

```
/*
 * Lab 4-5: Washing Machine
 * shieldIO.c
 *
 * Created: 2/14/2021
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 *
 * This file was created to define functions and ports associated
 * with the Arduino Mega IO shield used to interact with main.c.
 * It includes four functions. The first, shield_io_init, initializes
 * the DDRs and PORTs to define correct inputs for the pushbuttons,
 * toggle switches, and LEDs. The toggle switches have a very unorthodox
 * connection to PORTE and PORTD from arduino pins 2-5, requiring both
 * ports to be set to the same to function as intended. The second function
 * is Read_PB, which simply reads the values from PINB and returns the values
 * within variable "data". The pushbuttons used utilize negative logic, so the
 * read in data was inverted before being returned from the function.
 * The third function is Read_TS, a function that utilizes the macro
 * CHECK_BITIO() (detailed in shieldIO.h) to read the bits in the correct
 * order, then shifting them to create a 4 bit sequence that can be returned
 * as variable "data". The final function is Set_LED, which simply outputs
 * its parameter "LED" of type uint8_t to its associated output port PORTA.
 *
 * Hardware
 *      Push Buttons          PORTB.0-3
 *      Toggle Switches      PORTE.3-5, PORTG.5
 */
#include "shieldIO.h"

void shield_io_init(void)
{
    // PushButton Initializations
    DDRB = 0x00;
    PORTB = 0xFF;

    // TS Initializations
    DDRE = 0x00;
    PORTE = 0xFF;
    DDRG = 0x00;
    PORTG = 0xFF;

    // LED Initializations
    DDRA = 0xFF;
    PORTA = 0x00;
}

uint8_t Read_PB(void)
{
    // read in inputs from pushbuttons to variable "data"
    uint8_t data = ~(PINB & ((1<<PB3) | (1<<PB2) | (1<<PB1) | (1<<PB0)));
    return data;
}
```

```
}
```

```
uint8_t Read_TS(void)
```

```
{
```

```
    // read in PINE.3 to variable "data". Shift "data" left one bit
```

```
    uint8_t data = CHECK_BITIO(PINE, 3);
```

```
    data = data << 1;
```

```
    // read in PING.5 to bit 0 of "data". Shift "data" left one bit
```

```
    data = data | CHECK_BITIO(PING, 5);
```

```
    data = data << 1;
```

```
    // read in PINE.5 to bit 0 of "data". Shift "data" left one bit
```

```
    data = data | CHECK_BITIO(PINE, 5);
```

```
    data = data << 1;
```

```
    // read in PINE.4 to bit 0 of "data". Return "data"
```

```
    data = data | CHECK_BITIO(PINE, 4);
```

```
    return data;
```

```
}
```

```
void Set_LED(uint8_t LED)
```

```
{
```

```
    // output LED input to PORTA
```

```
    PORTA = LED;
```

```
}
```