NOISE DETECTION WITH AN AUTOMATIC RECORDING SYSTEM

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Abstract - Increase in sound in schools and office have proven to be a major problem. A pedagogue or a praepostor can't monitor every last one around the clock. To solve this, we have designed a Noise detection with an automatic recording system using Arduino. This device notifies us whenever it detects loud conversation (the sound level above 120dB to 140dB) and it also records the conversation and saves in a file. These devices are used in silent zones like hospitals, libraries, labs, and also in schools and colleges to maintain decorum. This helps us to maintain silence and also to identify noisy people so that necessary action can be against them.

Key Words: Bluetooth HC 05, Sound sensor module, Microcontroller, MIT app inventor.

1. INTRODUCTION

As we know that speaking loudly is an annoying thing. Having such a co-worker in the office environment will influence our work and productivity. When it comes to schools and colleges pedagogue or a praepostor can't monitor every last one all the time. It is very difficult to identify a noisy person. So it becomes obligatory to control students and monitor the situation. This project is set to overcome these problems. So whenever sound crosses the certain sound limit it will notify us and makes a small beep sound and also it records the sound which is above the set limits. So that we can identify the noisy people and we can take the necessary actions. It is not just noise generated by students that are of concern but electronic devices and other equipment can also make a loud noise which may disturb the students and faculty. Through this device, we can also detect them and take necessary steps.

2. WORKING

In this project, we are using a sound sensor module. This sensor consists of an in-built capacitive microphone, which uses the vibration and converts it into current or voltage signals. Whenever the sound level outstretch set threshold limit a buzzer connected to it will make a beep sound and sends a notification to the app and simultaneously it will also start recording the sound and it will go on recording until the noise level settles below the threshold limit. As the Arduino is connected to the Bluetooth module HC 05 the recorded clips are directly shown in the MIT app as a file.

3. DESIGN AND ESTIMATION

Interfacing of all components with Arduino UNO is as shown in the below figure.

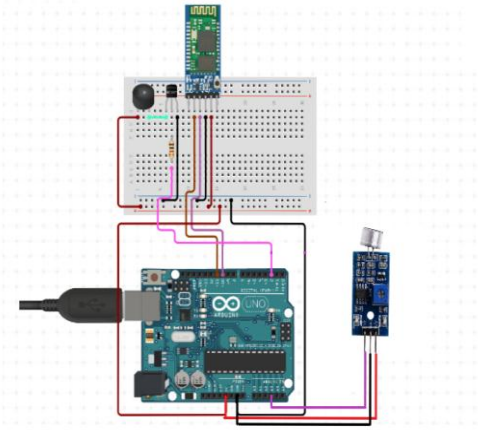

Fig1 Microcontroller and HC 05 Bluetooth module interface with LM 393 sound sensor module.

VCC and GND pins of the HC 05 Bluetooth module and LM 393 sound sensor module are connected to 5V and GND pins of Arduino. Transmitter (Tx) and Receiver (Rx) pins of the HC 05 Bluetooth module are used for serial communication with Arduino. They are connected to D10 and D11 digital pins of Arduino. Analog output pin (AO) of the LM 393 sound sensor is directly connected to the Analog pins (A3) of Arduino. At last, connect the VCC pin of the buzzer to the digital pin and another pin to GND of Arduino.

4. COMPONENTS

4.1. Arduino UNO

Arduino UNO is a microcontroller board based on an 8bit ATmega328p microcontroller. The board equipped with other components like crystal oscillator, voltage regulator, 14 digital output/input pins (6 PWM output pins), 6 Analog pins, USB port, and power jack.

Arduino is used to communicate with a computer, another Arduino, and other microcontrollers. The ATmega328p microcontroller which is equipped on the Arduino board provides UART TTL (5V) serial communication which can be achieved using digital pin 0 and digital pin 1. An ATmega16U2 channels this serial communication over the USB port and appears as a virtual com port to software on the computer. An ATmega16U2 firmware uses the USB com drivers and no other external drivers are required to communicate with the OS of a computer. But on windows, a .inf file is required. There are two Rx and Tx LEDs they glow whenever the data is transmitted are received through the USB and computer. A Software serial library allows for serial communication on any of the digital pins. ATmega328p supports I2C and SPI communication.

To program Arduino UNO board, an Arduino IDE is required.

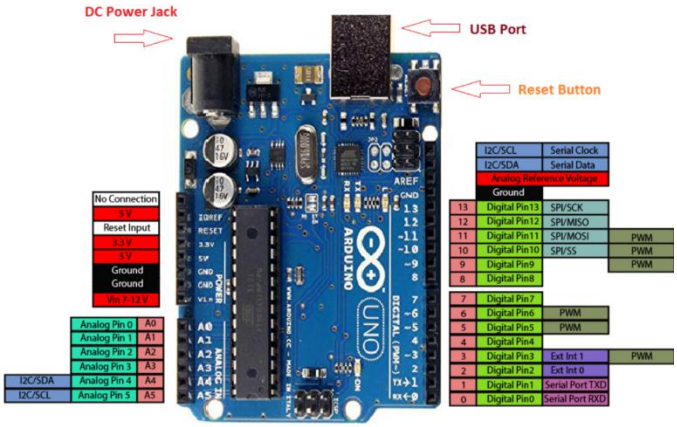

Fig2 Arduino UNO pinout

4.2. HC-05 Bluetooth Module

HC-05 is a Bluetooth module that is designed to add two ways of wireless communication. You can communicate between two different Microcontroller like Arduino or you can communicate with any device which has Bluetooth functionality like mobile phones and laptops. This module communicates with the help of USART (Universal Synchronous/Asynchronous Receiver/Transmitter) at 9600 baud rate. So it's easy to communicate any microcontroller that supports USART.

It consists of 6 pins.

- **State:** It is used to verify whether the module is connected or not.
- **RXD:** Receive serial data.
- **TXD:** Transmit serial data.
- **GND:** Ground pin.
- **VCC:** Power supply pin.
- **EN:** used to bring the module in AT command mode.

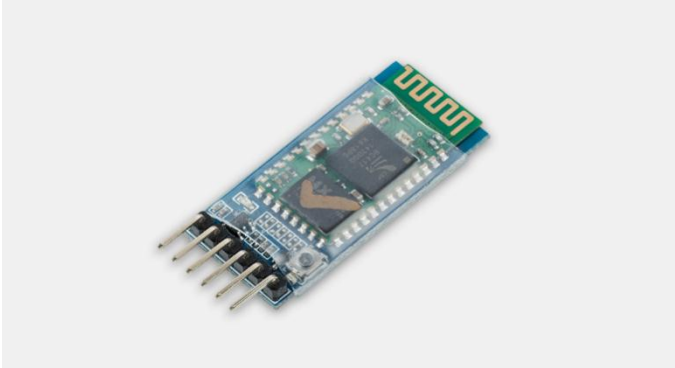

Fig3 HC-05 Bluetooth Module

4.3. LM393 sound sensor module

The sound sensor module is an easy way to detect the sound and its intensity. These modules are used in several cases like for security, speech recognition technology, as a switch, and also for monitoring the intensity of sound.

It consists of microphone which is given as an input to amplifier and peak detector. When the sensor detects the sound it sends the output voltage signal to the microcontroller then performs necessary actions.

When sound is detected through a microphone and fed into an **LM393 op-amp.** When the sound level exceeds the setpoint (sound level which is set by the Onboard potentiometer), the output signal is set to low.

It consists of 3 pins.

- **VCC:** power supply pin.
- **GND:** ground pin.
- **OUTPUT:** provides output voltage signals.

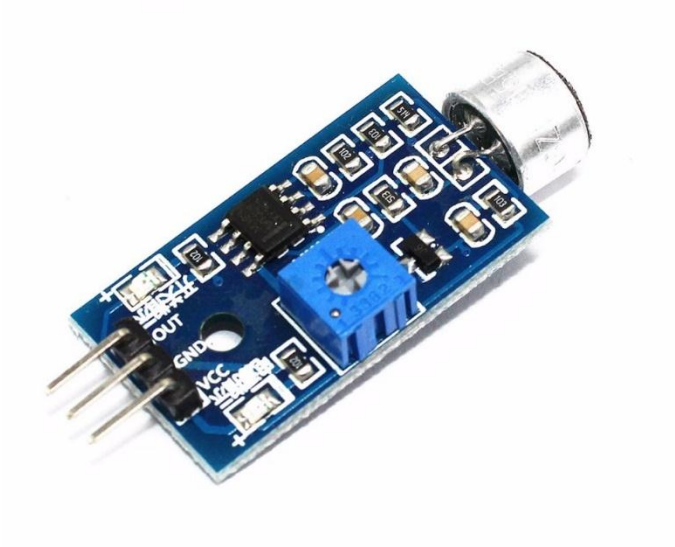

Fig4 LM393 sound sensor module

4.4. Buzzer

Buzzer is a device that is used to make a buzz or beep noise. These buzzers are mechanical, electromagnetic or piezoelectric. These are mostly used for alarm devices, timers, and communication equipment. It consists of two pins GND pin and power supply pin.

Fig5 Buzzer

5. RESULTS

We will be using the MIT app inventor for creating the App. Initially, we need to create a layout of the app and add the following components.

- 2 Buttons
- List picker
- Sound recorder
- Text level
- Bluetooth client

After that create an appropriate code Blocks.

After a successful connection and creating an app, your project is ready for testing by making some loud noise. Whenever the sound level crosses the threshold limit. Buzzer will make a buzz sound to notify about it. Simultaneously app starts recording until the sound limit settles below the threshold limit.

The layout of the app before and after recording of noise is as shown below.

Fig6 Layout of MIT App

6. CONCLUSION

Thus the above project is an efficient noise detection with an automatic recording system that can be used in schools and offices to identify noisy peoples.

7. REFERENCES

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