Faculty of Electrical and Electronic Engineering Technology

Development Of IoT Based Water Tank Level Detector Using Arduino

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Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours

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A project report submitted
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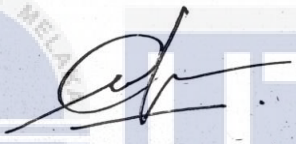
Signature : 

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APPROVAL

I hereby declare that I have checked this project report and in my opinion, this project report is adequate in terms of scope and quality for the award of the degree of Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours.

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DEDICATION

This thesis is dedicated to:

My beloved mother
Alifah Binti Jalil
and father
Mohd Zakhair Bin Mohd Idris

My brilliant supervisor
Ts. Abdul Halim Bin Dahalan

And
My beloved siblings and friends

ABSTRACT

The water level detector system is a straightforward method for detecting and indicating the amount of water in the water tank and other containers. The majority of households nowadays use pumps to store water in water tanks. However, no one can tell how much water is in the tank or when it will fill up. As a result, the tank will be empty, resulting in not knowing the condition of water in the water tank. A water level detector is a device that collects data on the water level in reservoirs or tanks in residences. Therefore, we can prevent water from being empty in the tanks by using the water level monitor. Besides that, all the connections between the power supply, the microcontroller and the switches are simple and straight forward to make the installation easy and fast. The system is designed to hook on the water tank with its water buoy customized to the height of the water tank, resulting in easy installation. The NodeMCU ESP8266 microcontroller serves as the project's brain, bridging the gap between all input and output devices. EEPROM in this project is used to store data in this system. The cycle for the switches to on and off at the water tank bouy will be read by the NodeMCU ESP8266 microcontroller. By using Arduino IDE software, the NodeMCU ESP8266 is programmed to read the level of water in the tank which is triggered by the switches and LED light will light up according to the level of the water. The water level will also be displayed in the Blynk application which shows the data based on the height of the water in a tank.

ABSTRAK

Sistem pengesan paras air adalah kaedah mudah untuk mengesan dan menunjukkan jumlah air di dalam tangki air dan bekas lain. Kebanyakkan penduduk rumah pada masa ini menggunakan pam untuk menyimpan air di tangki air rumahnya. Walau bagaimanapun, tiada siapa yang dapat mengetahui jumlah air di dalam tangki atau bila tangki akan kosong. Ini mengakibatkan pengguna tidak mengetahui keadaan air di dalam tangki. Pengesan paras air adalah alat yang mengumpulkan data mengenai paras air di takungan atau tangki di kediaman. Oleh itu, kita dapat mengelakkan air di dalam tangki kosong adalah dengan cara memantau paras air. Selain itu, semua sambungan antara bekalan kuasa, mikrokontroler dan suisnya mudah dan senang untuk difahami, maka menjadikan pemasangan mudah dan cepat. Sistem ini direka untuk menggantung ke dalam tangki air dengan pelampung yang direka khas untuk kesesuaian dengan ketinggian tangki air, ini menbolehkan pemasangannya mudah. Mikrokontroler NodeMCU ESP8266 adalah komponen utama iaitu sebagai otak kepada projek ini, yang akan menghubungkan antara semua peralatan dan peranti input serta output. EEPROM dalam projek ini digunakan supaya boleh menyimpan data kepada sistem ini. Kitaran untuk menghidupkan dan mematikan pada tangki air akan diberitahu oleh mikrokontroler NodeMCU ESP8266. Dengan menggunakan perisian Arduino IDE, NodeMCU ESP8266 diprogramkan untuk membaca ketinggian air di tangki yang dikawal oleh suis dan lampu LED akan menyala mengikut ketinggian air. Paras air juga akan dipaparkan di Aplikasi Blynk yang menunjukkan data berdasarkan ketinggian air di dalam tangki.

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V	-	voltage
mm	-	millimeter
cm	-	centimeter
m/s	-	milli per second
μA	-	micro ampere
k	-	kilo
kW	-	kilo watt
mAh	-	milli ampere per hour
Hz	-	hertz

LIST OF ABBREVIATIONS

BCD	-	Binary Coded Decimal
CPU	-	Central Processing Unit
DAQ	-	Data Acquisition
DC	-	Direct Current
DIY	-	Do It Yourself
EEPROM	-	Electrically Erasable Programmable Read-Only Memory
GSM	-	Global System For Mobile Communication
HMI	-	Human Machine Interface
IC	-	Integrated Circuit
IDE	-	Integrated Development Environment
IoT	-	Internet Of Things
LCD	-	Liquid Crystal Display
LDR	-	Light-Dependent Resistor
LED	-	Light-Emitting Diode
MCU	-	Microcontroller Unit
PC	-	Personal Computer
PCB	-	Peripheral Interface Controller
PIC	-	Peripheral Interface Controller
RAM	-	Random-Access Memory
VCC	-	Voltage Common Collector
WIFI	-	Wireless Local Area Network

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CHAPTER 1

INTRODUCTION

1.1 Background

In Malaysia, many houses and high-rise constructions are outfitted with a roof-mounted water tank. Water from the main inflow is frequently pumped up to the tanks using an electric water pump, with gravity supplying the bulk of the structure with water. Currently, water meters are used to count and measure the quantity of water utilized in homes. This isn't an effective technique to keep track of how much water is consumed. Every outlet wastes water, whether intentionally or unintentionally, and this adds up to a significant amount of money in the end. Water waste from a full tank is now a potentially dangerous situation. In a variety of ways, the supply of usable water resources is becoming a significant challenge. Bad water allocation, inefficient usage, and a lack of comprehensive and consolidated water management worsen the situation. Water is used in agriculture, industry, and domestic consumption. As a result, water monitoring and efficient use may be a challenge for home water management systems.

Water is incredibly vital in today's environment. If we fail to monitor water from the reservoir, we can be subjected to leaks, devastation, and waste without even realizing it. As a result, water prices would rise, putting customers at risk. In order to avoid this, a sensor tool should be created to address the issue. This design is meant to solve that problem. This design shows how much water is in the water tank and indicates when it is full. On the other hand, a water level monitoring system for the tank must be built. It must eventually be capable of alerting the tank's present status to the person in charge or the technician. In this

system, water level detector circuitry is integrated with wireless appliances. When the water level in the tank reaches a critical level, wireless gadgets provide information to the person in control for further action. Several control systems utilizing water level sensors have become widely recognized in recent decades. Measuring water levels is a critical responsibility for both the government and the general people. By including numerous regulatory activities, it will be possible to monitor the actual implementation of such programs. As a result, the use of a water management device in the home can be substantial. Automatic water level indicator and controller systems are beneficial for reducing water waste while filling any reservoir without thinking about turning off the motor until the reservoir is filled.

1.2 Statement of the Purpose

The research is to develop a monitoring system of water level in the water tank which are commonly used in houses and industries. Besides that, remotely monitor the water level condition and alert users on any warnings.

1.3 Problem Statement

Every day, much water is wasted in residential areas, offices, and hospitals, according to the existing situation. Water is crucial in many ways, and such massive water waste could lead to a shortage in the future. In today's world, everyone has an overhead tank in their home. The concept of measuring and displaying the water level in a container to prevent overflow can be applied implicitly to determining and controlling the level of water in overhead tanks to avoid waste. Many parts of the world confront water scarcity and natural disasters such as drought. Because the water level in the tank cannot be decided at random,

the tank overflows. This leads to higher energy consumption, which is a significant concern in today's globe. People must also wait until the tank is completely full before moving on to other activities.

All living things require water as one of their most necessities. Unfortunately, uncontrolled use wastes a significant amount of water. Other automated water level monitoring systems have been proposed, but most of them are ineffective in practice. A device can tackle the water loss problem by implementing an effective automated water level monitoring and controlling system with a versatile, inexpensive, and easily adaptable system.

1.4 Project Objective

The overall objective of this study is to design an IoT based water tank level detector using Arduino. The specific objectives that must be achieved are as follows:

a) To monitor the condition of water level in a water tank at home or in industries.

b) To develop a water level detector to monitor the water level in the tank.

c) To display the water level and other important informations via wireless appliances.

1.5 Scope of Project

To avoid any project-related uncertainty as a result of some restrictions and constraints, the scope of this project are as follows:

a) Develop a prototype of water tank level detector using wireless appliances and electronic circuit.

b) Design a program using NodeMCU ESP8266 to collect data of water level condition from water level detector.

c) Monitor information of water level via IOT based such as Blynk application.

1.6 Summary

The goal of this project is to detect the water level in a water tank. This report is divided into five chapters based on the stated goal. A brief overview of the research background, issue statements, aims, and scopes is given first. The following chapter presents a review of the literature on existing methodologies and other advancements that have been implemented in previous projects. In the meantime, the advantage and disadvantages of comparison will be discussed. The approach that has been devised for the components and the portrayal approach that was desired to employ will be clarified in this chapter three. A summary of the project's outline stream may appear here as well. The fourth chapter will go over the models created and the information gathered, including data tabulation and project analysis. Finally, chapter five summarises the main findings and the work completed during the research and makes recommendations for future research.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In today's world, numerous water tank level detectors have been developed for usage in homes and businesses. This chapter will provide an overview of the background of the water level monitoring system based on articles, papers, and other project-related sources.

2.2 Related Research to Investigate the Development of IoT-based water tank level detector using Arduino

2.2.1 A Review on Wireless Water Level Indication Using IoT by Mr.D.Ponkumar (2020)

The goal of this research is to create a self-contained water control system using ultrasonic transducers. It explains how the Internet of Things (IoT) can be used to achieve the best irrigation results. It also considers how the proposed mobile application can help save water supplies. The automatic water level monitoring system detects and indicates water levels in reservoirs, overhead tanks, and other storage containers. Motor pumps are used by homeowners to store water in overhead tanks. Water is wasted unnecessarily in many homes due to overflowing above the tanks. Agriculture, industry, and household eating are all common uses for water. For a home or business water management strategy, well-organized usage and water monitoring are possible restraints. The implementation of a water monitoring system has the potential to have a lot of relevance in household applications.