4 Use of Microcontrollers

Activity 4.1

Make a list of equipment in everyday use that can collect data from sensors and controlled by a microcontroller.

e.g. -

- Device to detect people or animals entering to a farm secretly
- Device to detect elephants entering to villages

Activity 4.2

Make a list of advantages of using microcontrollers.

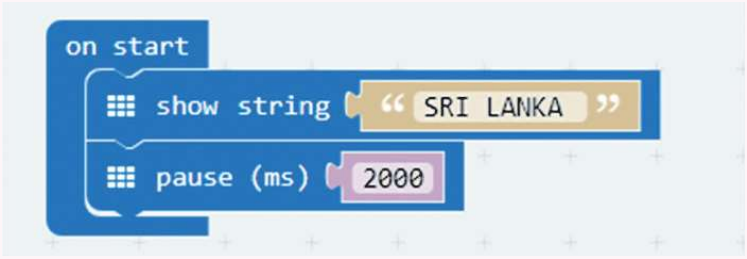
Activity 4.3

Connect the micro:bit module to the computer and use the Block Editor to code the following items using block.

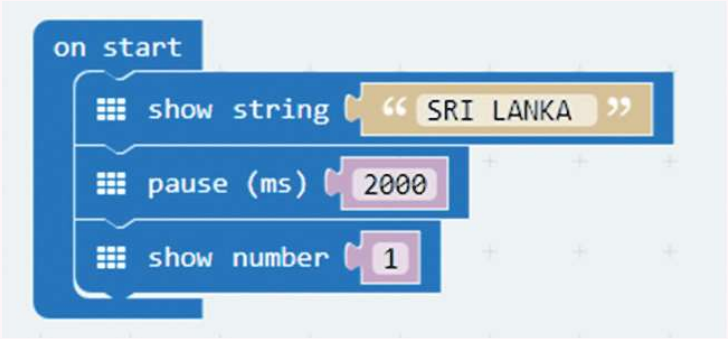
When a new project is obtained, the following two blocks are displayed.

Get ‘show string’ from 'Basic' and connect it to ‘on start’ and change it to Sri Lanka.

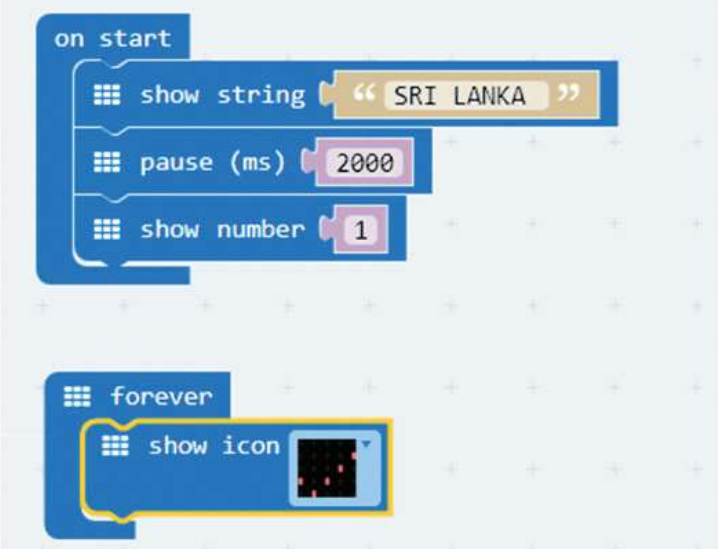
Get ‘pause’ from 'Basic'. Connect it to ‘show string’ and change it to 2000.



Get ‘show number’ from 'Basic'. Connect it to 'pause' and change it to 1.



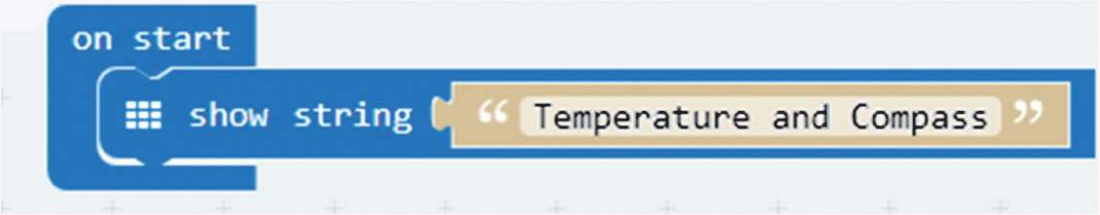
Get ‘show icon’ from 'Basic'. Connect it to ‘forever’ and change to the symbol '√ '



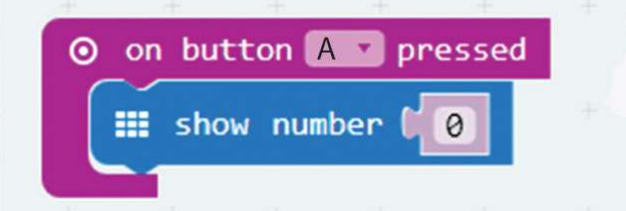
Download the codes to the computer arranged above, install them in the micro:bit module and observe the objects.

Experiment 2 - Connect to the micro:bit module and use the micro:bit Block Editor to do the coding using the blocks.

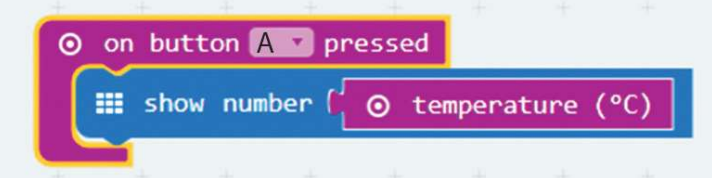
Get ‘show string’ into ‘on start’. Change to temperature and compass.



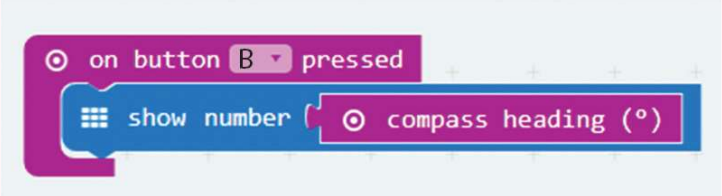
Get ‘on button A pressed’ in the Input menu and include the Bloke ‘show number’.



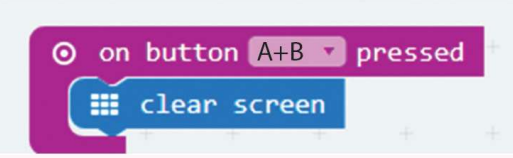
Get ‘Temperature’ from the Input menu into ‘show number’.



Get ‘on button A pressed’ from the Input menu and change at as B. Get ‘show number’ into it. Next, get ‘compass heading’ from the Input menu and include it in ‘show number’.

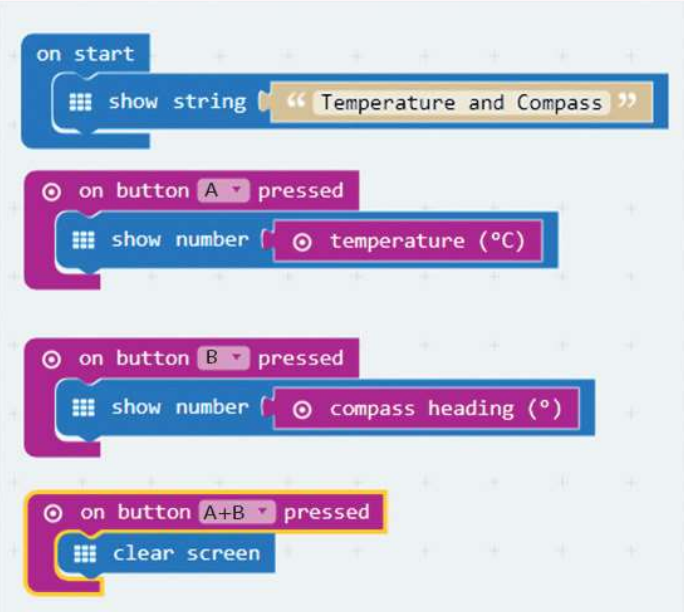


Get ‘on button A pressed’ from the Input Menu and change it to A+B. Include 'clear screen' into it by getting from Basic Menu.



The arrangement is as shown below;

Download the above coding. Install in micro:bit module. Observe the output by pressing the buttons A and B separately and both buttons together.



Activity 4.4

Entering data into microcontroller chip in Arduino Board

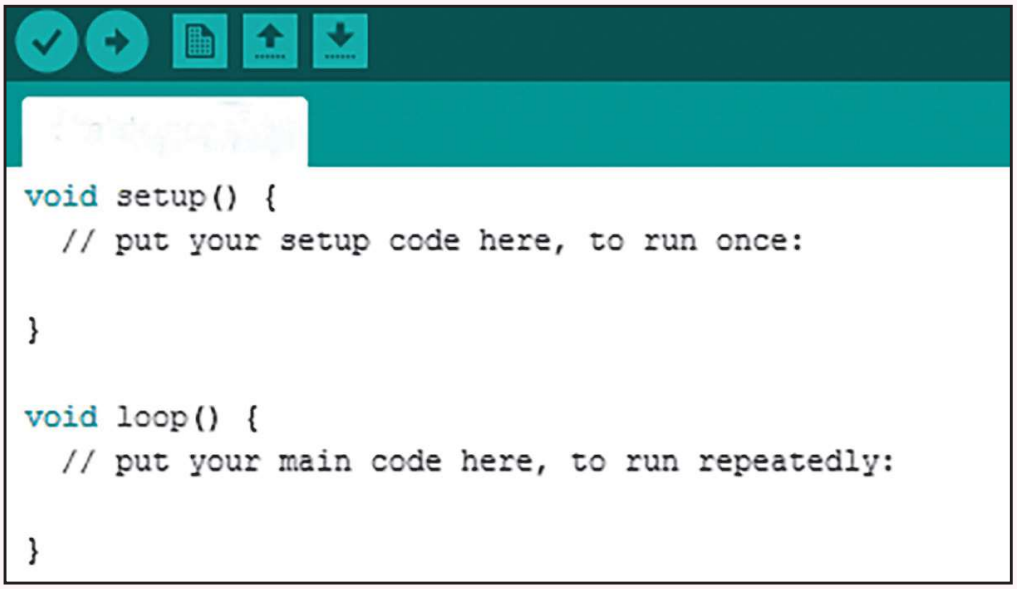
The Arduino board must be connected to the computer as shown. Enter the programs constructed using the Arduino programming language into the microcontroller chip of the Arduino board.

Arduino Programming Language is an Open Source software and the user is allowed to modify the program decoding to his/her requirements.

The cable connecting the Arduino Board to the computer has USB at one end and miniUSB at the other. The USB is connected to the computer and the miniUSB is connected to the Arduino Board.

Software used to program the microcontroller chip in the Arduino Yuno Board

The software known as Arduino is used for the purpose. It can be downloaded from the website www.arduino.cc when it is installed in the computer it can be seen as given below.



```
void setup() {
  // put your setup code here, to run once:

}

void loop() {
  // put your main code here, to run repeatedly:

}
```

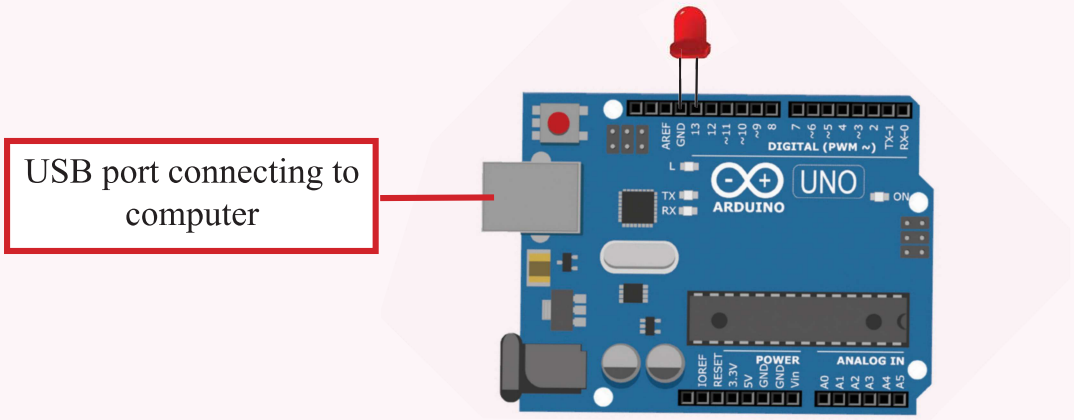
The Arduino Yuno board can be connected to the computer using a USB cable and the codes constracted using the Arduino software can be uploaded to the microcontroller chip in the Arduino Yuno board. Then the outputs are produced through the pins in the board according to the codes.

Activity 4.5

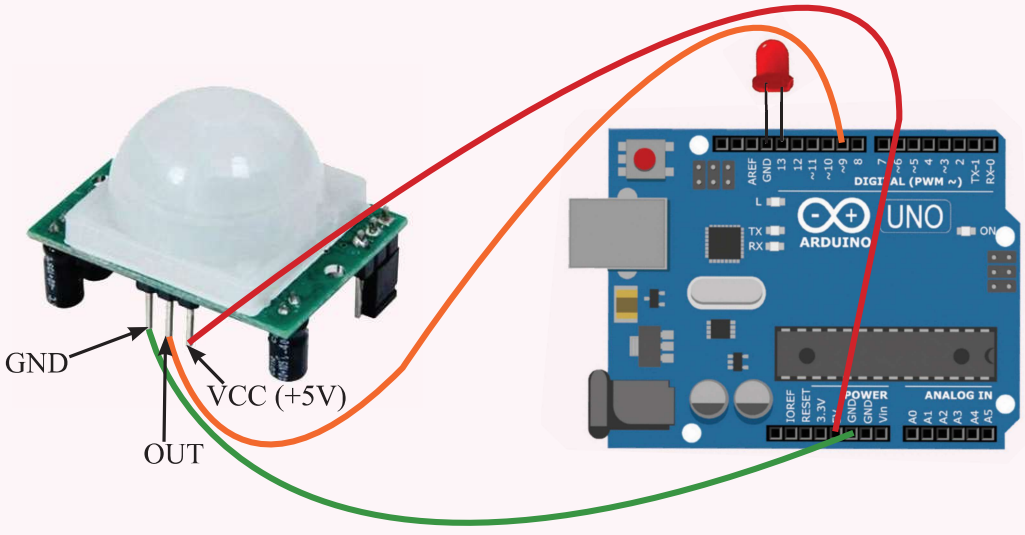
Connect the Arduino Board with the peripherals as shown.

Step 1 - Connect the LED bulb

LED bulb is connected to the GND and the 13th pin.



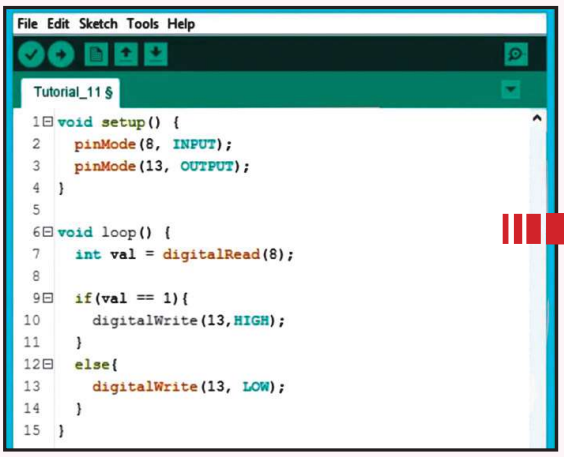
Step 2 - Connect the PIR sensor as shown in the image below;



In PIR is a sensor,

- GND pin connected to the GND port in power section.
- OUT pin is connected to the 9th pin of the Digital Section.
- VCC pin is connected to VCC in the power section.

Contract the cording given below in the Arduino software, upload and observe.

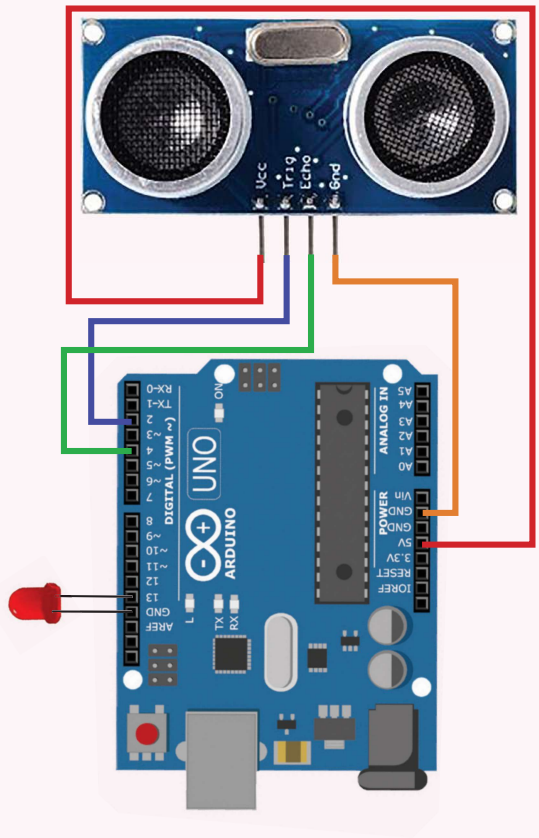



```
void setup(){
   pinMode(8,INPUT);
   pinMode(13,OUTPUT);
}
void loop(){
   Int val=digitalRead(8);

If(val= =1){
   digitalWrite(13,HIGH);
   }
else{
   digitalWrite(13, LOW);
   }
}
```

Activity 4.6

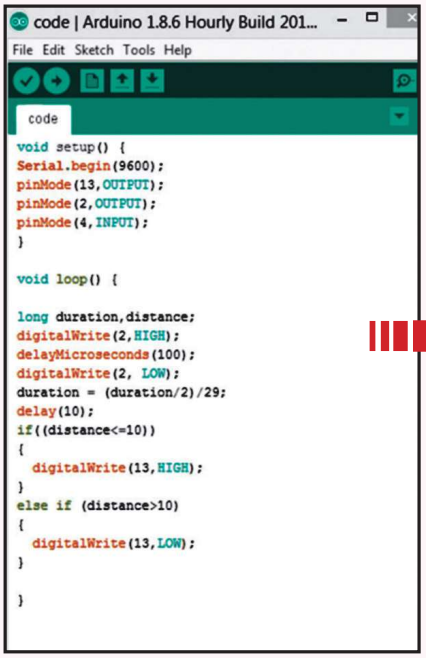
Connect the Arduino Board with the ultrasound wave sensor as shown below;



In this ultrasound wave sensors,

- GND pin in the Board is connected to the GND port in the power section.
- TRIGGER pin in the Board is connected to the 2nd pin of the Digital section.
- ECHO pin in the Board is connected to the 4th pin of the in Digital section.
- VCC pin in the Board is connected to the 5V port.
- The LED bulb is connected to the GND port and the 13th pin.

Connect the Board to the computer. Do the coding shown. Upload the code to the Board and study the procedure.




```
void setup(){
   Serial.begin(9600);
   pinMode(13,OUTPUT);
   pinMode(2,OUTPUT);
   pinMode(4,INPUT);
}

void loop(){
  long duration, distance;
  digitalWrite(2,HIGH);
  delayMicroseconds(100);
  digitalWrite(2,LOW);
  duration=pulseIn(4,HIGH);
  distance=(duration/2)/29;
   delay(10);
if((distance<=10))
{

   digitalWrite(13,HIGH);
}
else if(distance>10)
{

   digitalWrite(13,LOW);
}

}
```

Distance = (duration/2)/29

The distance between the obstacle and the sensor is shown in centimeters.