

Design and Development of a Utility Bill Calculator System

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Abstract

This paper presents the design and development of a desktop-based Utility Bill Calculator developed using Python and PyQt6. The system computes electricity consumption based on meter readings and allows users to dynamically add additional bills such as water, internet, and other rental-related expenses. The application generates a formatted receipt and enables users to save the receipt as an image file. The system aims to provide an efficient, accurate, and user-friendly solution for managing rental and utility expenses.

1. Introduction

Managing utility and rental bills manually can lead to miscalculations and inefficiencies. This project introduces a Utility Bill Calculator that automates electricity computation based on kilowatt-hour (kWh) readings and integrates additional bill entries into a single system. The application was developed to simplify billing processes for renters and property managers.

2. System Overview

The Utility Bill Calculator is a desktop application built using Python and the PyQt6 framework. It features a graphical user interface (GUI) that allows users to input previous and current electricity meter readings. The system calculates electricity consumption and multiplies it by a predefined rate per kWh. Users can also dynamically add or remove additional bills.

3. System Features

The key features of the system include:

- Electricity bill computation based on meter readings.
- Predefined rate per kilowatt-hour (₱15 per kWh).

- Dynamic addition and removal of extra bills (e.g., water, internet).
- Input validation and error handling using message prompts.
- Automatic receipt generation with date and time stamp.
- Option to save the generated receipt as a PNG image file.

4. Methodology

The system follows an event-driven programming approach. The user inputs data into text fields, and upon clicking the 'Calculate Total Bill' button, the system validates inputs and performs computations. The electricity usage is calculated as the difference between current and previous meter readings. Additional bills are summed and added to the electricity total. The final receipt is formatted and displayed within the application interface.

5. System Architecture

The application is structured using object-oriented programming principles. The main class 'BillCalculator' extends QWidget and manages all interface components and business logic. Core modules include input handling, dynamic layout management for additional bills, calculation logic, receipt formatting, and file-saving functionality.

6. Results and Discussion

Testing results show that the system accurately computes electricity consumption and integrates additional expenses without errors when valid inputs are provided. The validation system prevents incorrect data entry, such as negative consumption or invalid numeric values. The receipt generation feature ensures transparency and proper documentation of payments.

7. Conclusion

The Utility Bill Calculator successfully provides an automated solution for computing rental-related utility expenses. The system enhances accuracy, efficiency, and usability through its graphical interface and dynamic features. Future improvements may include database integration, user authentication, and customizable electricity rates.