Store data from IoT sensor to MySQL using Arduino IDE and Processing IDE v2.2.1

Overview

The main purpose of this system is to store the data that is generate by IoT sensor through the Arduino Mega to MySQL directly.

For this system, we use ultrasonic sensor (HC-SR04) as the example of IoT sensor.

Libraries

This system is required to import 3 packages for Processing IDE including:

1. de.bezier.data.sql.mapper.* - this package is used to map datablase names to instance names.
2. de.bezier.data.sql.* - this package is used to import MySQL library
3. processing.serial.* - this package allows communicating using the serial communication protocol.

Materials

1. Arduino Mega

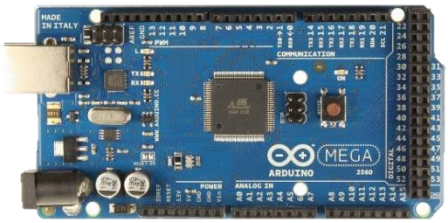

Figure 1: Arduino Mega

2. Ultrasonic sensor (HC-SR04)

Figure 2: HC-SR04

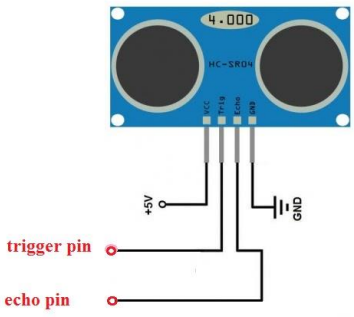

Figure 3: HC-SR04 Pinout

3. Arduino IDE
4. Processing IDE v2.2.1

5. Wamp OR Xampp Server

Installation

How to install Arduino IDE?

For Linux: https://www.arduino.cc/en/Guide/Linux (see also the Arduino playground page https://playground.arduino.cc/Learning/Linux)

For macOS X: https://www.arduino.cc/en/Guide/MacOSX

For Windows: https://www.arduino.cc/en/Guide/Windows

How to install Processing IDE v2.2.1?

Download from https://processing.org/download/

How to install Wamp?

Download from https://sourceforge.net/projects/wampserver/

How to install Xampp?

Download from https://xampp-windows.en.softonic.com/

How to install and import BezierSQLib-0.2.0 library for Processing IDE?

Download from https://cdn.instructables.com/ORIG/F9V/ZSGC/IUKESD09/F9VZSGCIUKESD09.zip

Then import BezierSQLib as shown on the figure below

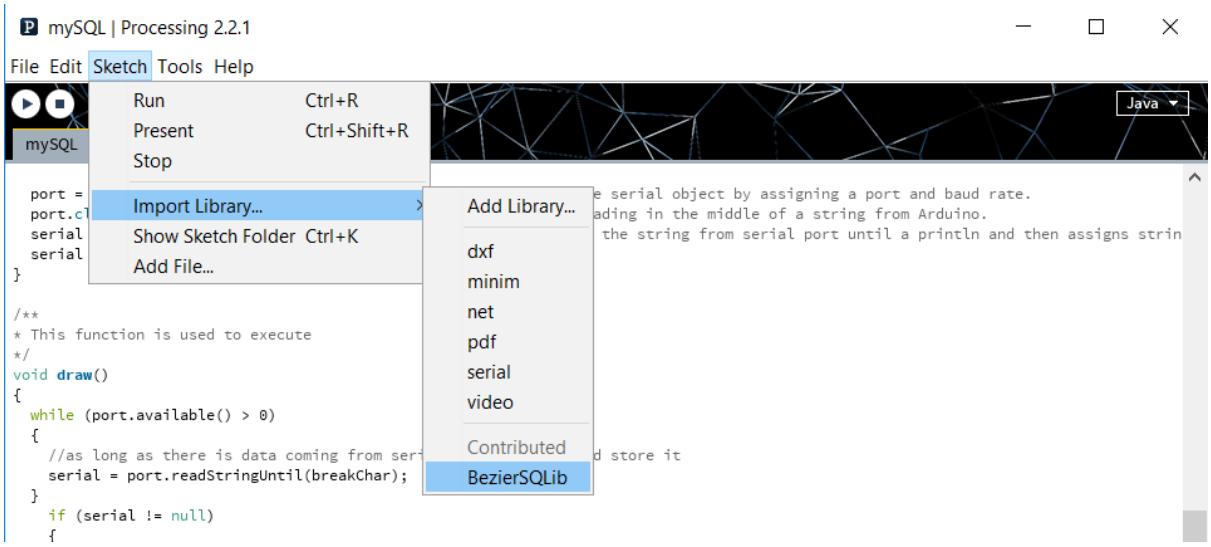

Figure 4: How to install and import BezierSQLib-0.2.0 library for Processing IDE

How to install IoT devices?

- Arduino Mega and HC-SR04 Ultrasonic sensor

```
Arduino Mega pin 2 -> HC-SR04 trig
Arduino Mega pin 3 -> HC-SR04 echo
Arduino Mega GND -> HC-SR04 GND
Arduino Mega 5V -> HC-SR04 VCC
```

Figure 5: Connection between Arduino Mega and HC-SR04 Ultrasonic sensor

Description of code

- For Arduino IDE, the code is separated into 2 parts including:

1. Setup part (setup()) – this is the part to set the trigger pin and echo pin of Ultrasonic sensor. Moreover it is used to set mode of pin.

2. Execution part (loop()) - used to calculate the actual distance by applying the raw data that stems from HC-SR04 with this formula; distance = time x speed of sound.

```
Speed of sound = 340 m/s = 34000 cm/s = 34 cm/ms = 0.034 cm/µs
time = distance / speed
distance = time x speed
distance apart (cm) = time x speed / 2 = time x 0.034 / 2
therefore, d = duration*0.034/2.0
```

Figure 6: Distance Formula's Proof

- For Processing IDE, the code is separated into 4 parts including:

1. Packages' import and variable's declaration part – importing 3 packages that is stated above. Moreover, declaring and initializing the variable that will be used later.

2. Setup part (setup()) – this is the main part to initialize MySQL object to create the connection and initialize serial object by assigning a port and baud rate.

3. Execution part (draw()) – this is used to store the data coming from serial port in the MySQL database by calling the external function named exeQuery().

4. Additional function part

    - exeQuery() is used to send the query to insert the data into table in MySQL database by using "msql.query()".

Instruction

Step 1: Uploading Arduino code to Arduino Mega

Step 2: Setting up MySQL

- To create the table in MySQL database in Wamp OR Xampp server

Step 3: Executing the program on Processing IDE

IMPORTANT: Don't open serial monitor on Arduino while running processing IDE because port conflict will occur as both have to use the same port.