

Driver Project 2: Basic GPIO Control with Hardware (Group Project due Oct 16, 2020) –

Total 10 points

Assignment:

Using the PIC 24F, you will design a simple IO controller to test out the hardware kit provided. Design a state machine to turn on, turn off and blink a LED connected to port RB8 based on the push buttons (PBs) connected to the input ports RA2, RA4 and RB4 as shown in the schematic in the lecture slide 'HW and IO Control.pdf'. PB1, PB2 and PB3 represent push buttons connected to ports RA2, RA4 and RB4 respectively. The state machine should operate as follows:

User input(s)	Output(s)
While PB1 is pressed	LED blinks at approx. 1 sec intervals (1 sec on and 1 sec off)
While PB2 is pressed	LED blinks at approx. 2 sec intervals (2 sec on and 2 sec off)
While PB3 is pressed	LED blinks at approx. 3 sec intervals (3 sec on and 3 sec off)
While 2 or more PBs are pressed together	LED stays on without blinking
No PBs pressed	LED stays off

Additional info:

Implement the above controller using the hardware kit and your code, which will be designed using basic ANSI C commands and placed in the following functions.

IOinit() – initializes the IO ports and placed in IOs.c

IOcheck() – implements the IO checks and LED blinking functions and placed in IOs.c

main() – Used to call IOinit() and IOcheck() and placed in main.c

Hint on generating delay cycles: The default clock speed of the microcontroller is 8MHz. The program counter increments from one instruction to the next at every other clock cycle (i.e. 4 MHz). The number of clock cycles needed per instruction varies between 2 and 20 for different types of instructions with the free C compiler used.

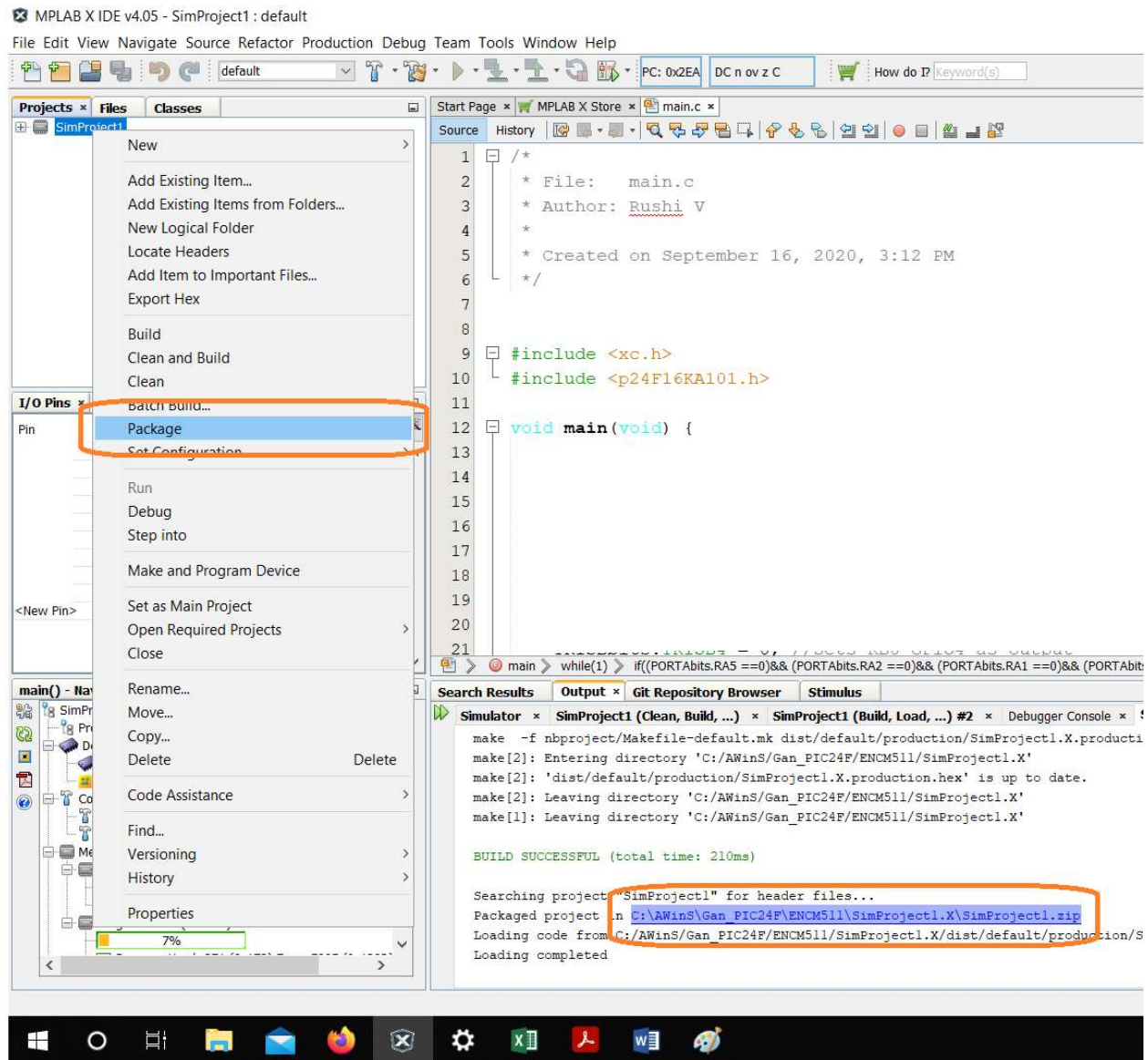
Deliverables:

This is a group project. Each group should upload the following **2 items** onto their respective group D2L-Dropbox folder created:

1. **A single video recording** no longer than 10 mins long showing the following:
 - a. UCID card of one group member placed in front of the computer with MPLAB running
 - b. Demo of the code and hardware operation showing the following:
 - i. Each of the PBs pressed individually
 - ii. 2 or more PBs pressed simultaneously
 - iii. No PBs pressed
 - iv. Repeat with each of the PBs pressed individually

NOTE: Video recordings of the HW and computer screen should be made using a smartphone or camera. Screenshots and screen recordings of individual segments using Yuja or Zoom or any other software will lose points. Groups can upload the video in mp4 format or a link to the video recording.

2. Zipped up file of the project. MPLAB projects can be zipped up by right clicking on the project and selecting package (See screenshot below). The zipped project is saved in the same project folder created by user on user's computer.



Grading rubric: (Total = 10 points)

IO port setup = 1 points

Proper code working – 1.5points for 4 PB states = 6 points

Proper video and code upload format including code commenting of every code line = 2 points

Group participation = 1