

G-Pay Integrated Sanitary Napkin Vending Machine

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ABSTRACT

Access to sanitary napkins remains a challenge in public and institutional areas due to limited availability and payment constraints. This paper presents an automated, cashless vending machine that exclusively accepts G-Pay transactions, ensuring seamless and hygienic access to menstrual hygiene products. The system is powered by an ESP8266 microcontroller, integrating a QR-based UPI payment system that verifies transactions in real time. Upon successful payment, the vending machine activates a motorized dispensing mechanism, delivering the product efficiently. An LCD display provides users with real-time stock availability, enhancing accessibility and ease of use. The key innovation of this system is its automated payment tracking and refund mechanism by using Google Sheets. By eliminating cash handling, the system enhances hygiene and operational efficiency, making it ideal for schools, workplaces, and healthcare facilities. The scalable design of this vending machine allows for future expansion to other essential products, contributing to a more accessible and digitally integrated vending ecosystem.

Keywords: Smart Vending Machine, G-Pay Integration, ESP8266

I. INTRODUCTION

Digital automation in recent times has been at the forefront in enhancing public hygiene and health, particularly in availing basic commodities such as sanitary napkins [1]. Conventional vending machines have also slowly evolved to become smart machines that are now able to make digital transactions, increase the ease of use and avoid the involvement of manual interventions [3]. With the growing acceptance of UPI platforms such as Google Pay (G-Pay), online payment solutions into vending systems guarantees quicker, touchless, and secure transactions [2], [5]. This paper presents a smart sanitary napkin vending machine integrated with G-Pay using Razor Pay's UPI platform [1]. The embedded system is developed with the ESP8266 Node MCU and is automated for payment verification, napkin dispensing, and payment transaction recording [2]. It employs Google Apps Script and Google Sheets for backend functions in real time [4]. The goal is to deliver a hygienic, low-maintenance, and user-friendly solution for schools, colleges, hospitals, and public places, while creating menstrual hygiene awareness and Digital India initiative support [1], [5]. The key contributions of this paper are:

1. Development of automatic napkin vending machine with ESP8266 MCU [2].
2. Integrating G-Pay for online payment transactions [5].
3. Registering all transactions by using Google Apps Script and Google Sheets for payment review process.

II. SYSTEM DESIGN

A. System Architecture

The Sanitary Napkin Vending Machine system is built as an integrated architecture where both hardware and software components work together to provide an automated and efficient solution for the user [2]. The core component is ESP8266 microcontroller, which serves as the heart of the system. The ESP8266 controls the entire operation by managing payment verification, dispensing of the napkin, and updating the transaction status [4].



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