Green University of Bangladesh

Department of Computer Science and Engineering (CSE)
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On-Off Time Delay

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Lab Project Status	
Marks:	**Signature:**
Comments:	**Date:**

Contents

Chapter 1

Introduction

1.1 Overview

The project aims to explore and implement on-off time delay mechanisms within computer architecture, focusing on optimizing system performance and energy efficiency. This involves investigating how introducing controlled delays in specific components can

positively impact overall system behavior.The On-Off Time Delay Project employing the 555 timer IC is a versatile and widely-used electronic project that allows for precise control of time delays in activating and deactivating a load. This project utilizes the 555 timer IC, a popular integrated circuit known for its flexibility in various applications. The objective is to design a circuit that introduces specified delays before turning a connected device on and off.This overview provides a broad perspective on the key aspects of this project.

1.2 Motivation

The motivation behind using the 555 timer IC in an On-Off Time Delay project stems from its versatility, ease of use, and reliability in providing precise timing control in electronic circuits.With the increasing demand for energy-efficient computing, understanding the effects of on-off time delays in computer architecture becomes crucial. This project is motivated by the potential to design systems that balance performance and energy consumption, contributing to sustainability in the rapidly evolving field of computing. [**?**].

1.3 Problem Definition

The traditional approach to computer architecture often neglects the dynamic adjustment of on-off times in various components. This project seeks to address this gap by investigating the optimal delay durations in key architectural elements, such as processors, caches, and memory, to strike a balance between performance and energy efficiency. 1.3.1 Complex Engineering Problem The following Table 1.1 must be completed according to your above discussion in detail. The column on the right side should be filled only on the attributes you have chosen to be touched by your own project.

Table 1.1: Summary of the attributes touched by the mentioned projects

Name of the P Attributess	**Explain how to address**
P1: Depth of knowledge required	Real problems can solved using its knowledge.
P2: Range of conflicting requirements	—-
P3: Depth of analysis required	Have the instant thinking capability and generate new ideas in a discipline way.
P4: Familiarity of issues	—-
P5: Extent of applicable codes	—-
P6: Extent of stakeholder involvement and conflicting requirements	—-
P7: Interdependence	Have the mindsate to play an important engineering role for the society that the common people's life become easier.

Figure 1.1: FIG-1

1.4 Design Goals/Objectives

1.Performance Optimization:Identify and implement on-off time delays to enhance the overall performance of the system by strategically managing component activities.

2.Energy Efficiency:Investigate the impact of on-off time delays on energy

consumption,aiming to reduce power usage without compromising performance.

3.Dynamic Adaptability:Develop algorithms or mechanisms for dynamically adjusting on off times based on varying workload and system conditions.

4. Fault Tolerance:Assess the system's resilience to faults introduced by on-off time delays and implement strategies to mitigate potential issues.

1.5 Application

The outcomes of this project can be applied to various computing environments, including data centers, edge devices, and mobile systems. The optimized on-off time delays can be integrated into existing architectures to enhance energy efficiency and overall system performance without sacrificing reliability. This project not only contributes to the academic understanding of on-off time delays in computer architecture but also provides practical insights for designing more sustainable and efficient computing systems.

Chapter 2

Design/Development/Implementation of the Project

2.1 Introduction

Multivibrators are electronic circuits that find essential applications in communication systems as versatile waveform generators. This type of circuit, specifically known as an astable multivibrator, plays a pivotal role in various aspects of communication technology, such as oscillators, timers, and flip-flops. Their widespread use can be attributed to their unique ability to produce a consistent square wave output, coupled with their simplicity, reliability, and ease of construction. Astable Multivibrators in Communication Systems: Astable multivibrators serve as indispensable components in communication systems, performing several crucial functions:

1. Triggering: Astable multivibrators can act as triggers in communication systems. They initiate specific actions or processes based on predefined conditions or input signals. This capability makes them invaluable in systems that require precise timing or synchronization.

2. Conversion: These circuits are adept at converting signals from one form to another, facilitating seamless integration between different parts of a communication system. Whether it's transforming analog signals into digital data or vice versa, astable multivibrators play a significant role.

3. Modulation: In modulation processes, astable multivibrators modulate carrier signals to encode information. This modulation is essential in various communication techniques, including amplitude modulation (AM) and frequency modulation (FM).

4. Division: Astable multivibrators can divide or subdivide frequencies, a fundamental operation in communication systems. This feature allows for the generation of multiple frequency channels for transmission or reception, which is crucial in radio frequency applications.

Applications in Specific Communication Technologies:

Astable multivibrators have diverse applications in specific communication technologies: -Frequency Shift Keying (FSK) Generators: In FSK modulation, where the frequency of the carrier signal varies according to the input data, astable multivibrators generate the necessary frequency shifts to encode information.

-Pulse Position Modulation (PPM): Astable multivibrators play a role in PPM systems by determining the timing of pulse signals, which conveys data.

-Radio-Frequency Identification (RFID): These circuits are used in RFID systems for generating timing and synchronization signals, ensuring smooth communication between RFID tags and readers.

-Amateur Radio Equipment: Astable multivibrators are integral to amateur radio equipment, facilitating the transmission and reception of radio signals.

-Morse Code Generators: They are employed in Morse code generators, which convert text into Morse code for communication purposes.

-Timers and Square Wave Generation: Astable multivibrators are used in various timing applications and for generating square waveforms, which are indispensable in television broadcasts and analog circuits.

2.2 Abstract

The 555 timer integrated circuit (IC) is an exceptionally versatile and widely used component in the realm of electronics. It serves various purposes across numerous electronic circuits. The IC 555 primarily functions as a square wave generator, with its duty cycle adjustable within the range of 50achieves time delay within a circuit through the use of an oscillator. The name "555 timer IC" is derived from the incorporation of three 5 kilo-ohm resistors, configured as a voltage divider, as depicted in the figure below. This voltage divider plays a crucial role in determining the timing parameters of the IC. The 555 timer IC is a 4-pin device, each pin serving a specific purpose. In order to create a time delay project using a 555 timer, it is essential to configure the IC in its monostable mode. In this mode, the 555 timer assumes the role of a one-shot pulse generator. It generates an output pulse of a specified duration in response to an external trigger signal. In summary, the 555 timer IC stands as a fundamental building block in electronics, enabling precise timing and pulse generation within a wide array of applications. Its reliability, stability, and adaptability make it a cornerstone in the field of electronic circuit design.

2.3 Implementation

The power supply to the circuit is provided by a 6-volt battery. The signal is generated from a 555 IC and is supplied to a transistor's base. The project is set up as per the given circuit diagram depicted in Figure 1.

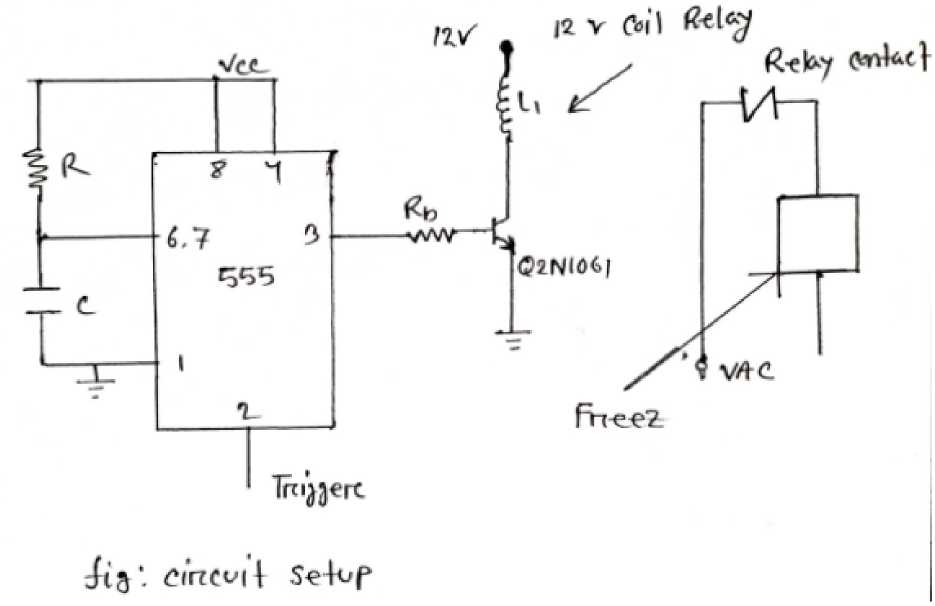

Figure 2.1: FIG-2-To achieve this operation, we have to connect all components according to this circuit.

Chapter 3

Performance Evaluation

3.1 Hardware component description

All the major hardware components used in the development of this work are:

Capacitor (47uF/25V)
Resistor (100k and 330 ohms)
555 Timer IC
BC547 Transistor
6V Relay
LED
Diode
9V Battery
Connecting wires
Breadboard
The IC NE555 was selected for this project due to its ability to produce square wave pulses and its small, compact size, making it easy to integrate into any system. If you need to adjust the delay time, you can do so by changing the values of the resistor and capacitor.

3.2 Results Analysis/Testing

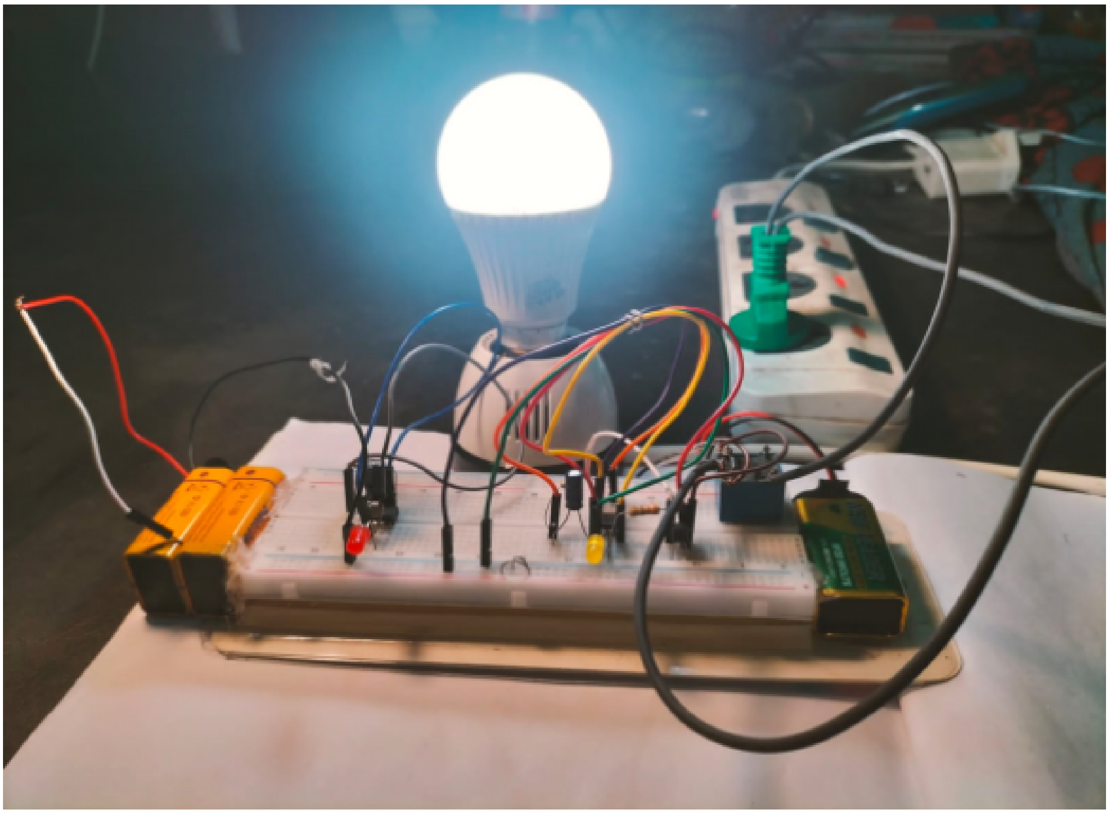

Figure 3.1: image-1

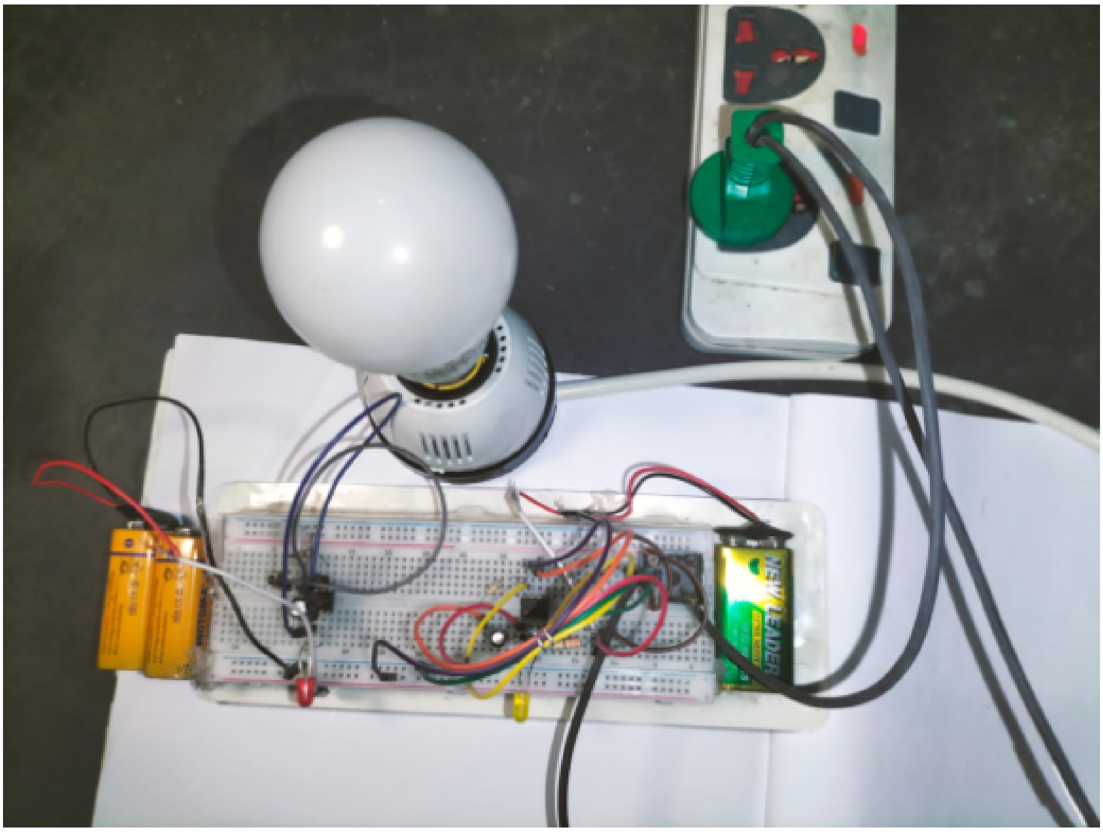

Figure 3.2: image-2

Chapter 4

Conclusion

4.1 Discussion

The 555 timer delay circuit serves as an invaluable component for controlling the activation of various electrical devices. Its primary function is to introduce a time delay between the application of power and the corresponding activation of a relay. This delay can be conveniently adjusted within a range of 5 to 20 minutes by fine-tuning the 1M potentiometer connected to the 555 timer IC. The versatility of the 555 timer IC extends beyond just time delay applications. It can be harnessed in a multitude of ways to generate square waves, produce pulses, or execute simple one-shot timing functions. This flexibility makes it a popular choice among electronics enthusiasts and engineers.

4.2 Limitations

While the 555 timer delay circuit offers significant advantages, it's essential to acknowledge its limitations. These limitations may include constraints on the range of time delays achievable, power requirements, and sensitivity to external factors such as temperature and voltage fluctuations. Understanding these limitations is crucial when designing circuits for specific applications.

4.3 Scope of Future Work

The successful design, construction, and testing of a delay timer circuit for home appliances highlight the practicality and effectiveness of this technology. In practical terms, here is how it can be employed: after creating the 5-minute delay circuit, an additional relay needs to be incorporated to facilitate the connection to a fridge or other appliances. Future work in this area could focus on further enhancing the precision and reliability of the 555 timer delay circuit. This might involve exploring advanced components, developing more compact designs, or integrating digital control interfaces for remote operation and monitoring. Additionally, expanding its application scope to address specific industry needs could open up new avenues for research and development.

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