Abstract

Temperature must be accounted for in order to provide accurate measurements in electrode-based pH sensors. We present an integrated wireless passive sensor for remote pH monitoring employing temperature compensation. The sensor is a resonant circuit consisting of a planar spiral inductor connected in parallel to a temperature-dependent resistor (thermistor) and a voltage-dependent capacitor (varactor). A pH combination electrode consisting of an iridium/iridium oxide sensing electrode and a silver/silver chloride reference electrode is connected in parallel with the varactor.

This parameter is send wirelessly to the user by a wireless network protocol in-order to secure a better monitoring of the physical parameter.

Keywords: pH Sensor, Thermistor, Varactor, MiWi, RFID.

Introduction

Initially a temperature sensor and a pH sensor are made to a physical contact with the liquid. A potential difference change across the electrodes due to pH variation of the solution changes the voltage-dependent capacitance and shifts the resonant frequency, while temperature of the solution affects the resistance and changes the quality factor of the sensor. An interrogator coil is inductively coupled to the sensor inductor and remotely tracks the resonant frequency and quality factor of the sensor.

The sensor is calibrated for temperature over a range of 25 °C–55 °C and pH over a 1.5–12 dynamic range. By employing temperature compensation, a measurement accuracy of less than 0.1 pH is achieved and the response time of the sensor is demonstrated to be less than 1 s. The sensor overcomes the pH measurement error due to the temperature dependence of electrode-based passive pH sensors and has applications in remote pH monitoring where temperature varies over a wide range.
Monitoring and controlling pH is important in numerous fields such as environmental and food spoilage monitoring, industrial and chemical processing, biomedical sensing, and structural health monitoring. In environmental monitoring applications, pH sensors have been found very useful for monitoring pH of the soil (more precisely pH of the soil solution) and drinking water. pH sensors are useful in many industrial manufacturing processes. They have been applied to monitor pH change during food production, for food spoilage monitoring and to monitor localized corrosion.

**Existing System**

Early food composition studies were carried out to identify and determine the chemical nature of the principles in foods that affect human health. These studies were also concerned with the mechanisms whereby chemical constituents exert their influence and provided the basis for the early development of the science of nutrition, and they continue to be central to the development of the nutritional sciences.

Current knowledge of nutrition is still incomplete, and studies are still required, often at an ever-increasing level of sophistication, into the composition of foods and the role of these components and their interactions in health and disease.

**Drawbacks of existing system**

- No monitoring time.
- Less awareness.
- No more time keep-up.
- No organ testified.

**Proposed System**

To optimize any process it is important to examine it, identify problems, analyze them, and, finally, propose solutions. A specific situation where optimization can be useful is the daily activity of grocery shopping in a supermarket. This document describes the process of designing and developing an electronic system that helps to visualize the shopping process in a supermarket. The system proposed monitors the route taken by customers inside the store using the technology of Radio Frequency Identification (RFID). This technology is used to identify the shopping carts as they move around the store.

**Benefits of Proposed System**

- Time Duration.
Organ monitoring.
Identifying foreign territories.
Identifying potential hazards and determining which part of the process they may arise in.

Block Diagram

Transmitter

Description of the block diagram

The physical parameter such as temperature and PH is detected by a temperature sensor and a PH Sensor and the analog output is converted to digital signal by Analog to Digital Convertor (ADC) then it is coupled to a microcontroller. The microcontroller sends the detected parameter digitally to the user by MiWi network with 802.11 network standard through UART. The various RFID Tag Reader detects the person who involves in monitoring.

Receiver
Description of the block diagram

In receiver end, MiWi network is used to receive signal from the transmitter and then it is passed to a UART and then to the personal computer in-order to monitor the parameter in the computer. As a real time application it sends the data all the time by the processing from the microcontroller and hence it serves as a good product for remote monitoring the temperature and the pH level of the physical quantity.

Simulation Output

![Simulation Output]

Inference from the simulation output

Here the value of the “Thermometer 2” denotes the temperature of the liquid and the “Tank” denotes the pH level of the liquid these are wirelessly received from the transmitter and processed in the computer using a front end software. A graph is plotted against the amplitude of the signal and the Time of the response. By this graphical representation an XY pattern graph is plotted which shows a gradual raise in potential.

Conclusion

In this hardware module the temperature and the pH level of the hard liquid can be monitoring with a minimal time and with a high accuracy and also Identifies potential hazards and determine which part of the process they may arise in. All the parameters can be remotely monitored by an individual. In supermarkets this system can be used to monitor the food items without degrading with its temperature and pH levels in order to provide a better organ monitoring.

References


