

**:: Day 1 (9, Aug.)**

- 1) Introduce each other.
- 2) What is "Urban Invader"?
- 3) The emerging technologies around the world.
- 4) Talk about urban related issues, such as global warming...etc.
- 5) Talk about New Media Arts creations around the world.
- 6) Share us some Keith's artworks.
- 7) Give an overview of coming days.
- 8) Introduce the Arduino micro controller.
  - Basic of Arduino.
  - What could Arduino help us to do?
  - Download and run Arduino IDE software. (<http://arduino.cc>)
  - Where can you get an Arduino?
- 9) Talk about LED.
- 10) The digital pin on Arduino can be configured as an INPUT/OUTPUT.
- 11) Writing a HIGH value (electronic signal) with *digitalWrite()* function to light an LED.
- 12) Soldering 20 or more LEDs together.
- 13) Light and dim LEDs over and over with 1 second delay. **[Sample Code 1]**

**[Sample Code 1]**

```
int ledPin = 13;           // LED connected to digital pin 13
.....
void setup()
{
  pinMode(ledPin, OUTPUT); // sets the digital pin as output
}
.....
void loop()
{
  digitalWrite(ledPin, HIGH); // sets the LED on
  delay(1000);                // waits for a second
  digitalWrite(ledPin, LOW);  // sets the LED off
  delay(1000);                // waits for a second
}
```

## :: Day 2 (10, Aug.)

1) Read the value of a button from specified digital pin, either HIGH or LOW by *digitalRead()* function. [Sample Code 2]

2) Read the value from specified analog pin by *analogRead()* function. This function will map input voltages between 0 and 5 volts into values between 0 to 1023. [Sample Code 3]

Introduce "Variable Resistors" and read values from this.

Introduce "Solar Cell" and read values from this.

3) Writes an analog value (PWM wave) to a pin by *analogWrite()* function. This function can be used to light a LED at varying brightnesses or drive a motor at various speeds. [Sample Code 4]

4) What is motor? What can motors be used to do?

5) Introduce Servo and DC motor. What is deferent?

6) Control a DC motor with Arduino and L293D chip. [Sample Code 5]

How to use the L293D with Arduino? We can get a quick guide on Internet [here](#).

7) How to control a Servo motor? [Sample Code 6]

Import "Servo library" from Arduino.

Define a Servo object.

Use *Servo.attach()* function to attach the servo variable to a pin.

Use *Servo.write()* function to write a value to the servo.

8) Drive the motor to burst a balloon. :-)

### [Sample Code 2]

```
int ledPin = 13; // LED connected to digital pin 13
.....
int inPin = 7;   // pushbutton connected to digital pin 7
.....
int val = 0;    // variable to store the read value
.....

void setup()
{
  pinMode(ledPin, OUTPUT);    // sets the digital pin 13 as output
  pinMode(inPin, INPUT);     // sets the digital pin 7 as input
}

void loop()
{
  val = digitalRead(inPin);  // read the input pin
  .....
```

```
digitalWrite(ledPin, val);    // sets the LED to the button's value
}

```

### [Sample Code 3]

```
int analogPin = 3;    // potentiometer wiper  connected to analog pin 3
                      // outside leads to ground and +5V
int val = 0;         // variable to store the value read

void setup()
{
  Serial.begin(9600);    // setup serial
}

void loop()
{
  val = analogRead(analogPin);    // read the input pin
  Serial.println(val);           // debug value
}

```

### [Sample Code 4]

```
int ledPin = 9;      // LED connected to digital pin 9
int analogPin = 3;   // potentiometer connected to analog pin 3
int val = 0;        // variable to store the read value

void setup()
{
  pinMode(ledPin, OUTPUT);    // sets the pin as output
}

void loop()
{
  val = analogRead(analogPin);    // read the input pin
}

```

```
    analogWrite(ledPin, val / 4); // analogRead values go from 0 to 1023, analog-  
Write values from 0 to 255  
.....  
}  
.....
```

### [Sample Code 5]

```
int switchPin = 2; // switch input  
.....  
int motor1Pin1 = 3; // pin 2 on L293D  
.....  
int motor1Pin2 = 4; // pin 7 on L293D  
.....  
int enablePin = 9; // pin 1 on L293D  
.....  
void setup() {  
.....  
    // set the switch as an input:  
    pinMode(switchPin, INPUT);  
.....  
    // set all the other pins you're using as outputs:  
    pinMode(motor1Pin1, OUTPUT);  
.....  
    pinMode(motor1Pin2, OUTPUT);  
.....  
    pinMode(enablePin, OUTPUT);  
.....  
    // set enablePin high so that motor can turn on:  
    digitalWrite(enablePin, HIGH);  
.....  
}  
.....  
void loop() {  
.....  
    // if the switch is high, motor will turn on one direction:  
    if (digitalRead(switchPin) == HIGH) {  
.....  
        digitalWrite(motor1Pin1, LOW); // set pin 2 on L293D low  
.....  
        digitalWrite(motor1Pin2, HIGH); // set pin 7 on L293D high  
.....  
    }  
.....  
    // if the switch is low, motor will turn in the opposite direction:  
    else {  
.....  
        digitalWrite(motor1Pin1, HIGH); // set pin 2 on L293D high  
.....  
        digitalWrite(motor1Pin2, LOW); // set pin 7 on L293D low  
.....  
    }  
.....  
}
```

```
}  
.....  
}
```

### [Sample Code 6]

```
#include <Servo.h>  
.....  
Servo myservo;  
.....  
void setup()  
{  
  myservo.attach(9);  
  myservo.write(90); // set servo to mid-point  
}  
.....  
void loop() {}  
.....
```

## :: Day 3 (11, Aug.)

1) Introduce the "Carbon Monoxide Sensor" (MQ-7, CO Detector).

How to connect a MQ-7 sensor with Arduino, we can get a reference on Internet [here](#).

Read value from MQ-7 by *analogRead()* function. **[Sample Code 7]**

2) Let's make our own "Urban Invader" !!

3) Talk about Processing IDE.

4) The value read from sensor and printed through the serial by Arduino.

5) Processing draws varying background color by read value from serial.

### **[Sample Code 7]**

```
int val;
.....
void setup()
{
  Serial.begin(9600);    // sets the serial port to 9600
}
.....
void loop()
{
  val = analogRead(0);    // read analog input pin 0
  Serial.print(val, DEC); // prints the value read
  Serial.print(" ");     // prints a space between the numbers
  delay(100);           // wait 100ms for next reading
}
.....
```

:: Day 4-5 (12-13, Aug.)

- 1) Free discussion.
- 2) Looking for an idea.

PS. Parts of sample codes come from the Arduino's official website.