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| ICBRAMR  **School of Electronics Engineering (SENSE)**  **B. Tech – Electronics & Computer Engineering**  **BECE403E – EMBEDDED SYSTEM DESIGN**  **LAB RECORD**  **(L15+L16)**  **Submitted By**  **21BLC1228 – Mayukh Ray**    **Submitted To**  **Dr. Manoj Kumar Rajagopal**  **DATE: 25/02/2024**  **Slot:** L15+L16  **Date: 25/2/2024**  **LAB – 07: Ultroasonic Sensor**  **AIM:**  Implement and verify the logic on the STM32 Nucleo-64 board using Keil Studio Cloud IDE.  **Software Required:** ARM Keil Studio (Mbed Online Compiler)  **Hardware Required:** Micro USB cable, NUCLEO64-STM32L152 Board, LEDs, Jumper Wires (M-F and M-M), Breadboard  **Procedure:**   1. Go to ARM Keil Studio (<https://studio.keil.arm.com>) and log in 2. Select File → New → Mbed Project 3. Click the Example project drop-down list and select “mbed2-example-blinky” 4. In Project name field, provide the name of the new project and click Add project 5. Double click on the “main.cpp” file from the newly created project folder 6. Modify the code in the editor window as per the logic of your application 7. Check for any errors in the program under the “Problems” tab of the panels window 8. If no errors, connect the Nucleo Board to the computer using Micro USB Cable 9. Click Play icon (Run project) to upload and start the code execution on the board.   **PROGRAM:**  **Lab Task 1:**  Write a program to read distance value from HCSR04 ultrasonic sensor module in cm and print it on the serial monitor. Implement and verify this logic on the STM32 Nucleo-64 board using keil Studio Cloud IDE.  **Code:**  #include “mbed.h”  Serial PC(USBTX,USBRX);  DigitalOut trigger(PC\_8);  DigitalIn echo(PC\_0);  int distance=0;  Timer sonar;  int main()  {  while(1){  trigger=1;  sonar.reset();  wait\_us(10.0);  trigger=0;  while(echo==0);  sonar.start();  while(echo==1);  sonar.stop()  distance=(sonar.read\_us())/58.0;  PC.printf(“Distance is %d cm\n\n”,distance);  wait(0.2);  }  }  **Output:**      **Output Verification:**    **Lab Task 2:**  Write a program to design a reverse parking sensor module. This module consist of HC-SR04 ultrasonic sensor, LCD and buzzer interfaced with Nucleo. The ultrasonic sensor continuously measure the distance (in cm) between the car and obstacle, then display it on the first row of the LCD. Whenever the measured distance is lesser than 30 cm generate warning signal to driver using buzzer also display a message “Obstacle !!!” on the second row of the LCD display. Implement and verify this logic on the STM32 Nucleo-64 board using Keil Studio Cloud IDE.  **Code:**  #include “mbed.h”  #include “TextLCD.h”  TextLCD lcd(PC\_0,PC\_1,PB\_0,PA\_4,PA\_1,PA\_0);  DigitalOut trigger(PC\_8);  DigitalIn echo(PC\_6);  DigitalOut buzzer(PC\_1);  int distance=0;  Timer sonar;  int main()  {  lcd.cls()  while(1){  trigger=1;  sonar reset;  wait\_us 10.0;  trigger=0;  while echo==0;  sonar.start();  while echo==1;  sonar.stop();  distance=(sonar.read\_us())/58.0;  lcd.locate(5,0);  lcd.printf(“Distance is %d cm \n\n”,distance);  wait(0.2);  if (distance>15)  {  buzzer=1;  lcd.locate(2,1);  lcd.printf(“Obstancle !!!”,distance);  }  else  {  buzzer=0;  }  }  }  **Output:**    **Output Verification:**      **INFERENCE:**   1. We need to identify the pin connected to the LED. 2. Write the program to toggle the state of the LED between ON and OFF in a loop. 3. Compile and upload the code to the microcontroller.   **RESULT:**  **Lab-1:**  Hence, we were able to read distance value from HCSR04 ultrasonic sensor module in cm and print it on the serial monitor.  **Lab-2:**  Hence, we were able to design a reverse parking sensor module. |