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KORİNT YAYINCILIK

THE PROGRESSION OF PH WATER DETECTION FOR HEMODIALYSIS MACHINE

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ABSTRACT

pH scale is used to measure the acidity and basicity of a liquid. It can have readings ranging from 1-14 where 1 shows the most acidic liquid and 14 shows the most basic liquid. 7 pH is for neutral substances that are neither acidic nor basic. Now, pH plays a very important role in our lives and it is used in various applications. For example, it can be used in a hemodialysis machine to check the quality of water. Similarly, pH measurement is used in a wide variety of applications like agriculture, wastewater treatment, industries, environmental monitoring even in medical also need the pH measurement to ensure the patient get the best treatment. In this project, were going to make an Arduino pH Meter and learn how to measure the pH of a liquid solution using a gravity pH sensor and Arduino. A 16x2 LCD is used to show the pH value on the screen. This projet also calibrate the pH sensor to determine the accuracy of the sensor

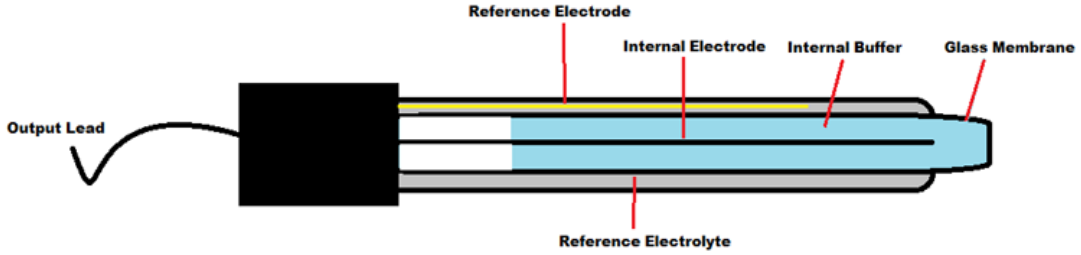
Keywords: PH sensor, Hemodialysis machine

INTRODUCTION

Analog pH sensor is designed to measure the pH value of a solution and show the acidity or alkalinity of the substance. It is commonly used in various applications such as agriculture, wastewater treatment, industries, environmental monitoring, etc. The module has an on-board voltage regulator chip which supports the wide voltage supply of 3.3-5.5V DC, which is compatible with 5V and 3.3V of any control board like Arduino. The output signal is being filtered by hardware low jitter.

The construction of a pH sensor is shown above. The pH Sensor looks like a rod usually made of a glass material having a tip called “Glass membrane”. This membrane is filled with a buffer solution of known pH (typically pH = 7). This electrode design ensures an environment with the constant binding of H+ ions on the inside of the glass membrane. When the probe is dipped into the solution to be tested, hydrogen ions in the test solution start exchanging with other positively charged ions on the glass membrane, which creates an electrochemical potential across the membrane which is fed to the electronic amplifier module which measures the potential between both electrodes and converts it to pH units. The difference between these potentials determines the pH value based on the Nernst equation.

pH Electrode Construction:



OBJECTIVE

- To makesure the water filter of hemodialysis stay in neutral potential of hydrogen
- learn the calibration method which will determine the correctness and accuracy of the sensor

SCOPE OF PROJECT

- Dialysis machine operator and repairman
- Nurses who regularly use dialysis machines take care of patients

IMPORTANT OF RESEARCH

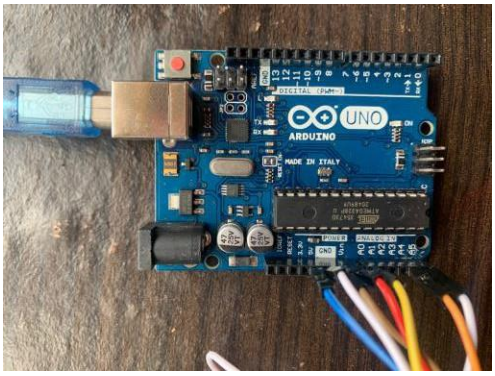
- Helps reduce the cost of expenses in terms of maintenance
- Ensure the dialysis fluid is in the correct pH for treatment use

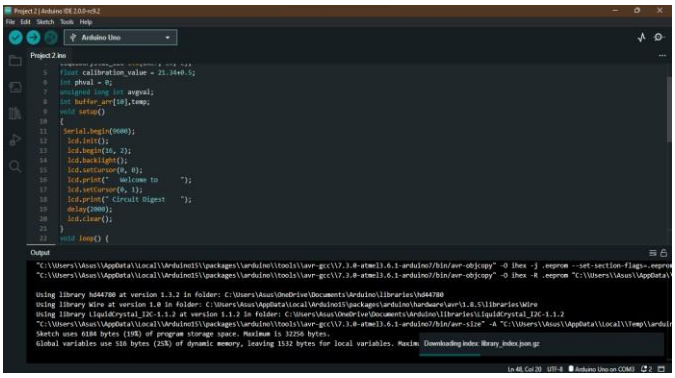
METHODOLOGY

Components that used to build the project is including Arduino microcontroller, Ph Electrode, I2C Module for LCD, Arduino IDE for software.

ARDUINO UNO R3 Development Board & ARDUINO IDE SOFTWARE

Arduino Uno is an open source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. In this project, the software used to create a program to be inserted into the arduino is arduino software.ide. The coding that has been made is linked to the use of the pH water sensor that will be used.





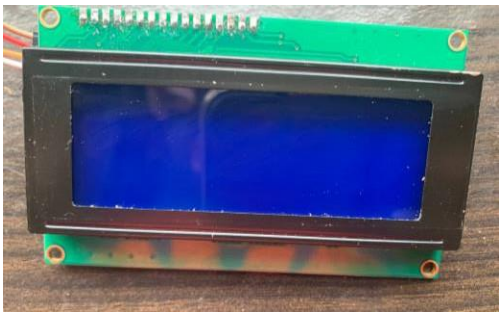
PH SENSOR ELECTRODE

A pH meter is a scientific instrument that measures the hydrogen-ion activity in water-based solutions, indicating its acidity or alkalinity expressed as pH. The pH meter measures the difference in electrical potential between a pH electrode and a reference electrode, and so the pH meter is sometimes referred to as a “potentiometric pH meter“. The difference in electrical potential relates to the acidity or pH of the solution.

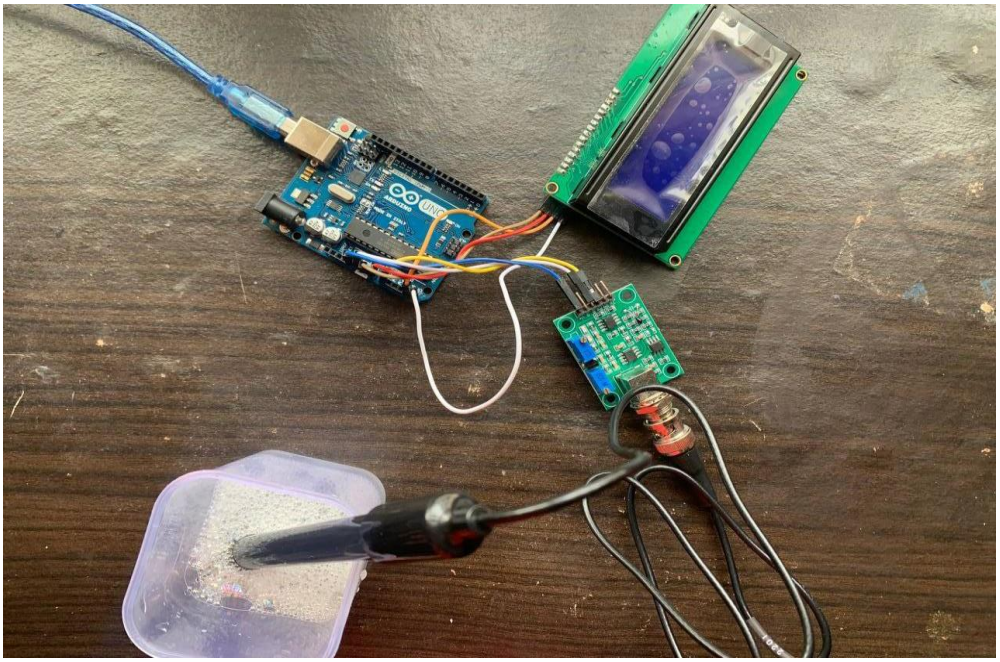
I2C Module for LCD

The display is composed of a 16 character x 2 line LCD display with a blue backlight and white characters. Each of the characters are composed of a 5 x 8 dot matrix for good character representation.The backlight has a potentiometer for adjustment of the contrast of the display for best viewing. If the potentiometer is turned too

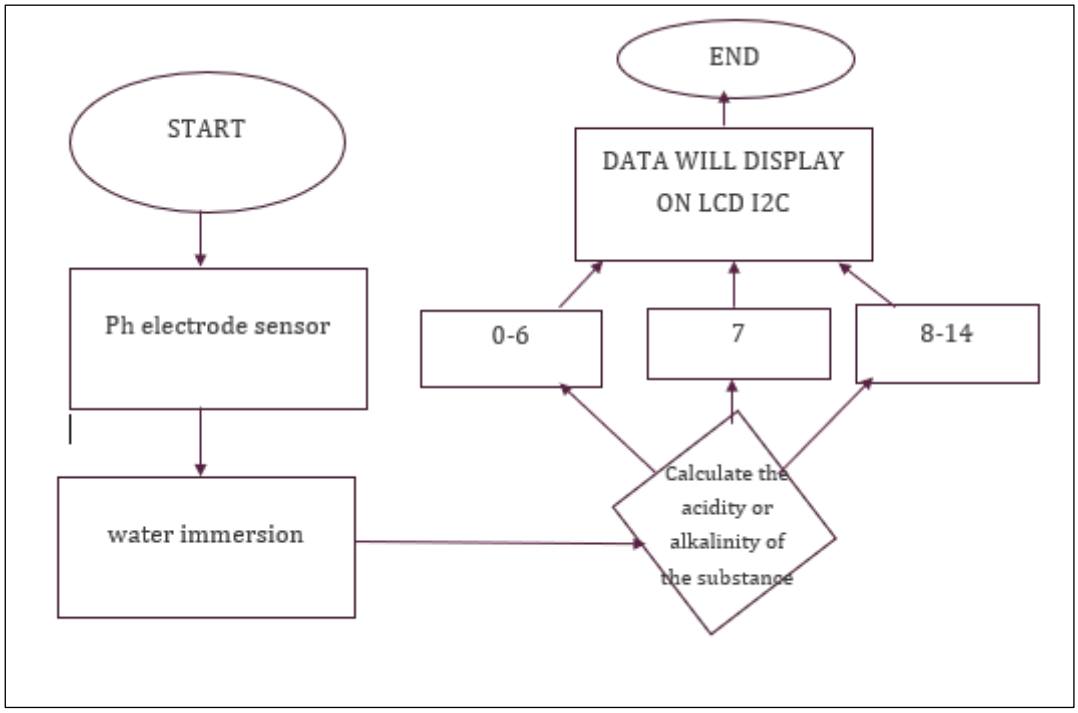
far in one direction or the other, the display will appear blank or solid squares will appear instead of characters. If this happens, just fiddle with the adjustment until it gives the best display.



CIRCUIT BLOCKDIGRAM



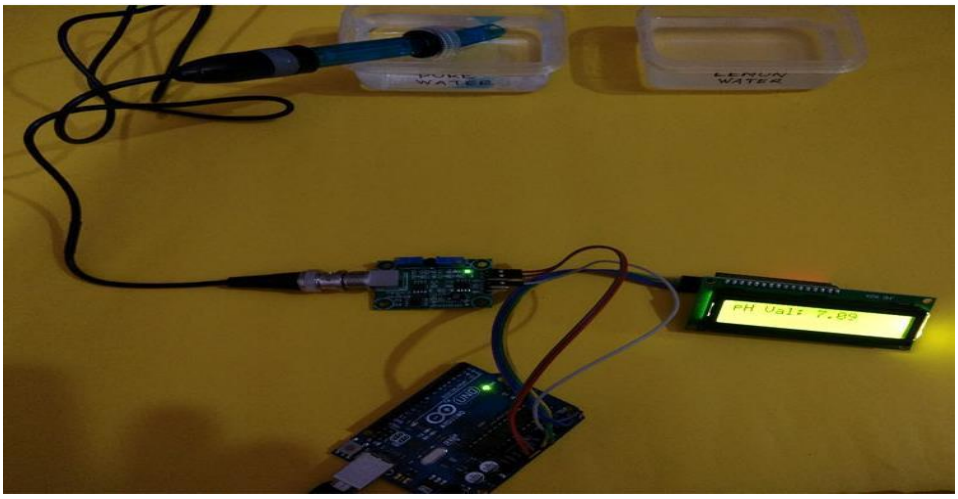
FLOWCHART



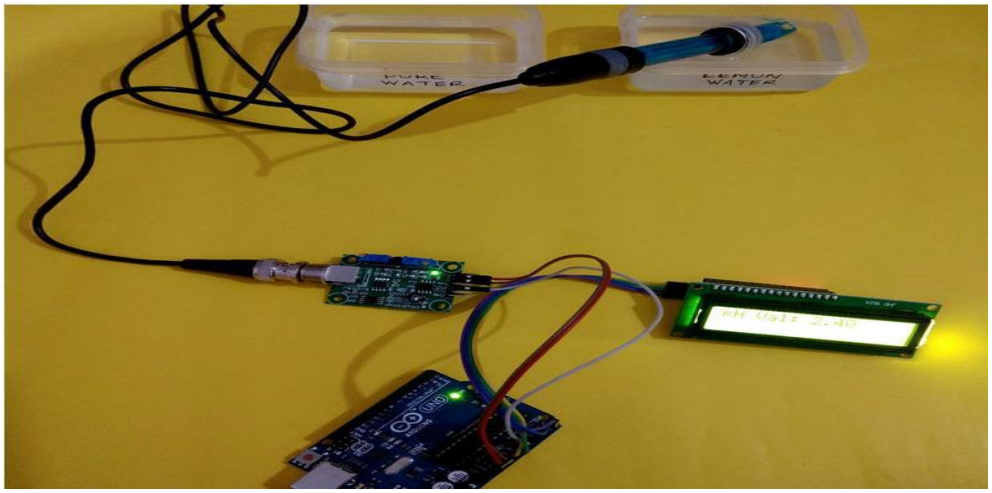
EXPECTED RESULTS

Expected results for this project, when the pH sensor is dipped in lemon water, the output on the LCD must be 0 to 6. For alkaline water such as soapy water, the result should be from 8 to 14. For the hemodialysis machine, it should be 7. +-

Pure water



LEMON WATER



CONCLUSION

At the end of this project , from the opinions and studies that have been conducted, this project can help in repairing and upgrading the lifespan as well as repairing the dialysis machine.

This study is also related to producing pH filter electrodes. In addition to being able to use an Arduino to program the output to determine the water temperature.Hope this project will become benefits to nurses and technicians to facilitate the maintenance of hemodialysis machines.

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