Assignment No. 11

Title:

Write a program using piezo element and use it to play a tune after someone knocks.

Aim

To Detect a Knock.

Objectives

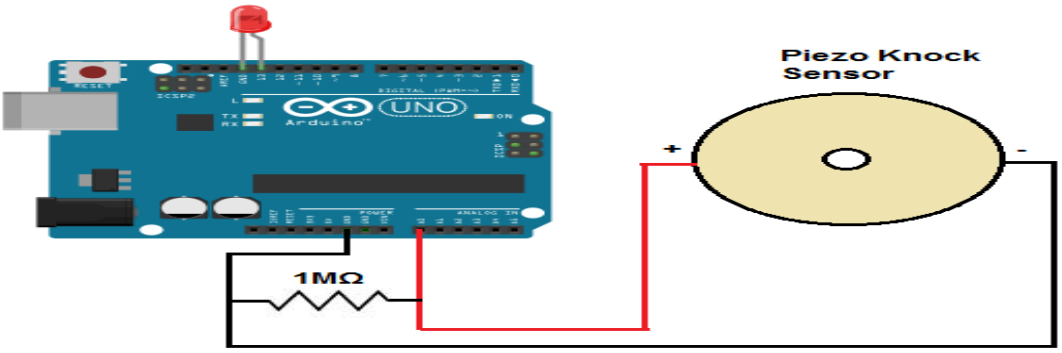
1. Hardware platforms and operating systems commonly used in IoT systems.
2. Help the students in providing a good learning environment and also work with real time problems faced in day to day life.

Hardware Requirement: Arduino, Piezo electric dis, solid surface & 1 Megohm resistor.

Software Requirement: Arduino IDE

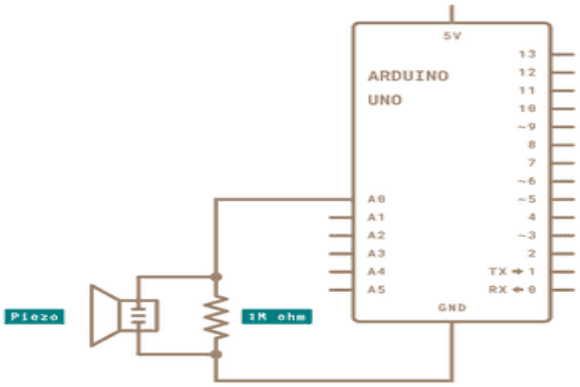
Theory

A piezo is an electronic device that generates a voltage when it's physically deformed by a vibration, sound wave, or mechanical strain. Similarly, when you put a voltage across a piezo, it vibrates and creates a tone. Piezo can be used both to play tones and to detect tones.The sketch reads the piezo output using theanalogRead() command, encoding the voltage range from 0 to 5 volts to a numerical range from 0 to 1023 in a process referred to as analog-to-digital conversion, or ADC.If the sensors output is stronger than a certain threshold, your board will send the string "Knock!" to the computer over the serial port.Piezos are polarized, meaning that voltage passes through them (or out of them) in a specific direction. Connect the black wire (the lower voltage) to ground and the red wire (the higher voltage) to analog pin 0. Additionally, connect a 1-megohm resistor in parallel to the Piezo element to limit the voltage and current produced by the piezo and to protect the analog input.It is possible to acquire piezo elements without a plastic housing. These will look like a metallic disc, and are easier to use as input sensors. Piezo sensors work best when firmly pressed against, taped, or glued their sensing surface.



Schematic:-

The piezo is attached to analog pin 0 with a 1 Megohm resistor in between the two legs. The placement of the resistor is used to save the piezo from damage from extra current. Without it, the analog pin might not be capable of reading the piezo's signal.



Conclusion:

Successfully studied piezo element and used it to play a tune after someone knocks.

Assignment No.12

Title:

Understanding the connectivity of Raspberry-Pi /Beagle board circuit / Arduino with IR sensor. Write an application to detect obstacle and notify user using LEDs.

Aim

To detect obstacle and notify user using LEDs.

Objectives

1. Hardware platforms and operating systems commonly used in IoT systems.
2. Help the students in providing a good learning environment and also work with real time problems faced in day to day life.

Hardware Requirement: Arduino, IR Sensor etc.

Software Requirement: Arduino IDE

Theory

Infrared or IR proximity sensors emit infrared light and once this light hits an object, it is reflected back to the sensor. Depending on the strength of the reflected light, the sensor will know how far or close an object is. The stronger the reflected signal, the closer the object. The weaker the signal, the farther the object is.

The function of a proximity detector is to be able to tell a moving machine when it is near an object without it having to actually bump against the obstacle. In proximity detection, what we are more interested in are devices that allow machines to detect obstacles without collision. There are several types of proximity sensors available. One of which is the infrared or IR proximity sensor. An example of an infrared proximity sensor is the parking detector. The parking detector is a simple device that can be seen in a modern parking lot. A green light may turn on when there is no car occupying the parking space, while a red light turns on when the space is occupied. The IR sensor in effect detects the presence of a car in a parking space.

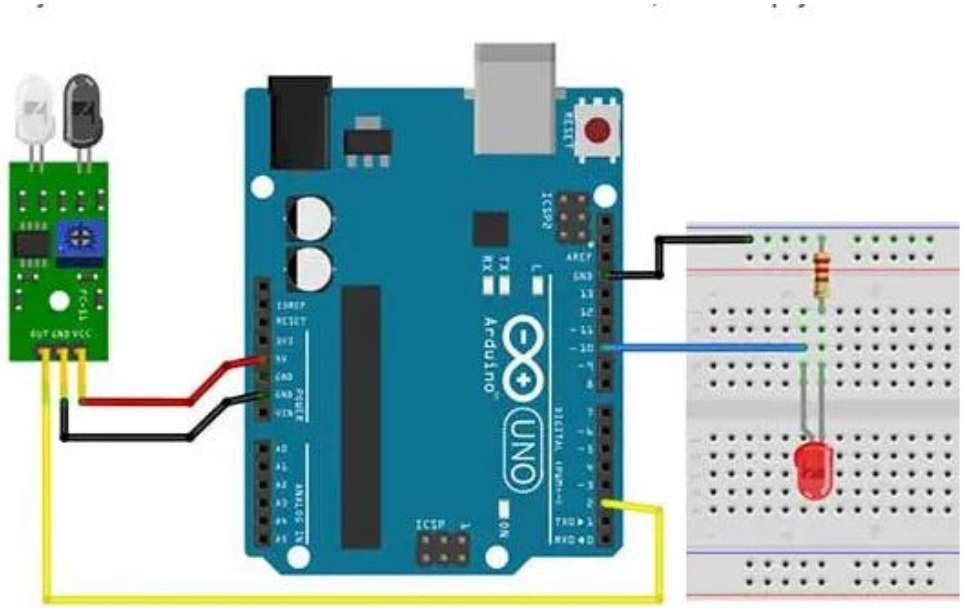
To demonstrate the capability of an IR proximity sensor, we'll be using the HW-201 IR obstacle sensor module.

The detection range of this module is from 2-30cm (depending on the surface). It only has a digital output, which means, it only gives a HIGH or LOW signal, or 1 or 0. HIGH if it detects an object, LOW if no object is detected. This module requires 5 volts DC.An IR sensor is made up of two basic parts: an infrared LED and an infrared photodiode. The IR LED emits the infrared light while the IR photodiode converts the reflected LED light to an electrical current that allows the sensor to interpret the strength of the reflected IR.

There are three header pins for the HW-201 obstacle sensor. The VCC goes to the 5V on the Arduinoboard. GND, of course, should be connected to the GND on the Arduino, and the OUT pin

goes to any digital pin, except 0 and 1.There is also an adjuster in the module to adjust the distance of the object before the sensor is triggered. You can turn the adjuster clockwise or counterclockwise using a screwdriver to adjust the sensitivity level.

To test our IR obstacle sensor, we will try to turn on an LED when an object is detected and turn it off when no object is detected. For the breadboard circuit, we simply add an LED circuit.



Conclusion:

Successfully studied the the connectivity of Raspberry-Pi /Beagle board circuit / Arduino with IR sensor.