Ultrasonic Range Sensor Assessment

Mechatronics Microcontroller Project MXEN2003

Scenario

A code library has been created for the "PING)))" ultrasonic range sensor, intended to measure and display the distance on an Arduino through serial. The programmer responsible has left the library uncommented and the code unreadable.

You must add the comments and improve the readability of the code to explain how the program functions and reads the ultrasonic range sensor's distance. You will need to refer to the range sensor datasheet to explain the *main()* and *ping_sensor*() functions, you can find the datasheet linked below.

https://www.mouser.com/datasheet/2/321/28015-PING-Sensor-Product-Guide-v2.0-461050.pdf

Requirements

A sample of an appropriate commenting style has been provided in the code library for reference. Use it to understand the level of comment detail and appropriate readability required.

You will also need to create a TinkerCad project which uses the code and an Arduino Uno R3 wired to use the range sensor and LED. You must edit the code to light up the LED based on the range detected, the last 3 digits of your student ID should represent your range (99999**376** would correspond to 37.6cm). This is an individual assignment and must be your own work. To avoid plagiarism do not share your code or TinkerCad model. You must be able to adequately explain your code and model.

You must submit:

- A short report explaining the functionality of the range sensor and code (maximum 2 pages).
- Include a screenshot of the TinkerCad project built to use the code.
- The edited code with comments and changes made to it

The report must include:

- Calculations relevant to the range sensor
- A description of the logic involved (flow chart recommended)
- A summary of the range sensor functionality

Marking Guide

Description	Marks Available
Code commenting	4
Readability of the code improved	2
Code commenting refers to datasheet	2
Code changes functional	1
Code changes adequately commented	1
TinkerCad model functional	2
Report Calculations	2
Report describes range sensor functionality	2
Description of code logic (flow diagram)	3
Report presentation/professionalism	1

Use of generative AI tools must be properly acknowledged, see Gen-AI - UniSkills - Curtin Library (https://uniskills.library.curtin.edu.au/digital/gen-ai/). This includes what prompt(s) were used and how the output of the tool was used in your submission. You must critically analyse the tools output to demonstrate understanding of the code content and sensor functionality.