Distance Calculating System Using Ultrasonic Sensor

Table of content (V1.2)

1. About the project

1.1 Description

- In the old times calculating distance was much difficult. But today it has become so easy by using the modern technique which involves many kind of sensor, actuators etc. A servo motor is also known for its rotation with great precision. And what would be better than giving that precise distance/rotation using an ultrasonic sensor. This project uses a servo motor and an LCD screen with an ultrasonic sensor. The distance of the object from the sensor is mapped with the rotation of the motor between 0 and 180 degrees. So, when the object is at a distance of 30cm, the servo angle is 30 degrees and when the object is at a distance of 90 cm, the servo angle is 90 degrees, and so on.

2 Requirements

2.1 High Level Requirements

ID	High Level Requirements
HLR1	Use of ultrasonic sensor must be done in the project.
HLR2	Use of ultrasonic sensor must be done in the project.
HLR3	Use of LCD display.
HLR4	Use of servo motor.

2.2 Low Level Requirements

ID	Low Level Requirements for H1	ID	STATUS
LLR1	Here using ultrasonic sensor we can calculate the exact distance between the object.	HLR1	IMPLEMENTED
LLR2	By using LCD display we can keep a track of water level without actually measuring the depth	HLR2	IMPLEMENTED
LLR3	A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position	HLR3	IMPLEMENTED

3 Components And Sensor Used

1.Arduino Uno

A arduino uno is a compact integrated circuit designed to govern a specific operation in an embedded system.

2.LCD

The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits & devices.

3.Ultrasonic Sensor

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal.

4.Potentiometer

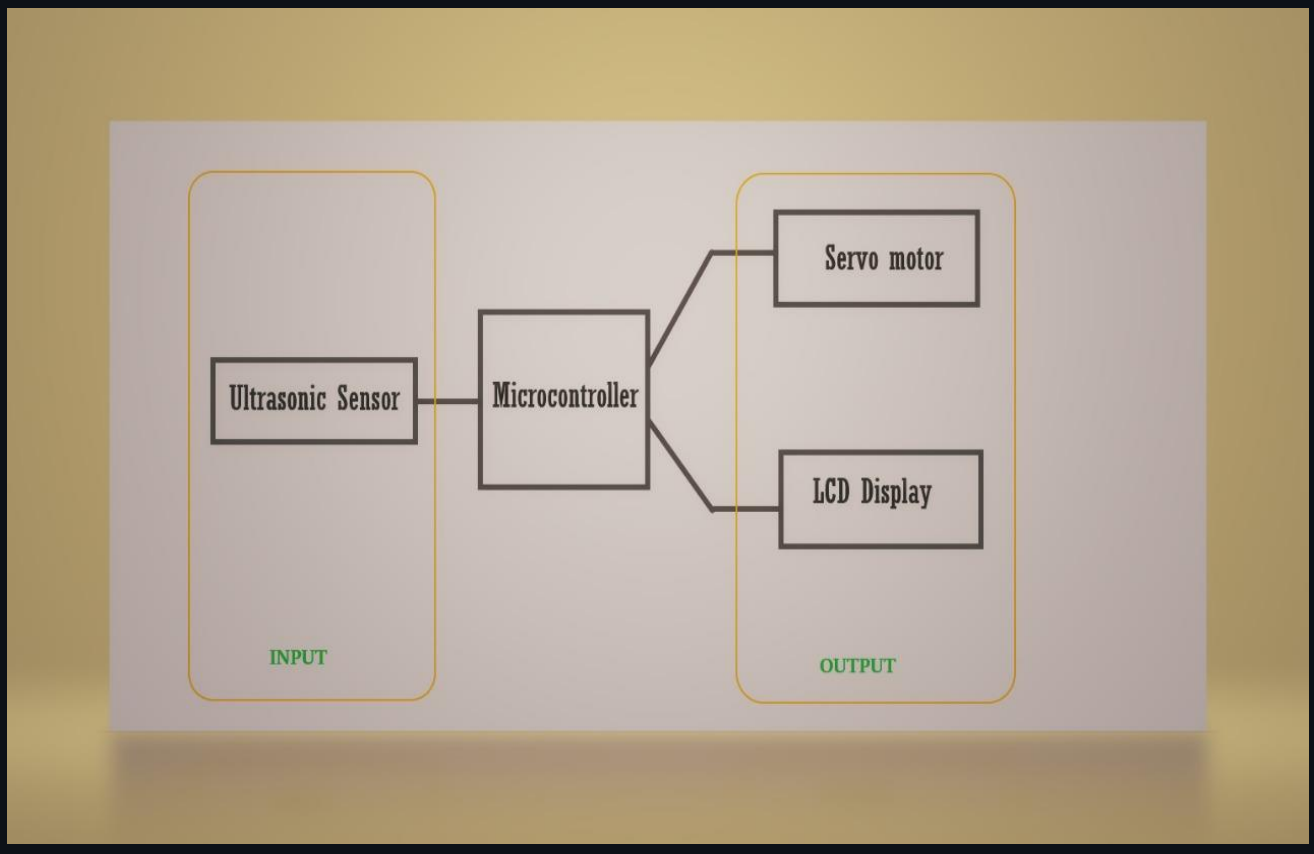
Potentiometer are used in the circuit to control the threshold value of the gas.

5.Servo motor

A servomotor is a linear actuator or rotary actuator that allows for precise control of linear or angular position, acceleration, and velocity.

4 Architecture

- **4.1 Behavioral Diagram**



5 Test plan and output

5.1 HIGH LEVEL TEST PLAN / Integrated test plan

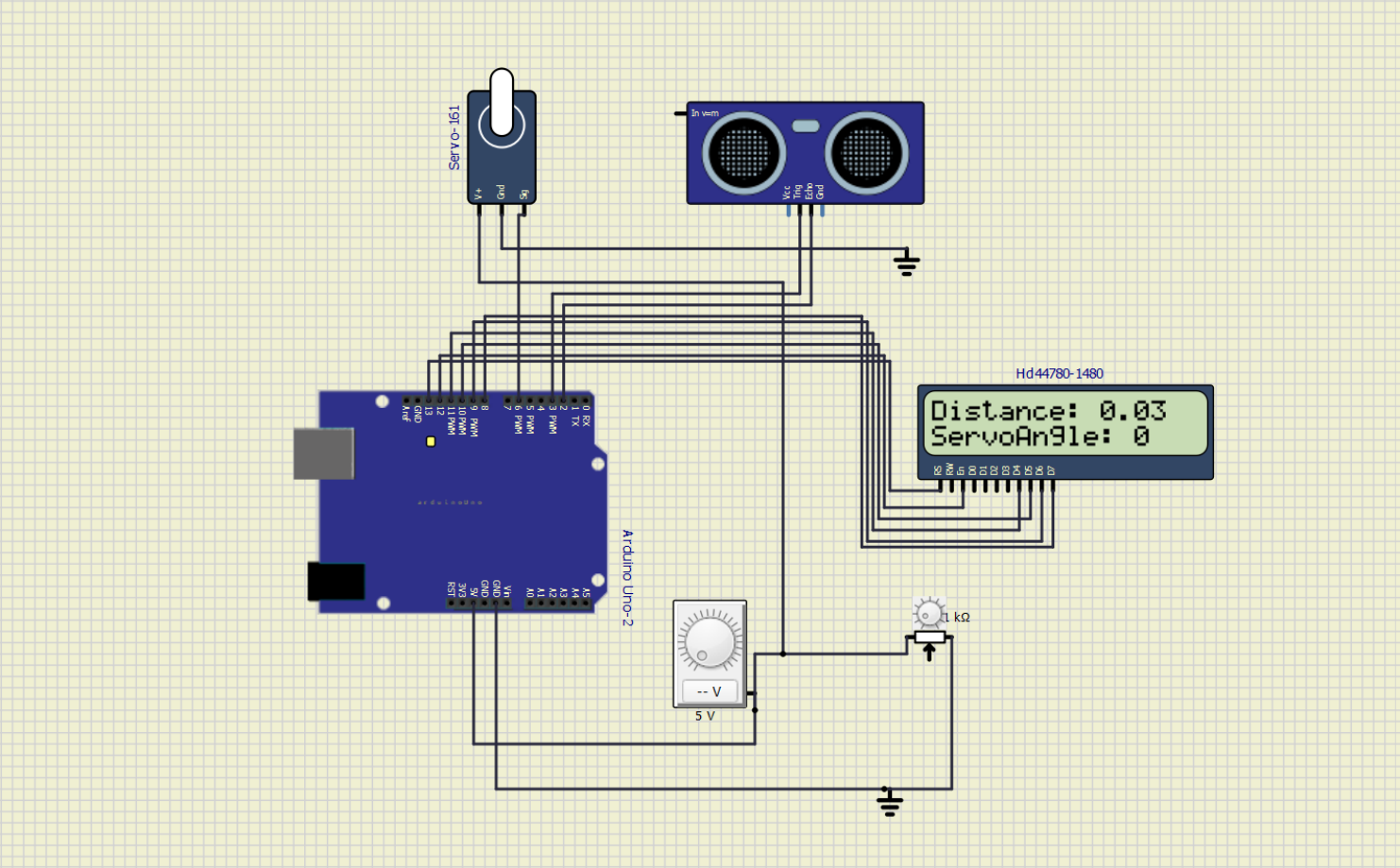
Test ID	Description	Input	Expected output	Actual Output	Passed or not
01	To check if the servo motor is rotating btw(0 to 180	Message passed	angling of motor	angling of motor	✓
02	To check if message is displayed of object distance	sensor detects	message displayed	message displayed	✓
03	Ultrasonic sensor should detect the object	Object in range	Detected	Detected	✓
04	Servo motor should pause when Ultrasonic sensor detect	Object in range	Servo motor stops	Servo motor stops	✓

5.2 LOW LEVEL TEST PLAN / Unit test plan

Test ID (for LCD)	Description	Input	Expected output	Actual Output	passed/not
01	When power supply is given all the components should activate	Power input	Components Activated	Components Activated	✓

Test ID (for LCD)	Description	Input	Expected output	Actual Output	passed/not
02	`To check if Servo motor works Message passed in code`	Message passed in code	angling of motor	angling of motor	☑
03	To check the message displayed	Message passed in code	message displaye	message displaye	☑
04	Servo motor should pause when Ultrasonic sensor detect	Object in range	Servo motor stops	Servo motor stops	☑

7 Output



8 Applications

* It can be used in traffic control systems.
* It is used in Automated vehicles.
* It can be used in waterflow control systems.
* It is used in Speed control systems.