**Assignment -4**

**Ultrasonic.cpp:**

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**\* Ultrasonic.cpp**

**\***

**\* Library for Ultrasonic Ranging Module in a minimalist way**

**\***

**\*/**

**#if ARDUINO >= 100**

**#include <Arduino.h>**

**#else**

**#include <WProgram.h>**

**#endif**

**#include "Ultrasonic.h"**

**Ultrasonic::Ultrasonic(uint8\_t trigPin, uint8\_t echoPin, unsigned long timeOut) {**

**trig = trigPin;**

**echo = echoPin;**

**threePins = trig == echo ? true : false;**

**pinMode(trig, OUTPUT);**

**pinMode(echo, INPUT);**

**timeout = timeOut;**

**}**

**unsigned int Ultrasonic::timing() {**

**if (threePins)**

**pinMode(trig, OUTPUT);**

**digitalWrite(trig, LOW);**

**delayMicroseconds(2);**

**digitalWrite(trig, HIGH);**

**delayMicroseconds(10);**

**digitalWrite(trig, LOW);**

**if (threePins)**

**pinMode(trig, INPUT);**

**previousMicros = micros();**

**while(!digitalRead(echo) && (micros() - previousMicros) <= timeout); // wait for the echo pin HIGH or timeout**

**previousMicros = micros();**

**while(digitalRead(echo) && (micros() - previousMicros) <= timeout); // wait for the echo pin LOW or timeout**

**return micros() - previousMicros; // duration**

**}**

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**\* If the unit of measure is not passed as a parameter,**

**\* sby default, it will return the distance in centimeters.**

**\* To change the default, replace CM by INC.**

**\*/**

**unsigned int Ultrasonic::read(uint8\_t und) {**

**return timing() / und / 2; //distance by divisor**

**}**

**/\***

**\* This method is too verbal, so, it's deprecated.**

**\* Use read() instead.**

**\*/**

**unsigned int Ultrasonic::distanceRead(uint8\_t und) {**

**return read(und);**

**}**

**Ultrasonic.h:**

**/\***

**\* Ultrasonic.h**

**\***

**\* Library for Ultrasonic Ranging Module in a minimalist way**

**\***

**\*/**

**#ifndef Ultrasonic\_h**

**#define Ultrasonic\_h**

**/\***

**\* Values of divisors**

**\*/**

**#define CM 28**

**#define INC 71**

**class Ultrasonic {**

**public:**

**Ultrasonic(uint8\_t sigPin) : Ultrasonic(sigPin, sigPin) {};**

**Ultrasonic(uint8\_t trigPin, uint8\_t echoPin, unsigned long timeOut = 20000UL);**

**unsigned int read(uint8\_t und = CM);**

**unsigned int distanceRead(uint8\_t und = CM) \_\_attribute\_\_ ((deprecated ("This method is deprecated, use read() instead.")));**

**void setTimeout(unsigned long timeOut) {timeout = timeOut;}**

**void setMaxDistance(unsigned long dist) {timeout = dist\*CM\*2;}**

**private:**

**uint8\_t trig;**

**uint8\_t echo;**

**boolean threePins = false;**

**unsigned long previousMicros;**

**unsigned long timeout;**

**unsigned int timing();**

**};**

**#endif // Ultrasonic\_h**

**Diagram.json**

**{**

**"version": 1,**

**"author": "Rozen Berg",**

**"editor": "wokwi",**

**"parts": [**

**{**

**"type": "wokwi-arduino-uno",**

**"id": "uno",**

**"top": 259.31,**

**"left": 31.06,**

**"rotate": 0,**

**"hide": false,**

**"attrs": {}**

**},**

**{**

**"type": "wokwi-hc-sr04",**

**"id": "ultrasonic",**

**"top": 86.99,**

**"left": 109.89,**

**"rotate": 0,**

**"hide": false,**

**"attrs": { "distance": "100" }**

**}**

**],**

**"connections": [**

**[ "uno:GND.1", "ultrasonic:GND", "black", [ "v-8", "\*", "v8" ] ],**

**[ "uno:13", "ultrasonic:ECHO", "green", [] ],**

**[ "uno:12", "ultrasonic:TRIG", "purple", [ "\*", "v4" ] ],**

**[ "uno:5V", "ultrasonic:VCC", "red", [ "v16", "h-96", "\*", "v12" ] ]**

**]**

**}**

**Ultrasonic simulation:**

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**Ultrasonic Simple**

**Prints the distance read by an ultrasonic sensor in**

**centimeters. They are supported to four pins ultrasound**

**sensors (liek HC-SC04) and three pins (like PING)))**

**and Seeed Studio sensors).**

**The circuit:**

**\* \* Module HR-SC04 (four pins) or PING))) (and other with**

**three pins), attached to digital pins as follows:**

**--------------------- --------------------**

**| HC-SC04 | Arduino | | 3 pins | Arduino |**

**--------------------- --------------------**

**| Vcc | 5V | | Vcc | 5V |**

**| Trig | 12 | OR | SIG | 13 |**

**| Echo | 13 | | Gnd | GND |**

**| Gnd | GND | --------------------**

**---------------------**

**\*/**

**#include "Ultrasonic.h"**

**/\***

**Pass as a parameter the trigger and echo pin, respectively,**

**or only the signal pin (for sensors 3 pins), like:**

**Ultrasonic ultrasonic(13);**

**\*/**

**Ultrasonic ultrasonic(12, 13);**

**int distance;**

**void setup() {**

**Serial.begin(9600);**

**}**

**void loop() {**

**// Pass INC as a parameter to get the distance in inches**

**distance = ultrasonic.read(CM);**

**Serial.print("Distance in CM: ");**

**Serial.println(distance);**

**distance = ultrasonic.read(INC);**

**Serial.print("Distance in Inches: ");**

**Serial.println(distance);**

**delay(1000);**

**}**