Lab 3: Digital Inputs

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Connections

- Complete the soldering and connections up to Lab 2
- Make sure that your board is programmable and EEPROM is not corrupted
- Now add external switch as shown in Fig 1.
- Connect PB1 to external switch
- Make sure that you have used VCC and resistor
- Be careful about shorted terminals of the push button
- Follow the 2 slides after the Fig.1. for more details

Connections

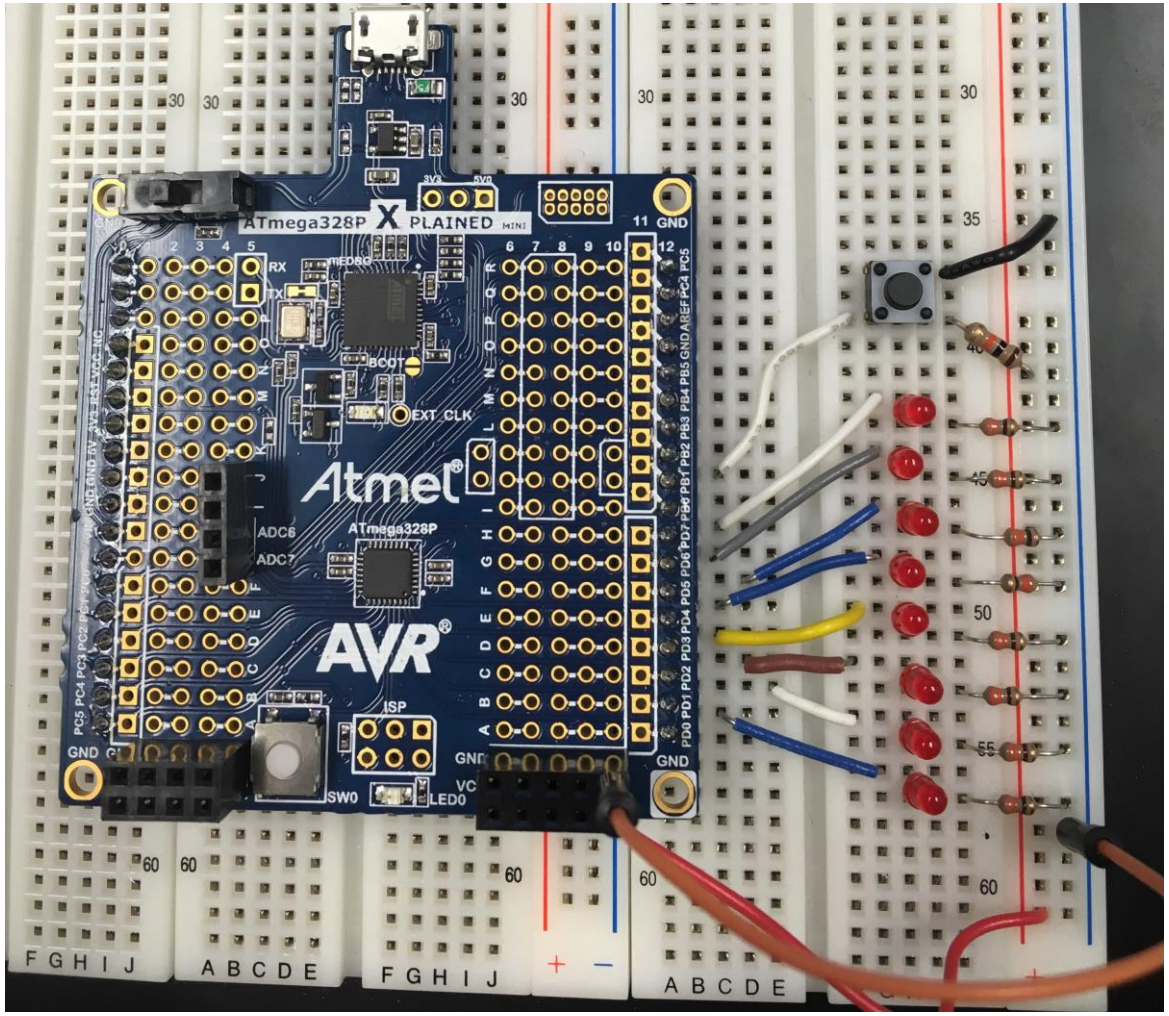
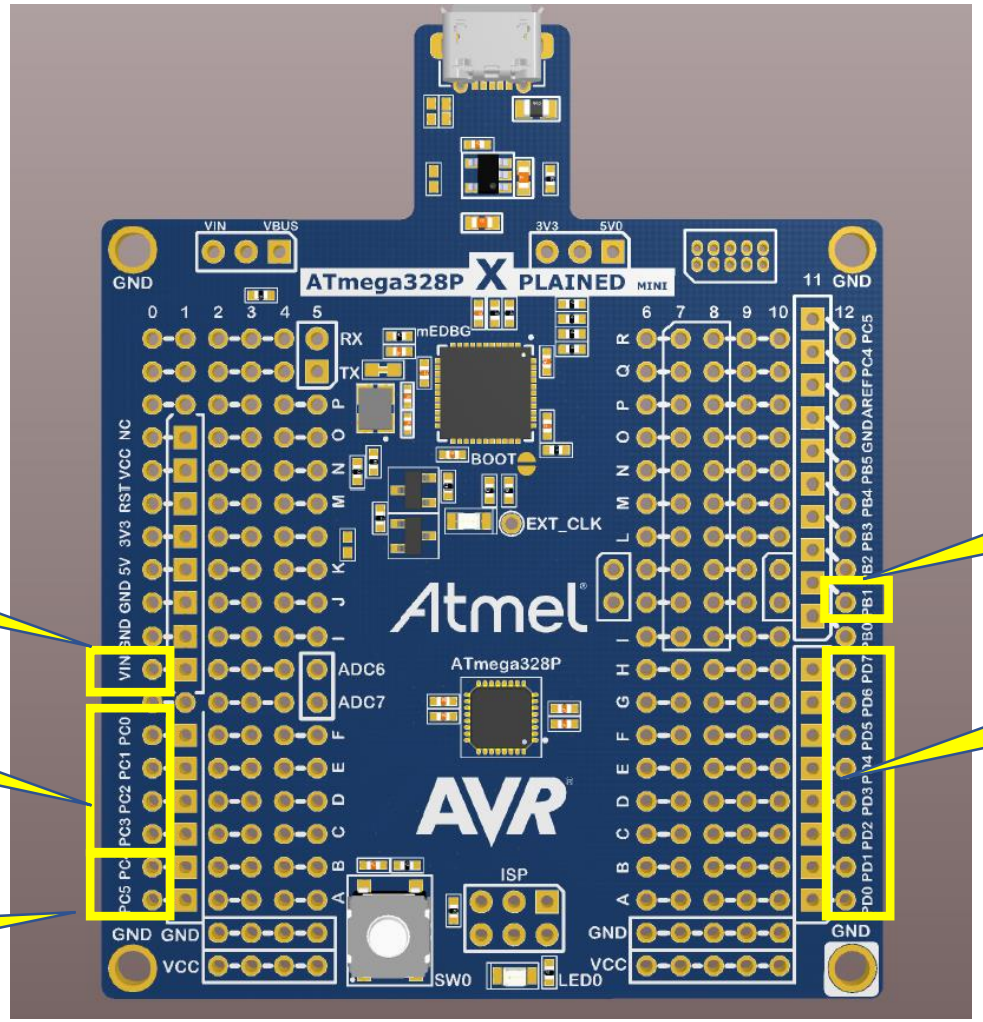


Fig1. Connections for digital input and outputs

ATmega328P Xplained Mini Pin Allocation



VIN
5V Input

PC0-PC3
LCD Data Pins

PC4-PC5
LCD Control Pins

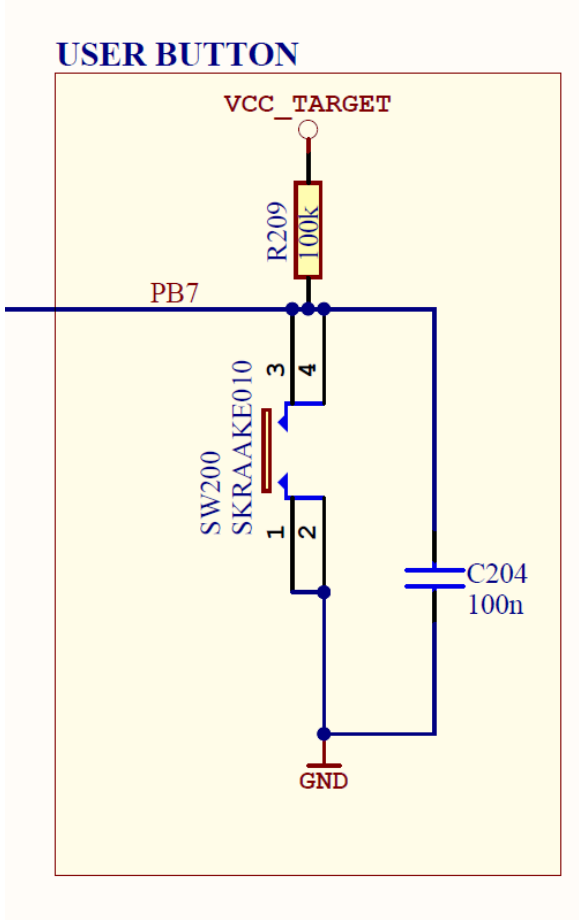
PB1
External Switch

PD0-PD7
External LEDs

Source: Presentation from Marten Van Dijk

Push Switch Interface

- A push switch provides a logic HIGH or LOW value to the microcontroller pin to which it is connected
  - HIGH: When the switch is not pressed
  - LOW: When the switch is pressed
- Figure shows the schematic of the push button onboard ATmega328p Xplained Mini kit
  - The switch is connected to PB7
- We have another push switch on the bread board which is connected to PB1
- You should use the switch on the bread board (Switch 2) for debouncing tasks



Source: Presentation from Marten Van Dijk

Programming practice

- Practice the Example of textbook 6.1, 6.2 and 6.3
- Read carefully about debouncing and look carefully to figure 6-5
- Now make a program to blink the LEDs connected based on the pushbuttons as described in next slide

Lab Task: Need to demonstrate

- Q1. [100 points] Write down C programs and demonstrate the code for your ATmega328P XPlained mini kit so that it performs the following functions:

  (A)[25 points] Initiate 2 switches SW1 and SW2 as input and 8 LEDs of port D as output. Write down the code to set up the blinking frequency of the 3rd LED to 3Hz and rest of the LEDs should be turned off.

  (B)[25 points] Extend the Task a so that blinking frequency of LED will be increased by 1 Hz if the switch SW1 is pressed and blinking frequency will be decreased by 1Hz if the switch SW2 is pressed.

  (C)[50points] Modify code to change the position of the blinking LED if both SW1 and SW2 switches are pressed at a time. The position of the blinking LED should go left to write initially. After it goes to 8th position the direction will be reversed. Once it goes to 1st position the direction will be reversed again. The process will be repeated. The position of the LED will be changed as following:

Switches pressed	Status of the LEDs
Initial condition	00100000
SW1 and SW2	00010000
SW1 and SW2	00001000
SW1 and SW2	00000100
SW1 and SW2	00000010
SW1 and SW2	00000001
SW1 and SW2	00000010
SW1 and SW2	00000100
SW1 and SW2	00001000
SW1 and SW2	00010000
SW1 and SW2	00100000
SW1 and SW2	01000000
SW1 and SW2	10000000
SW1 and SW2	01000000
SW1 and SW2	00100000
.	.
.	.
.	.
	.

Here, 1 means blinking LED and 0 means off LED.

Switch definition for LAB task

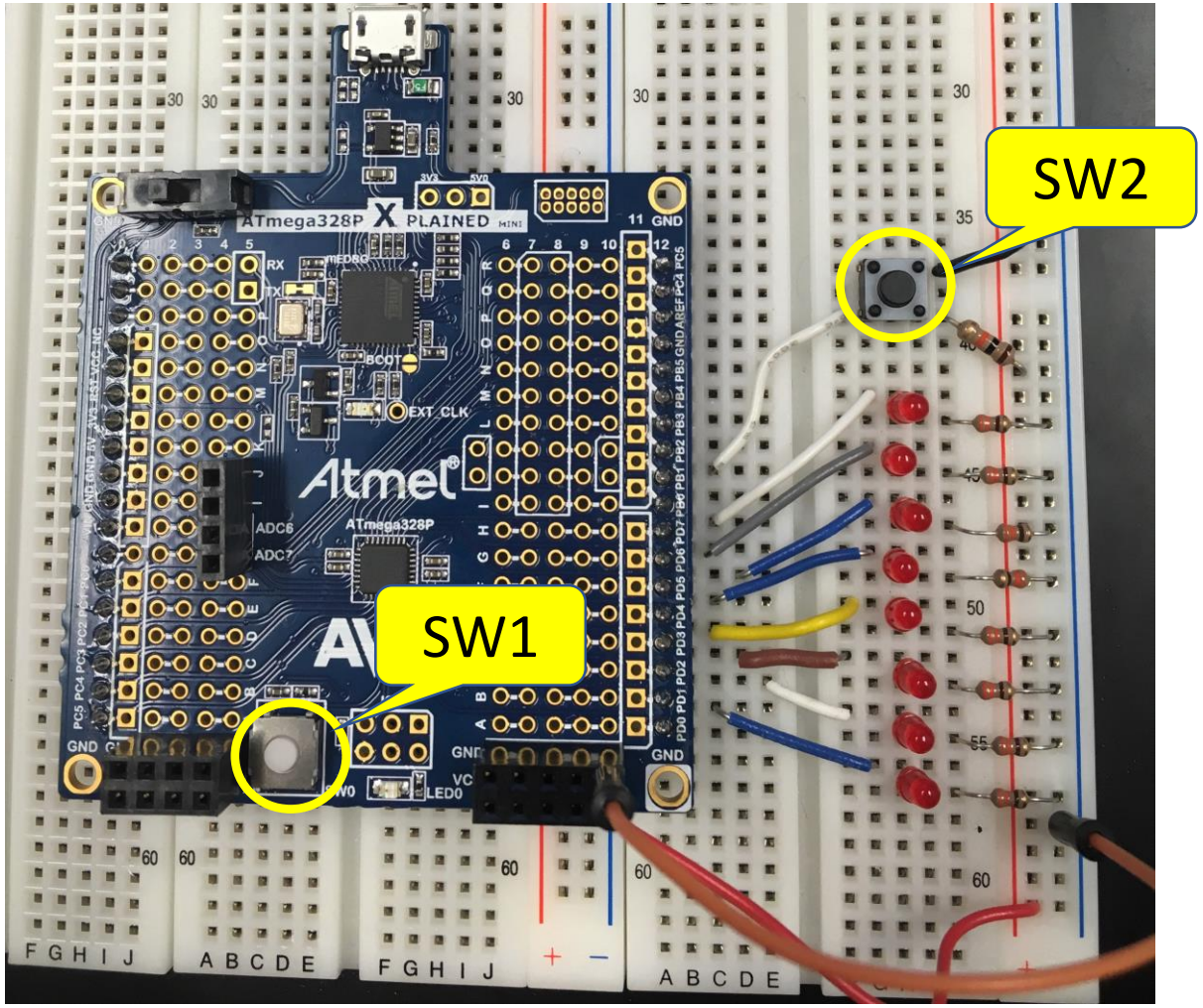


Fig1. Definition of switches for LAB task