



Communicating through UART & PIC

Team A:

Devanshi Chauhan

Jainam Shah

Harsh Manghnani

Siddhpura Hemangi

Overview

The task is about interfacing two PIC controllers with each other through implementing a UART Protocol. In the PIC microcontroller there is an internal hardware which implements the UART protocol but to learn the UART protocol from scratch we will start implementing the protocol manually (without using internal dedicated hardware or software serial libraries). Then in further sub tasks we will be switching to communicate two MCUs using internal hardware in order to learn using internal hardware functioning and usage from datasheet

Task 2.1 - UART from scratch

Installation & introduction

On day 1 the team members are supposed to study UART protocol from scratch like data frames/ baudrate/ start and stop conditions etc. requirements of UART protocol.

UART receiver - without using internal hardware

Team Members should refer to the datasheet of the [PIC16F877](#) for implementing this task. In this task you will control LEDs from a serial monitor. **You don't have to use pins which have internal dedicated hardware for connecting the serial monitor (UART).** You have to connect the serial monitor to any other pin. To handle The data received from the serial monitor you have to sample the Tx Pin of the serial monitor using timers to match the baud rate of the serial monitor. In order to receive data you have to turn on and off sampling of the pin according to Start and Stop conditions detected (you might have to use hardware interrupt for the same). The received binary string will then be stored in a variable. (refer fig. 1)

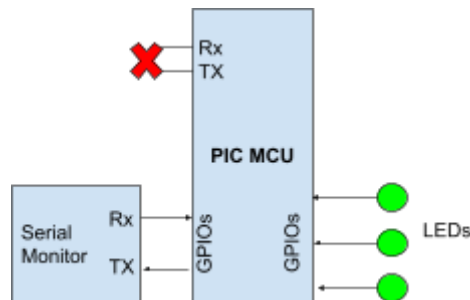


Fig. 1: connection diagram for Task 2.1

Controlling the LED from serial monitor

In this section you will be controlling 3 LEDs from your serial monitor. The received binary string then will be analyzed and the respective LED will be turned on.

OUTPUT: sending 1 from serial monitor will toggle LED-1 , sending 2 from serial monitor will toggle LED-2 and likewise for LED-3 also.

Task 2.2 - UART using internal Hardware

Implement receiver

Up till now we have implemented the UART protocol manually by sampling bus and detecting string and what not but PIC controller also has a dedicated hardware which takes care of all these things. What you just need to do is reading the datasheet and implementing this task

In this task you have to connect serial monitor on Hardware serial (UART pins) and implement the same LED control task (this time the communication will happen using internal dedicated hardware) (refer figure 2)

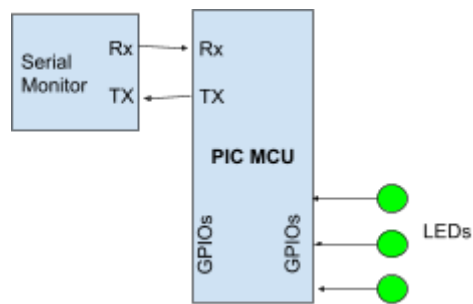


Fig. 2: Connections diagram for task 2.2

Implement transmitter

Extend its functionality by reprinting the character entered in the serial monitor.

OUTPUT: when you enters 1 from from serial monitor it will print 1 on serial monitor and also it will turn on the LED 1 and likewise for all 3 LEDs

Task 2.3 - Communicating two PIC controllers

Communicate with UART (day 10 & 11)

Here you have to control the LEDs connected on MCU-1 by switches connected with MCU-2. In order to pass the commands both the MCUs must be communicating with internal dedicated hardware of UART. (refer figure 3)

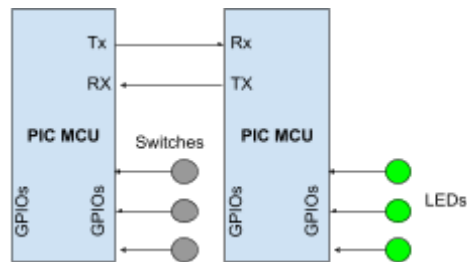


Fig 3: Connection diagram for Task 2.3