)
        {
            MessageBox.Show("ID CHeck Connection failed !!! Please
check that the server is ready !!!", "Error Message",
MessageBoxButtons.OK, MessageBoxIcon.Error);              return;
        }

try
{
            MySQLCMD.CommandType = CommandType.Text;
            MySQLCMD.CommandText = "SELECT * FROM " +
Table_Name + " WHERE ID LIKE '" + LabelGetID.Text + "'";
            MySQLDA = new
MySqlDataAdapter(MySQLCMD.CommandText, Connection);
            DT = new
DataTable();              Data =
MySQLDA.Fill(DT);
if (Data > 0)
            {
                if (MessageBox.Show("ID registered ! Do you want to edit the
data ?",
"Confirmation", MessageBoxButtons.OKCancel,MessageBoxIcon.Question)
==
DialogResult.Cancel)
                {
                    DT = null;
                    Connection.Close();
```

```
                ButtonScanID.Enabled = true;
                GetID = false;
                LabelGetID.Text =
"_________";                    return;
            }
else
            {
                byte[] ImgArray = (byte[])DT.Rows[0]["Images"];
                var lmgStr = new MemoryStream(ImgArray);
                PictureBoxImageInput.Image = Image.FromStream(lmgStr);
                PictureBoxImageInput.SizeMode =
PictureBoxSizeMode.Zoom;
                TextBoxName.Text = DT.Rows[0]["ID"].ToString();

                TextBoxAddress.Text = DT.Rows[0]["Address"].ToString();
                TextBoxCity.Text = DT.Rows[0]["City"].ToString();
                TextBoxCountry.Text = DT.Rows[0]["Country"].ToString();
                StatusInput = "Update";
            }
        }
    }
    catch (Exception ex)
    {
        MessageBox.Show("Failed to load Database !!!" + ex.Message,
"Error Message");
        Connection.Close();
        return;
    }
```

```
            DT = null;
            Connection.Close();
            ButtonScanID.Enabled = true;
            GetID = false;
        }

        private void ViewData()
        {
            labelid.Text = "ID : " + StrSerialIn;
            if (labelid.Text == "ID : _________")
            {
                ViewData();
            }
else
            {
                ShowDataUser();
            }
        }

        private void ButtonCloseReadingTag_Click(object sender, EventArgs e)
        {
            PanelReadingTagProcess.Visible = false;
            ButtonScanID.Enabled = true;
        }

        private void groupBoxdetaileddata_Enter(object sender, EventArgs e)
        {
```

```
        }
    }
}
```