

GEOLOCATION-BASED PAYMENT SYSTEM AND A METHOD THEREOF

FIELD OF THE INVENTION

The present invention generally relates to technologies and innovations in payments and more specifically, the present invention relates to a geolocation-based payment system and a method thereof, for reducing queue time and enhancing transaction efficiency.

BACKGROUND OF THE INVENTION

The digitization of payments in India has witnessed significant growth with the advent of innovative technologies and government initiatives. Key developments include the Unified Payments Interface (UPI), mobile wallets, Aadhaar-enabled payments, QR, and electronic fund transfer systems (NEFT and RTGS). These advancements have promoted cashless transactions, financial inclusion, and enhanced convenience for users.

The increasing demand for faster and more convenient payment solutions has led to numerous innovations in the payment industry. However, despite technological advancements, conventional payment methods still suffer from time-consuming processes that cause delays, leading to customer dissatisfaction and business revenue losses. There are various factors that lead to longer transaction times or delays in completing digital payment processes. Despite the advancements in digital payment technologies, certain challenges persist, contributing to the extended time taken for payments. Scanning QR codes and swiping credit/debit cards, coupled with PIN entry, often lead to inefficiencies, error-prone transactions, and long waiting queues. Also, waiting for OTPs (one-time passwords) or biometric verifications can cause delays, especially during peak transaction periods. Additionally, security measures like two-factor authentication are essential, but even they can also contribute to increased transaction times. Waiting for OTPs (one-time passwords) or biometric verifications can also cause delays, especially during peak transaction periods.

To be more specific, we can consider the some of the recent solutions that were meant to reduce payment time, such as contactless payment or Tap based payments for credit cards and debit cards, or advent of UPI payment or wallet-based payments using QR codes. However, the card-based Tap to pay depends on the Point of Sale (POS) device's integrity. Many times, there are issues with POS Device like battery issues which add to the wait time. These are also less secure, especially if the card is lost. Then, UPI Payment is dependent on manual entering of UPI ID or scanning codes. Besides, for QR Code scanning, we need a camera-based smartphone and the camera/scanner has to be aligned to be able to read the QR Code. All these involve user input and conditions which further add to the wait time.

Therefore, there is a need in the art for a geolocation-based payment system and a method thereof, for reducing queue time and enhancing transaction efficiency. Such a solution should not suffer from the deficiencies of the prior art or at least provide a viable alternative.

OBJECT OF THE INVENTION

An object of the present invention is to provide a geolocation-based payment system.

Another object of the present invention is to provide a geolocation-based payment method.

Yet another object of the present invention is to reduce payment/queue time and enhance transaction efficiency.

Yet another object of the present invention is to eliminate the requirement of QR code scanning for making wallet based or UPI payments.

Yet another object of the present invention is to utilise geofencing and localisation signals for facilitating transactions.

SUMMARY OF THE INVENTION

According to one aspect of the invention, there is provided a geolocation-based payment system that comprises at least one user device associated with a user. The user device is equipped with a geolocation sensor configured to determine a current

geographic location of the user and a payment application configured to facilitate transactions. The system further includes a server configured to maintain accounts for registered users and merchants, and to manage transaction data and communication within the system. Additionally, a processing module is communicatively coupled to the at least one user device and the server via a wireless communication network. The processing module is configured to receive geolocation data from the user device, compare the received geolocation data with predefined geofenced areas associated with registered merchant locations, retrieve a dynamic merchant identifier corresponding to the detected geofenced area, and transmit the dynamic merchant identifier to the user device. This enables the user device to perform a payment transaction upon receiving the dynamic merchant identifier from the processing module, without requiring interaction with a physical merchant device.

In accordance with an embodiment of the present invention, the processing module is further configured to periodically update the dynamic merchant identifier using a cryptographic algorithm to ensure transaction security and prevent unauthorized access.

In accordance with an embodiment of the present invention, the geolocation sensor in the user device utilizes multiple geolocation technologies, but not limited to, GPS, Wi-Fi triangulation, Bluetooth, cellular network triangulation, or a combination thereof, to enhance the accuracy of the user's detected location relative to the predefined geofenced areas.

In accordance with an embodiment of the present invention, the processing module is further configured to store transaction history on the server. Additionally, the server is configured to provide secure access to transaction records for both the users and the merchants, allowing them to review past transactions.

In accordance with an embodiment of the present invention, the system includes an API configured to integrate with multiple payment platforms, but not limited to, UPI, credit cards, digital wallets, and bank transfers, and to support third-party services, but not limited to, loyalty programs and promotions.

In accordance with an embodiment of the present invention, the processing module is further configured to receive a payment request initiated by a registered merchant

account via the server. The payment request specifies a particular transaction amount and includes the merchant's geolocation. The processing module compares the merchant's geolocation with the user's geolocation to verify that the user is within a specified proximity of the merchant's location. Upon verifying the proximity, the processing module transmits a payment prompt to the user device, instructing the user to authorize the specified payment amount to the merchant account via the a payment platform interface. In accordance with an embodiment of the present invention, the processing module is further configured to create a list of registered merchants in proximity to the user's current geolocation, present the curated list of nearby merchants on the user device in an ordered manner, and enable the user to select a merchant from the list and initiate a payment to the selected merchant via a payment platform interface.

According to a second aspect of the invention, there is provided a geolocation-based payment method that comprises determining, by a geolocation sensor in at least one user device associated with a user, a current geographic location of the user. The method further comprises receiving geolocation data from the user device via a wireless communication network, comparing the received geolocation data with predefined geofenced areas associated with registered merchant locations stored in a server, retrieving a dynamic merchant identifier corresponding to the detected geofenced area, periodically updating the dynamic merchant identifier, and transmitting the dynamic merchant identifier to the user device. This enables the user device to perform a payment transaction upon receiving the dynamic merchant identifier, without requiring interaction with a physical merchant device.

In accordance with an embodiment of the present invention, the method further includes periodically updating the dynamic merchant identifier using a cryptographic algorithm to ensure transaction security and prevent unauthorized access.

In accordance with an embodiment of the present invention, the geolocation sensor in the user device utilizes multiple geolocation technologies, but not limited to, GPS, Wi-Fi triangulation, Bluetooth, cellular network triangulation, or a combination thereof, to enhance the accuracy of the user's detected location relative to the predefined geofenced areas.

In accordance with an embodiment of the present invention, the method further includes storing transaction history on the server and providing secure access to transaction records for both the users and the merchants, allowing them to review past transactions.

In accordance with an embodiment of the present invention, the method further includes integrating an API of the geolocation-based payment method with multiple payment platforms, but not limited to, UPI, credit cards, digital wallets, and bank transfers, and supporting third-party services, but not limited to, loyalty programs and promotions.

In accordance with an embodiment of the present invention, the method further includes receiving a payment request initiated by a registered merchant account via the server. The payment request specifies a particular transaction amount and includes the merchant's geolocation. The method further includes comparing the merchant's geolocation with the user's geolocation to verify that the user is within a specified proximity of the merchant's location. Upon verifying the proximity, the method transmits a payment prompt to the user device, instructing the user to authorize the specified payment amount to the merchant account via a payment platform interface.

In accordance with an embodiment of the present invention, the method further includes creating a list of registered merchants in proximity to the user's current geolocation, presenting the curated list of nearby merchants on the user device in an ordered manner, and enabling the user to select a merchant from the list and initiate a payment to the selected merchant via a payment platform interface.

BRIEF DESCRIPTION OF THE DRAWINGS

So that the manner in which the above recited features of the present invention can be understood in detail, a more particular description of the invention, briefly summarized above, may have been referred by embodiments, some of which are illustrated in the appended drawings. It is to be noted, however, that the appended drawings illustrate only typical embodiments of this invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments.

These and other features, benefits, and advantages of the present invention will become apparent by reference to the following text figure, with like reference numbers referring to like structures across the views, wherein:

Figure 1 illustrates a geolocation-based payment system, in accordance with an embodiment of the present invention;

Figure 2 illustrates a geolocation-based payment method, in accordance with an embodiment of the present invention; and

Figures 3A-3B illustrate information flow diagrams showcasing an exemplary implementation of the system and method of Figs. 1 and 2 in a geofenced area, in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

While the present invention is described herein by way of example using embodiments, those skilled in the art will recognize that the invention is not limited to the embodiments of drawing or drawings described and are not intended to represent the scale of the various components. Further, some components that may form a part of the invention may not be illustrated in certain figures, for ease of illustration, and such omissions do not limit the embodiments outlined in any way. It should be understood that the drawings and detailed description thereto are not intended to limit the invention to the particular form disclosed, but on the contrary, the invention is to cover all modification/s, equivalent/s and alternative/s falling within the scope of the present invention as defined by the appended claim. The headings used herein are for organizational purposes only and are not meant to be used to limit the scope of the description or the claim. As used throughout this description, the word "may" be used in a permissive sense (i.e. meaning having the potential to), rather than the mandatory sense (i.e. meaning must). Further, the words "a" or "an" means "at least one" unless otherwise mentioned. Furthermore, the terminology and phraseology used herein is solely used for descriptive purposes and should not be construed as limiting in scope. Language such as "including", "comprising", "having", "containing", or "involving" and variations thereof, is intended to be broad and encompass the subject matter listed thereafter, equivalents, and additional subject matter not recited, and is not intended to exclude other additives, components, integers or steps. Likewise, the term

"comprising" is considered synonymous with the terms "including" or "containing" for applicable legal purposes. Any discussion of documents, acts, materials, devices, articles and the likes are included in the specification solely for the purpose of providing a context for the present invention. It is not suggested or represented that any or all of these matters form part of the prior art base or were common general knowledge in the field relevant to the present invention.

In this disclosure, whenever an element or a group of elements is preceded with the transitional phrase "comprising", it is understood that we also contemplate the same composition, element or group of elements with transitional phrases "consisting of", "consisting", "selected from the group of consisting of", "including", or "is" preceding the recitation of the composition, element or group of elements and vice versa.

This invention described herein may be embodied in many different forms and should not be construed as limited to the embodiment set forth herein. Rather, the embodiment is provided so that this disclosure will be thorough and complete and will fully convey the scope of the invention to those skilled in the art. In the following description, numeric values and ranges are provided for various aspects of the implementations described. These values and ranges are to be treated as examples only and are not intended to limit the scope of the claims.

In general terms, the embodiments of the present invention provide a geolocation-based payment system and a method thereof. The present invention provides a novel location-based payment system designed to significantly reduce queue time and enhance transaction efficiency during payment processes. The present invention aims to revolutionize traditional payment methods by providing a seamless and secure payment experience, eliminating the need for QR code scanning, credit/debit card swiping, and PIN entry. By recognizing the merchant's location with exceptional accuracy and retrieving a unique payment identifier for making payment, the present invention streamlines the payment process, enabling users to make payments swiftly and effortlessly. The present invention is meant to improve and quicken the payment process for registered users visiting specific locations that may be geofenced, such as Merchant Shops, grocery stores, Petrol Pumps etc. through their commonly used payment apps (no need for installing additional apps).

The invention will now be described in detail with reference to the accompanying drawings:

Figure 1 illustrates a geolocation-based payment system (100) (hereinafter referred to as "the system"), in accordance with an embodiment of the present invention. As shown in Figure 1, the system (100) comprises, but is not limited to, at least one user device (102) associated with a user for making payments; a server (106) configured to maintain accounts for registered users and merchants, and to manage transaction data and communication within the system (100); and a processing module (104) connected with the one or more user devices (102) using a communication network (110).

Herein, the user device (102) may be selected from, but is not limited to, a smartphone, tablet, or other portable electronic devices. The user device (102) is equipped with a geolocation sensor configured to determine the current geographic location of the user, and a payment application that facilitates transactions. The user device (102) includes a microprocessor for processing tasks, connection means such as ports for wired connections and Wi-Fi/Bluetooth modules for wireless connectivity, and input/output interfaces. The input/output interfaces may include a display screen, a touch-sensitive interface, and possibly other input mechanisms such as physical buttons or a keypad. Additionally, the user device (102) may utilize multiple geolocation technologies, including GPS, Wi-Fi triangulation, Bluetooth, and cellular network triangulation, to enhance the accuracy of the user's detected location relative to predefined geofenced areas.

In accordance with an embodiment of the present invention, the system (100) is equipped to detect geofenced areas. As would be understood to a skilled addressee, 'Geofencing' is a widely used technology that creates virtual geographic boundaries, or "geofences," around specific physical locations. These geofences are typically defined using various location-based technologies, such as Global Positioning System (GPS), Wi-Fi triangulation, Bluetooth beacons, and cellular network signals.

In a typical geofencing setup, geographic coordinates of a specific location, such as a merchant's venue, are identified and mapped. A virtual boundary is then established around this location, creating a geofence. When a user device (102) enters this

geofenced area, the geolocation sensor within the device detects the entry and triggers specific actions based on the system's configuration.

The system (100) utilizes this geofencing capability to identify when the user device (102) is within the proximity of a registered merchant location. Upon detecting the user device (102) within a geofenced area, the system (100) can proceed to retrieve and transmit the dynamic merchant identifier necessary for completing a payment transaction.

It will be appreciated by a skilled addressee that in this invention, geofencing is employed as a reliable and established technology to enhance the functionality of the geolocation-based payment system (100).

In accordance with an embodiment of the present invention, a communication network may also be used in the system (100) to connect the user device (102), processing module (104), and the server (106). The communication network can be a short-range communication network and/or a long-range communication network, either wired or wireless. The communication interface includes, but is not limited to, a serial communication interface, a parallel communication interface, or a combination thereof. The communication network may be implemented using a number of protocols, such as, but not limited to, TCP/IP, 3GPP, 3GPP2, LTE, IEEE 802.x, etc. The communication network may be a wireless communication network selected from one of, but not limited to, Bluetooth, radio frequency, internet, or satellite communication network, or a combination thereof, providing maximum coverage.

Furthermore, the processing module (104) is responsible for handling all processing tasks within the system (100). The processing module (104) is envisaged to include computing capabilities such as a memory unit (1022) configured to store machine-readable instructions. These machine-readable instructions may be loaded into the memory unit (1022) from a non-transitory machine-readable medium, such as, but not limited to, CD-ROMs, DVD-ROMs, and Flash Drives. Alternatively, the machine-readable instructions may be stored as a computer software program within the memory unit (1022). The memory unit (1022) may be selected from a group comprising EPROM, EEPROM, Flash memory, or other suitable storage technologies.

The processing module (104) includes a processor (1024) operably connected with the memory unit (1022), where the processor (1024) may be one of, but not limited to, a microprocessor, a general-purpose processor, an application-specific integrated circuit (ASIC), or a field-programmable gate array (FPGA). The processor (1024) executes the machine-readable instructions stored in the memory unit to perform various tasks, including geolocation data processing, comparison of geofenced areas, retrieval of dynamic merchant identifiers, and communication with the user device (102) and server (106).

In various embodiments, the configuration of the processing module (104) can vary based on the system's design and operational requirements:

1. **User Device-Based Processing:** In some embodiments, the processing tasks may be handled locally on the user device (102). In such cases, the processing module (104) may correspond to the microprocessor or other computational components within the user device (102). This configuration is beneficial in scenarios where the processing needs to be performed in real-time and directly on the user device (104), reducing latency and dependency on network connectivity.
2. **Server-Side Processing:** In other embodiments, the processing module (104) may be part of a cloud processing server (106) that remotely handles all processing tasks for the system (100). In this configuration, the server (106) executes the machine-readable instructions to process geolocation data, manage dynamic merchant identifiers, and facilitate communication between multiple user devices (102). This approach is advantageous for centralized management, scalability, and the ability to handle complex processing tasks that require significant computational resources.
3. **Hybrid Configuration:** In yet another embodiment, the system (100) may utilize a hybrid configuration where the processing module (104) operates both on the user device (102) and the server (106). In this setup, certain processing tasks, such as geolocation data determination and initial comparison with geofenced areas, may be handled locally on the user device (102). More complex tasks, such as updating dynamic merchant identifiers and maintaining

transaction history, may be processed on the server (106). This hybrid approach optimizes performance by balancing the load between the user device (102) and the server (106), ensuring efficient operation across various network conditions.

In addition, the server (106) plays a critical role in maintaining accounts for registered users and merchants, managing transaction data, and facilitating communication within the system (100). In accordance with an embodiment of the present invention, the server (106) may also include a data repository. This data repository may be a local storage or cloud-based storage system, capable of storing predefined geofenced areas associated with registered merchant locations, dynamic merchant identifiers, and transaction histories. The data repository is designed to provide data to the processing module (104) when queried, using applicable security and data transfer protocols. Additionally, the data repository may be configured to store localization signals specific to each merchant's venue in the database, ensuring accurate and secure transaction processing.

In the context of a cloud-based system, the server (106) may be part of a distributed computing environment, where multiple servers work in tandem to provide high availability, redundancy, and load balancing. The server (106) can communicate with the user device (102) and the processing module (104) via a secure wireless communication network, ensuring data integrity and protection against potential cyber threats.

Additionally, the server (106) may provide APIs for integrating with various payment platforms, including UPI, credit cards, digital wallets, and bank transfers. It may also support third-party services such as loyalty programs and promotions, enhancing the functionality and versatility of the system (100).

As would be apparent, the processing module (104) and server (106) form the backbone of the geolocation-based payment system (100), enabling secure, efficient, and flexible processing of geolocation data and payment transactions, whether the processing occurs on the user device (102), the server (106), or through a combination of both.

The geolocation-based payment system (100) is designed with robust data security measures to ensure the confidentiality, integrity, and availability of sensitive information processed within the system. To protect against unauthorized access, data breaches, and other potential threats, the system employs a multi-layered security framework. All data transmitted between the user device (102), processing module (104), and server (106) is encrypted using industry-standard encryption protocols, such as Advanced Encryption Standard (AES) or Transport Layer Security (TLS). This encryption safeguards data during transmission, making it unreadable and secure even if intercepted. Additionally, sensitive information stored in the server (106) and data repository, including geolocation data, transaction histories, and dynamic merchant identifiers, is also encrypted at rest to prevent unauthorized access in the event of a storage medium compromise.

The system (100) further incorporates secure authentication mechanisms to verify the identity of users and merchants before processing any transactions. Users may be required to complete multi-factor authentication (MFA), which could involve passwords, biometrics, or one-time passcodes sent to the user device (102). For merchants, the system ensures that only registered and authorized devices can interact with the system by using secure login credentials and device-specific authentication methods. Moreover, the use of dynamic merchant codes, which are periodically updated, adds an additional layer of security by minimizing the risk of fraudulent activities. These codes ensure that each transaction is tied to a unique and time-sensitive identifier, further enhancing the overall security of the payment process.

Method of Operation:

Figure 2 illustrates a geolocation-based payment method (hereinafter referred to as “the method (200)”), in accordance with an embodiment of the present invention. The method of operation, as illustrated in **Figure 2**, involves a sequence of steps, each corresponding to a specific aspect of the payment process. This section will be better understood with simultaneous reference to the exemplary information flow shown in **Figures 3A-3B**.

Although not specifically essential to the present invention, the registration process is a critical precursor to the operation of the geolocation-based payment system (100).

During registration, the merchant's venue is precisely mapped and geofenced using state-of-the-art geofencing technology. This process creates a virtual boundary around the merchant's location, ensuring accurate identification when user devices (102) enter the vicinity.

As explained, geofencing involves creating virtual geographic zones using technologies such as GPS, Wi-Fi triangulation, Bluetooth beacons, and cellular network signals. The merchant's store may also be equipped with one or more inbuilt or externally connected GPS modules, NFC, RFID tags, or internet modules for determining the location of the respective customer device. These localization signals are then captured and stored in the data repository of the server (106), facilitating swift identification and authentication during payment transactions. Since, geofencing is generally known in the art, so, in some embodiments, it may be assumed that a no. of merchant locations are stored as predefined geofenced locations along with their respective localization signals. In some other embodiments, the users may also be required to register before they can use the present invention for transaction.

Now, the geolocation-based payment method begins when a user enters a particular geofenced area.

Step 202: Determining User's Geolocation

As shown in **Figure 2**, the first operational step involves determining, by a geolocation sensor in at least one user device (102), the current geographic location of the user. This is represented as **step 202**. The user device (102) may utilize multiple geolocation technologies, including GPS, Wi-Fi triangulation, Bluetooth, and cellular network triangulation, to accurately determine the user's location relative to predefined geofenced areas.

In an exemplary implementation (as shown in **Figures 3A**), as the user device (102) enters a geofenced area (302), the geolocation sensor detects the entry and the user's location is precisely determined.

Step 204: Receiving Geolocation Data

Following the determination of the user's location, the geolocation data is received by the processing module (104) via the wireless communication network (110), as illustrated in **step 204** of **Figure 2**. The processing module (104) uses this data to proceed with the subsequent steps of the method (200). The data transmission is secured and ensures that the system accurately identifies the user's proximity to a registered merchant.

Step 206: Comparing Geolocation Data with Geofenced Areas

Once the geolocation data is received, the processing module (104) compares the received geolocation data with predefined geofenced areas associated with registered merchant locations stored in the server (106), as shown in **step 206** of **Figure 2**. This comparison is crucial for determining whether the user is within the vicinity of a registered merchant. **Figures 3A** also illustrates this step.

Step 208: Retrieving Dynamic Merchant Identifier

Upon successful comparison and confirmation that the user is within a registered merchant's geofenced area, the processing module (104) retrieves a dynamic merchant identifier corresponding to the detected geofenced area. This is represented as **step 208** in **Figure 2** and also shown in **figure 3A**. The dynamic merchant identifier, which is periodically updated for security purposes, is stored in the server (106) and is essential for initiating a secure payment process.

Step 210: Transmitting Dynamic Merchant Identifier and Initiating Payment

Following the retrieval of the dynamic merchant identifier, the processing module (104) transmits the identifier to the user device (102). This step is depicted as **step 210** in **Figures 2** and **3A**.

Now, referring to **figure 3B**, after receiving the dynamic merchant identifier, the user device (102) may display a prompt on the screen, indicating that the merchant has been detected and asking the user to initiate the payment. The user is presented with options to choose a preferred payment method, such as UPI, credit card, or other supported digital wallets. Accordingly, the user selects the desired payment method, which triggers the payment process within the system (100).

In some embodiments, for additional security, a secure handshaking process may be initiated between the user device (102) and the server (106) to verify the authenticity of the transaction. The handshaking process ensures that the dynamic merchant identifier corresponds to the correct merchant and that both the user device (102) and merchant location are authenticated. This secure verification process is critical to prevent fraudulent activities and unauthorized transactions.

Upon successful verification, the payment process is facilitated and completed as illustrated in Figure 3B. The user device (102) sends a payment confirmation to the server (106), which then processes the transaction.

The server (106) communicates the transaction details back to the user device (102), confirming that the payment has been successfully completed. This is typically indicated on the user device's screen with a message such as "Transaction Complete" or "Payment Successful."

In some embodiments, the payment process may be initiated by a payment request directly from the merchant. In this scenario, the merchant specifies the transaction amount along with other relevant details, such as the nature of the transaction or any applicable discounts. This payment request is transmitted to the system (100) via the server (106). Upon receiving the payment request, the system (100) undertakes a verification process to ensure the user device (102) is within the proximity of the merchant's location, which has been predefined and geofenced. The proximity verification is crucial as it ensures that the transaction is only authorized when the user is physically near the merchant, thus enhancing security and preventing unauthorized transactions. Once the proximity of the user device (102) to the merchant is confirmed, the system (100) prompts the user to authorize the payment. The user then reviews the payment request on their device, verifies the amount, and approves the transaction using their preferred payment method, such as UPI or another digital payment platform. The transaction is then processed, and both the user and merchant receive a confirmation of the successful payment.

This merchant-initiated payment process is particularly useful in scenarios where the merchant needs to have control over the transaction initiation, such as in restaurants,

service-based businesses, or any situation where the payment amount is variable and determined by the merchant.

In some other embodiments, the payment process may involve the user selecting a merchant from a dynamically generated list of nearby merchants. In this embodiment, the system (100) first detects the user's current geographic location using the geolocation sensor in the user device (102). Based on this location, the system (100) generates a list of registered merchants that are within a predefined proximity, such as a geofenced area, relative to the user. This list is presented on the user device (102) in an ordered manner, potentially ranked by distance or other criteria like merchant popularity or user preferences. The user then selects a merchant from this list, initiating the payment process. Once the merchant is selected, the system (100) retrieves the dynamic merchant identifier associated with the selected merchant and begins the payment transaction. The user is then prompted to confirm the payment details, such as the amount, and choose their preferred payment method. After the user authorizes the payment, the system (100) completes the transaction and sends a confirmation to both the user and the merchant, ensuring that the process is both seamless and secure.

Real-Life Working Example:

Scenario: Emily, a busy professional, frequently refuels her car at "Indian Oil," a popular petrol station near her office. The petrol station has registered with a geolocation-based payment system (100) and is equipped with geofencing technology to facilitate seamless, contactless payments. Emily has the payment application of the present invention installed on her smartphone (102), which is configured to use multiple geolocation technologies such as GPS, Wi-Fi triangulation, and Bluetooth to determine her precise location.

Merchant Registration: "Indian Oil" registered with the payment system and provided its exact geographic coordinates during registration. The system (100) used these coordinates to create a geofence around the petrol station, ensuring that any customer within this geofenced area could be recognized for payment purposes. During registration, "Indian Oil" was also assigned a unique dynamic merchant identifier, which is periodically updated by the system to enhance transaction security.

Emily's Refueling Experience: One morning, Emily drives into "Indian Oil" to refuel her car. As she enters the petrol station's geofenced area (302), her smartphone (102) automatically detects her presence within the designated zone. The geolocation sensor in her smartphone accurately determines her location using a combination of GPS and Wi-Fi signals. The system (100) then compares Emily's current location with the predefined geofenced area stored in the server (106).

Traditional Payment Hassles: In the past, Emily would have needed to wait for the attendant to provide a QR code or direct her to a POS terminal to make the payment. This process often took time, especially when the station was busy, leading to delays not only for her but also for other customers waiting in line to refuel their vehicles. The need to manually scan a QR code or swipe a card at the POS terminal added unnecessary steps to the process, causing further delays.

Payment Initiation with the New System: Now, with the geolocation-based payment system (100), as soon as Emily's location is confirmed within the geofenced area, the system (100) retrieves the dynamic merchant identifier for "Indian Oil" from the server (106). This identifier is transmitted to Emily's smartphone (102), where the payment application recognizes the petrol station as a registered merchant. The application prompts Emily with a message, "Merchant Detected: Indian Oil," and offers her the option to initiate payment without needing to wait for a QR code or POS terminal.

Payment Process: Emily selects her preferred payment method—UPI—within the application. The system (100) then initiates a secure handshaking process between Emily's smartphone and the server (106) to verify the authenticity of the transaction. Once the verification is complete, Emily is prompted to confirm the payment amount, which reflects the cost of the fuel she has just filled.

Completion of Payment: Emily confirms the payment, and the system (100) processes the transaction through the UPI platform. Within seconds, both Emily and "Indian Oil" receive a confirmation message indicating that the payment has been successfully completed. The transaction history is updated in the server (106), ensuring that both Emily and the petrol station can review the transaction at any time. This quick and efficient process means that Emily can drive off without making other customers wait unnecessarily for their turn.

Alternative Scenario – Merchant-Initiated Payment: On another day, when the petrol station is particularly busy, the attendant at "Indian Oil" quickly initiates a payment request for Emily's refueling amount directly from the station's system. The system (100) verifies that Emily is within the geofenced area and sends a payment prompt to her smartphone (102) with the exact amount. Without needing to interact with a physical terminal, Emily taps "Approve" on the payment prompt, and the transaction is completed within seconds, allowing her to continue on her way without delay.

In this real-life example, the geolocation-based payment system (100) at "Indian Oil" significantly improves the customer experience by eliminating the need for QR codes or POS terminals. This not only saves time for Emily but also reduces waiting times for other customers, making the refueling process faster, more convenient, and more secure.

The present invention offers several significant advantages in the realm of merchant payments, particularly through the integration of geolocation technology and dynamic merchant codes. These advantages contribute to a more secure, efficient, and user-friendly payment system:

1. **Enhanced Security:** By leveraging geofencing technology and dynamic merchant codes, the present invention significantly enhances the security of payment transactions. Geofencing ensures that payments are only processed when the user device is within a precisely defined geographic area, reducing the risk of fraudulent transactions. The use of dynamic merchant codes, which are periodically updated, further minimizes the likelihood of unauthorized access or tampering, providing a robust layer of security.
2. **Reduced Transaction Times:** The geolocation-based payment system streamlines the payment process, drastically reducing the time required to complete transactions. By eliminating the need for physical merchant devices, QR codes, or manual entry of UPI IDs, the system allows users to make payments quickly and effortlessly. This not only enhances the customer experience by minimizing wait times but also increases throughput for merchants, particularly in high-traffic environments like petrol stations or retail outlets.

3. **Cost Efficiency for Merchants:** One of the standout benefits of the present invention is the elimination of the need for traditional merchant devices such as POS terminals, QR codes, or physical UPI IDs. This reduction in hardware requirements lowers the overall cost for merchants, who no longer need to invest in or maintain expensive payment processing equipment. Additionally, the system reduces operational costs associated with managing these devices, making it an economically advantageous solution for businesses of all sizes.
4. **Seamless User Experience:** The system is designed to provide a seamless payment experience for users. With the ability to detect when a user enters a geofenced area, the system automatically initiates the payment process, removing the need for manual intervention such as scanning QR codes or entering payment information. This level of automation not only makes the payment process faster but also more intuitive, allowing users to complete transactions with minimal effort.
5. **Increased Accuracy in Payment Transactions:** By mapping and geofencing merchant venues with precision, the system ensures that payment transactions are highly accurate. The geofencing technology ensures that the correct merchant is identified, and the dynamic merchant codes further enhance the accuracy by preventing errors associated with static codes or identifiers. This accuracy fosters a trustworthy payment ecosystem where users and merchants can confidently engage in transactions.
6. **Elimination of Merchant Devices:** The uniqueness of the present invention lies in its ability to function without the need for traditional merchant devices. By eliminating the necessity for QR codes, UPI IDs, and POS terminals, the system simplifies the payment process and reduces the physical infrastructure required to facilitate payments. This not only makes the system more scalable and easier to deploy across various locations but also reduces the likelihood of technical issues that can arise from hardware malfunctions.
7. **Scalability and Flexibility:** The geolocation-based payment system is highly scalable and flexible, capable of being implemented across a wide range of environments, from small retail shops to large-scale service providers like petrol

stations. The use of geofencing and cloud-based processing allows the system to easily adapt to different merchant needs and user preferences, making it a versatile solution for modern payment challenges.

8. **Improved Customer Satisfaction:** With faster transaction times, enhanced security, and a seamless payment experience, the present invention is likely to significantly improve customer satisfaction. Users appreciate the convenience and speed of the payment process, while merchants benefit from increased customer throughput and reduced operational costs. This leads to a more positive overall experience for both parties involved.

Various modifications to these embodiments are apparent to those skilled in the art from the description and the accompanying drawings. The principles associated with the various embodiments described herein may be applied to other embodiments. Therefore, the description is not intended to be limited to the embodiments shown along with the accompanying drawings but is to be providing broadest scope of consistent with the principles and the novel and inventive features disclosed or suggested herein. Accordingly, the invention is anticipated to hold on to all other such alternatives, modifications, and variations that fall within the scope of the present invention and the appended claims.

I Claim

1. A geolocation-based payment system (100), comprising:
 - at least one user device (102) associated with a user, the user device (102) being equipped with a geolocation sensor configured to determine a current geographic location of the user and a payment application configured to facilitate transactions;
 - a server (106) configured to maintain accounts for registered users and merchants, and to manage transaction data and communication within the system (100);
 - a processing module (104) communicatively coupled to the at least one user device (102) and the server (106) via a wireless communication network (110), the processing module (104) being configured to:
 - receive geolocation data from the user device (102);
 - compare the received geolocation data with predefined geofenced areas associated with registered merchant locations;
 - retrieve a dynamic merchant identifier corresponding to the detected geofenced area, the dynamic merchant identifier being periodically updated by the processing module (104); and
 - transmit the dynamic merchant identifier to the user device (102), enabling the user device (102) to perform a payment transaction upon receiving the dynamic merchant identifier from the processing module (104), without requiring interaction with a physical merchant device.
2. The geolocation-based payment system (100) of claim 1, wherein the processing module (104) is further configured to periodically update the dynamic merchant identifier using a cryptographic algorithm to ensure transaction security and prevent unauthorized access.
3. The geolocation-based payment system (100) of claim 1, wherein the geolocation sensor in the user device (102) utilizes multiple geolocation technologies selected from a group comprising GPS, Wi-Fi triangulation, Bluetooth, cellular network triangulation, or a combination thereof, to enhance an accuracy of the user's detected location relative to the predefined geofenced areas.

4. The geolocation-based payment system (100) of claim 1, wherein the processing module (104) is further configured to store transaction history on the server (106), wherein the server (106) is configured to provide secure access to transaction records for both the users and the merchants, allowing them to review past transactions.
5. The geolocation-based payment system (100) of claim 1, wherein the system (100) includes an API configured to integrate with multiple payment platforms, including UPI, credit cards, digital wallets, and bank transfers, and to support third-party services selected from loyalty programs and promotions.
6. The geolocation-based payment system (100) of claim 1, wherein the processing module (104) is further configured to:
 - receive a payment request initiated by a registered merchant account via the server (106), the payment request specifying a particular transaction amount and including the merchant's geolocation;
 - compare the merchant's geolocation with the user's geolocation to verify that the user is within a specified proximity of the merchant's location;
 - upon verifying the proximity, transmit a payment prompt to the user device (102), instructing the user to authorize the specified payment amount to the merchant account via the a payment platform interface.
7. The geolocation-based payment system (100) of claim 1, wherein the processing module (104) is further configured to:
 - create a list of registered merchants in proximity to the user's current geolocation;
 - present the curated list of nearby merchants on the user device (102) in an ordered manner; and
 - enable the user to select a merchant from the list and initiate a payment to the selected merchant via a payment platform interface.
8. A geolocation-based payment method, comprising:
 - determining, by a geolocation sensor in at least one user device (102) associated with a user, a current geographic location of the user;
 - receiving geolocation data from the user device (102) via a wireless communication network (110);

comparing the received geolocation data with predefined geofenced areas associated with registered merchant locations stored in a server (106);

retrieving a dynamic merchant identifier corresponding to the detected geofenced area, the dynamic merchant identifier being periodically updated;

transmitting the dynamic merchant identifier to the user device (102), enabling the user device (102) to perform a payment transaction upon receiving the dynamic merchant identifier, without requiring interaction with a physical merchant device.

9. The geolocation-based payment method of claim 8, further comprising a step of periodically updating the dynamic merchant identifier using a cryptographic algorithm to ensure transaction security and prevent unauthorized access.
10. The geolocation-based payment method of claim 8, wherein the geolocation sensor in the user device (102) utilizes multiple geolocation technologies selected from a group comprising GPS, Wi-Fi triangulation, Bluetooth, cellular network triangulation, or a combination thereof, to enhance an accuracy of the user's detected location relative to the predefined geofenced areas.
11. The geolocation-based payment method of claim 8, further comprising:
 - storing transaction history on the server (106); and
 - providing secure access to transaction records for both the users and the merchants, allowing them to review past transactions.
12. The geolocation-based payment method of claim 8, further comprising a step of integrating an API of the geolocation-based payment method with multiple payment platforms, including UPI, credit cards, digital wallets, bank transfers, and supporting third-party services selected from loyalty programs and promotions.
13. The geolocation-based payment method of claim 8, further comprising:
 - receiving a payment request initiated by a registered merchant account via the server (106), the payment request specifying a particular transaction amount and including the merchant's geolocation;
 - comparing the merchant's geolocation with the user's geolocation to verify that the user is within a specified proximity of the merchant's location;

upon verifying the proximity, transmitting a payment prompt to the user device (102), instructing the user to authorize the specified payment amount to the merchant account via the payment platform interface.

14. The geolocation-based payment method of claim 8, further comprising:

creating a list of registered merchants in proximity to the user's current geolocation;

presenting the curated list of nearby merchants on the user device (102) in an ordered manner;

enabling the user to select a merchant from the list and initiate a payment to the selected merchant via a payment platform interface.