

Smart Fuel Hub: Revolutionizing Refueling with IoT- Driven Advanced Automated Petrol Pump

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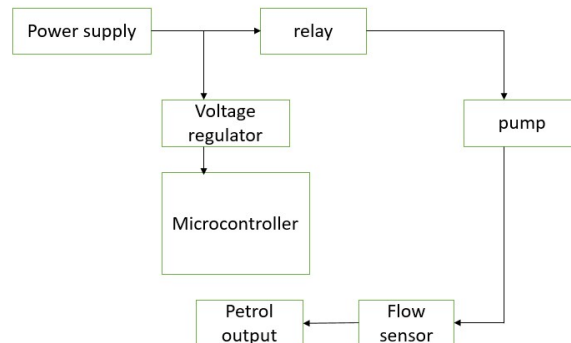
ABSTRACT - This paper indicates a design in which a system will be capable to trace a vehicle's petrol refill amount, cost & time then notifies the vehicle's owner about the refill as well. The system is divided into two parts: A mobile application and a petrol pump. The users will use the mobile app to register themselves to the system and control their accounts. The users will also have an RFID which will work as a prepaid card. They can recharge the card from any authorized recharge point. The deduction of fuel from the pump for each individual will be automatic after scanning the RFID card and providing a unique password. Cost of fuel will be charged from the RFID card and at the same time, the user will be notified via realtime email technology. All the information of transactions (e.g. refill amount, refill type, refill cost, current balance, previous balance, transaction time etc.) will be sent to a database through Wi-Fi technology. This system has interconnected the pump and the mobile app by a central and secure database so that they can communicate between themselves. The database is accessible from any corner across the world and the users will be able to trace their account through the mobile application at anytime from anywhere. This system can also measure the level of fuel inside the petrol bunk.

INTRODUCTION

The concept of revolutionizing refueling takes a significant leap forward with the advent of an Internet of Things (IoT)-driven advanced automated petrol pump. This innovative system represents a paradigm shift in the traditional refueling experience by seamlessly integrating IoT technologies into the petrol pump infrastructure. With real-time connectivity and data-driven intelligence, this automated pump promises to enhance efficiency, accuracy, and customer experience. The IoT-driven features enable automated fuel dispensing, remote monitoring of fuel levels, predictive maintenance, and personalized customer interactions. By converging IoT capabilities with refueling stations, this solution not only modernizes the fueling process but also lays the foundation for a smarter, more responsive fueling ecosystem that aligns with the evolving demands of the digital age.

SYSTEM DESCRIPTION OF EXISTING SYSTEM

The power supply serves as the primary source of electrical energy for the system, providing the necessary power for all components. The relay acts as a switch controlled by the microcontroller, allowing it to manage the activation and deactivation of the pump. The pump, driven by electrical power, facilitates the transfer of petrol through the system. The voltage regulator ensures a stable and consistent voltage level, preventing fluctuations that could affect the performance of sensitive components like the microcontroller. The microcontroller acts as the central processing unit, orchestrating the overall operation of the system and coordinating the actions of the relay, pump, and other components. The RF reader enables wireless communication, facilitating remote control or monitoring. The flow sensor measures the flow rate of petrol, providing crucial data for system control and monitoring.

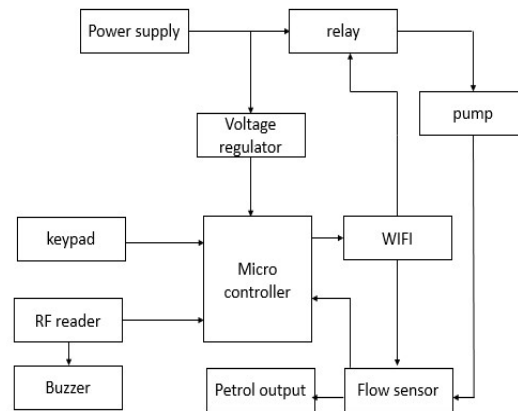


Finally, the petrol output represents the endpoint of the system, where the controlled flow of petrol is directed to its intended destination or application. Together, these components form a comprehensive system for managing and regulating the flow of petrol.

SYSTEM DESCRIPTION FOR PROPOSED SYSTEM

Android application : To register, the user must first log in using an application. After logging in, the user must pick the nearest petrol station offered by the application. The list was compiled using the Global Positioning System (GPS). After selecting the desired petrol pump, the user must choose the available time period and amount. The user must pay after picking a time slot and quantity. A one-of-a-kind code will be produced and saved in the database. This code will be sent to the user's registered cellphone number via SMS.

Hardware : The power supply serves as the foundational energy source for the system, delivering electrical power to all components. The relay, controlled by the microcontroller, acts as a switch to manage the pump's activation and deactivation, facilitating the controlled transfer of petrol. The voltage regulator ensures a stable voltage level, safeguarding sensitive components like the microcontroller. The keypad allows user input for system interaction and control. The microcontroller functions as the central processing unit, orchestrating overall system operations, interpreting keypad inputs, and coordinating the actions of the relay, pump, and other components. WiFi capability enables wireless communication, facilitating remote monitoring and control. The RF reader provides additional input options and connectivity. The buzzer serves as an auditory alert for system status or error notifications.



The flow sensor measures petrol flow, providing crucial data for system monitoring. The petrol output represents the system's final stage, directing the controlled flow of petrol to its intended destination. Together, these components create a comprehensive system for efficient petrol management with user-friendly interfaces, wireless connectivity, and real-time monitoring capabilities.

CONCLUSION

In conclusion, the Smart Fuel Hub represents a groundbreaking paradigm shift in the refueling experience, seamlessly integrating IoT-driven technologies to revolutionize automated petrol pump systems. With a sophisticated combination of advanced components such as a microcontroller, WiFi connectivity, RFID reader, keypad, and flow sensor, the Smart Fuel Hub not only enhances user convenience but also optimizes operational efficiency. The system allows for real-time monitoring, remote control, and precise measurement of petrol flow. This holistic approach not only streamlines the refueling process but also ensures a secure and user-friendly interface. By leveraging cutting-edge technologies, the Smart Fuel Hub not only meets but exceeds the demands of modern refueling, paving the way for a more efficient, connected, and intelligent petrol pump experience.

FUTURE SCOPE

Looking ahead, the SmartFuel Hub holds immense potential for further evolution and adaptation in the realm of automated petrol pumps. Future iterations could integrate machine learning algorithms to analyze user preferences, optimize fueling patterns, and enhance predictive maintenance capabilities. Enhanced connectivity features may allow seamless integration with smart vehicles, enabling automatic and personalized fueling based on vehicle data. The implementation of blockchain technology could also contribute to secure and transparent transactions. Moreover, the SmartFuel Hub could play a pivotal role in the transition to alternative fuels, facilitating the integration of eco-friendly options and supporting sustainable practices. As technology continues to advance, the SmartFuel Hub is poised to continually redefine the refueling experience by embracing emerging innovations, contributing to a more efficient, environmentally conscious, and user-centric approach to fueling vehicles.

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