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# TOUCHLESS ATM

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**Abstract:** Science and technology have made enormous advances in the past few years, resulting in hand gesture recognition technologies and their applications, including touchless devices and personal identification tools that minimize the risk of touching equipment and screens. As a result, viruses are less likely to spread because of hand gesture recognition technology and applications. Worldwide, millions of individuals have been impacted by coronavirus, which is rapidly spreading. Our team concluded that interaction in public settings is the main factor in the current spike in coronavirus cases. Therefore, we created this initiative to do away with the requirement for interaction at key locations, like banks. For many members of society, having access to money is still crucial under the present worldwide lockdown. Studies conducted on the virus all around the world have revealed that it may survive on solid surfaces for up to two days. This research attempts to guarantee that bank transactions are safe because it is not advised to sanitise electronic devices like POS terminals and ATMs after each usage. We present a model using the ATM camera to recognize hand motions for the purposes of utilizing touchless ATMs.

## I. INTRODUCTION

In today's world, we interact with gadgets and machinery mostly using touch, whether we're browsing the internet on a mobile device, using a vending machine, entering a PIN at the point of sale (POS), or using an ATM. As a result of the Corona pandemic, researchers from a variety of fields, especially those in the information technology industry, are now more concerned with minimizing direct human-technology interactions, particularly when it comes to finance and commerce. Customers generally interact with Automated Teller devices (ATMs) through "Touch" interactions in the banking business, where these devices handle the majority of transactions. As a result, the system is regularly used by numerous users at the same time, thereby increasing the danger of virus transmission due to the devices' lack of self-sterilization. "Touchless" control and interaction are becoming more common in human-machine interactions. One of the most prominent approaches is to carry out certain tasks using intelligent voice commands. One of the most well-known applications is "Amazon Alexa," an artificial intelligence-based virtual assistant developed by Amazon. Furthermore, "touchless" human-computer interaction has and continues to rely largely on vision-based technology. The field of gesture recognition is rapidly increasing. Gesture recognition is now used in a wide range of applications, including gaming, home automation, cell phones, cameras, and personal computers. Touchless technology, in addition to being a component of the technological revolution, is becoming increasingly important for human health preservation. Encountering a contaminated surface, such as an ATM used by an infected individual, can expose one to the viral illness and other highly dangerous diseases. The purpose of this project is to provide a practical, economical, backward-compatible, and easy-to-deploy touchless interface for publicly accessible self-service devices such as ATMs, Cash Deposit Machines, Vending Machines, Points of Sale (POS), Ticketing Kiosks, and Parking Tickets. This strategy significantly reduces the chances of contracting an infection. Finally, the proposed solution is based on tracking hand movement to move the pointer or highlight and focus on a field or button. It is possible to use a word like "choose" as voice activation for the Clicking action.

## II. LITERATURE REVIEW

Since the invention of touch-sensitive digital devices such as ATMs, [10] intel.com, technology has improved, and touch devices have now become problematic without lowering the risks they bring. To control a hand motion without touching, a thorough authentication system that certifies the user from many sources is required. The CNN form can be used to alter the authentication code, which saves memory. The special authentication code consists of an integer between 0 and 9. To distinguish motions and image processing, bypass neural networks (CNN) can be used to compare hand shapes or determine how they differ. The system presented in this article employs sensors to track finger movements. The efficacy of the measurement is limited by the similarity between gesture and non-gesture frames, [9] Al-Hammadi, Muneer,which is determined by analysing projections, evaluating three-dimensional geometric characteristics, and examining electroencephalogram (EEG) responses. It is difficult to define the limitations of continuous movements while designing the hand gesture detection system in real time from start to finish. [6] Lu, Yifan, ChangzhanGu, Lin-Sheng Wu, and Jun-FaMao,To improve the precision of time-segment networks, a lightweight semantic segmentation methodology (FASSD-Net) and a real-time hand motion recognition method based on side-by-side RGB frames were used.

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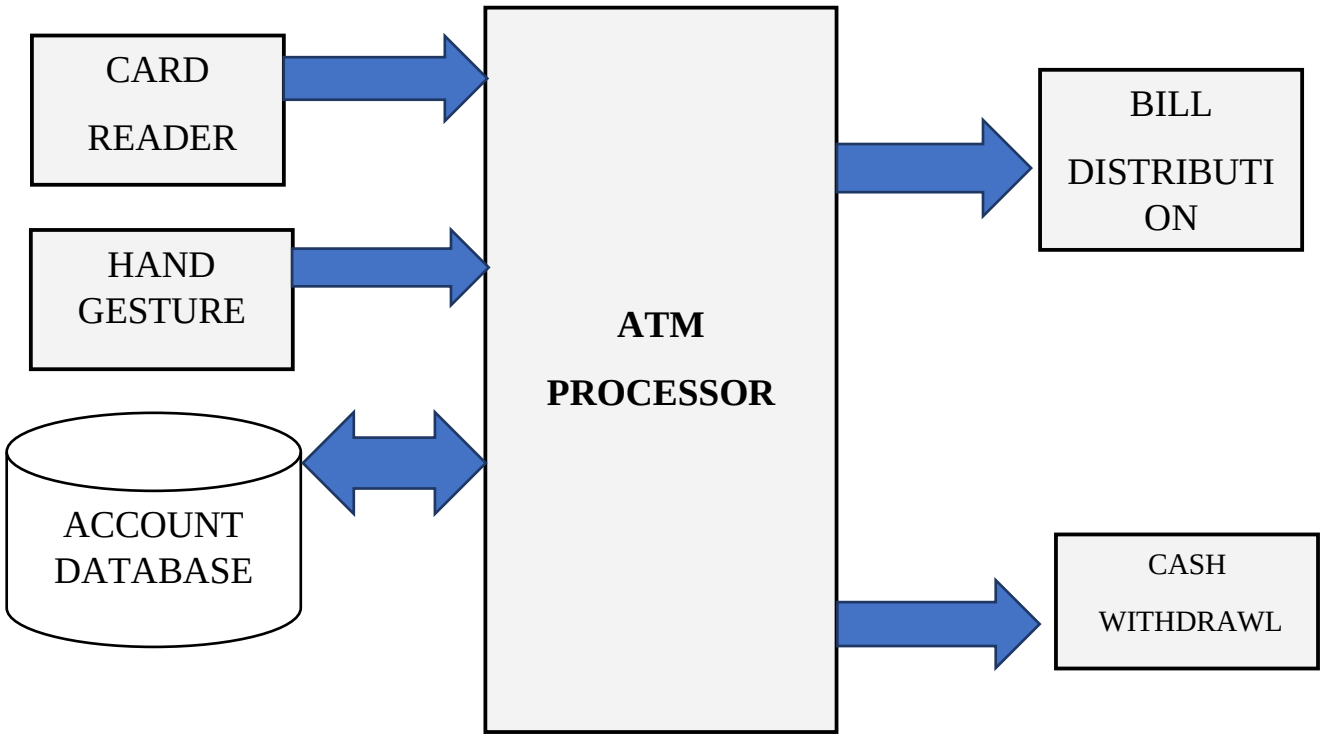
Time shift notches (TSNs) and time shift modules (TSMs) are utilised instead of manual segmentation. [4] Benitez-Garcia, Gibran, Lidia Prudente-Tixteco, Luis Carlos Castro-Madrid, Rocio Toscano-Medina, Jesus Olivares Mercado, Gabriel Sanchez-Perez, and Luis Javier Garcia Villalba, optical flow and depth techniques the movement of the hand is recognised in real time using ultrasonic sensors, and a three-dimensional ray-tracing model is provided for non-touch sensing of hand motions utilising microwaves or millimetre-wave radar. Although hand detection is difficult, especially under unexpected situations, end users can tailor gesture detection from demos for smartphones with RGB cameras on top. a method for distinguishing hand gestures and identifying fingers using a single convolutional neural network the dynamic hand gesture recognition system, which segments the hand using multiple deep learning architectures, is one technology with a promising future.

To address the need for a touchless ATM during the COVID-19 outbreak, Anvekar advises designing hardware and a way for key or keyboard action based on the user's finger sensing with little energy consumption. While Kumamoto and associates created a method that minimises the impact on already in use public equipment while allowing a variety of public devices to operate offline using individual smartphones. RubanaGudi suggests a British Sign Language-based ATM-handling system that is beneficial to the blind through study but is inaccessible to non-blind people because everyone must learn sign language, making it challenging to put into effect without exceptional circumstances. Due of the audible lights, this poses a threat to privacy and security aside from ATM growth and cost-increasing modifications. Recognising non-touch hand gestures, particularly in public locations like elevators and automated teller machines or even in enclosed environments like operating rooms that necessitate a high level of sterility upkeep, is the safest technique to prevent the spread of diseases and viruses like COVID-19. To accomplish their objective in this instance, the researchers used non-touch hand movements.

## III. METHODOLOGY

To execute the approach of this article, a comprehensive, transaction-focused research of current ATM transaction needs as well as a feasibility study to introduce touchless use were carried out. Following the creation of a conceptual design, based on both functional and non-functional needs. This area also considers any modifications that must be made to the ATM hardware and software. This part also emphasises making only necessary adjustments to present assets. This section describes a functional implementation of the Touchless ATM user experience (minimum viable product, MVP). A cursor will be shown on the ATM screen that moves in reaction to the user's hand movement, and the MVP will use CV to detect and monitor the user's hand movement. In our scenario, any sound peak will be labelled a click; the sound can be human voice or just snapping your fingers. A complete transaction lifetime must be implemented to obtain an MVP version; the next two sub-sections discuss a comprehensive ATM transaction lifecycle in detail and a proposed touchless lifecycle in depth.



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The architecture of the touchless ATM system depicted above is to explain the process of the system for simple understanding. With the above diagram we can understand the process as the card reader is to read the data in the customers card given that is given as input to the processor of ATM then the recognition of hand gesture is recognised by the system's camera by the ATM processor then all the details collected from customer is sent to the database to verify and the transaction takes place where the cash is withdrawn by the processor out to customer and the bill is issued by the processor and finally the recent transaction is recorded and saved in the database.

### A. ACCOUNT IDENTIFICATION

It is advised for the customer to either submit their bank card information beforehand or to simply select the contactless option. We advise presenting a masked video stream in the top right corner to alert the user that this ATM uses a front-facing camera to record human movement. We believe that by viewing these clips, the user can be convinced to try a touchless experience.

### B. INTERACTION SELECTION (TOUCHLESS OR TOUCH BASED)

After successfully verifying the account, the user is urged to begin a touchless user experience by putting his or her hand in the centre of the RED rectangle on the screen. The user is quickly moved to a touch-based experience if they ever engage with the ATM's buttons or touch screen.

### C. USER AUTHENTICATION

For authentication, you can make use of a PIN, a token, or an OTP. By simply displaying the identification number with their fingers, the user can submit the identification number; the CV module will count the number of fingers and enter it in the input area. The user also has the option of using a hand motion to move the cursor over the numbers on a virtual PIN pad in order to choose them.

### D. TRANSACTION SELECTION

There are several transaction selection possibilities and circumstances when utilising a touchless experience. By giving commands like "user says: CASH WITHDRAW," or by simply moving the mouse over possible transactions on the screen, users may select a transaction. With the aid of new, flappable panels, the user may find the necessary transaction; nevertheless, to guarantee a positive user experience, the screens should be organised in the order of the most often executed transactions using previous user data from logged-in users. The user can choose between utilising a virtual PIN pad and the same method for entering transaction data. Drag the mouse over the green confirmation button to choose it.

## IV. RESULTS AND DISCUSSION

This paper aims to present a cutting-edge, safe, effective, user-friendly, simple to grasp, and backward-compatible ATM experience. The proposed approach must be thorough and adhere to all functional and non-functional requirements already in use by banks. To accomplish the objectives, the technique should be non-invasive and reversible, which means that after attempting to use the touchless experience, the user can always switch back to touch-based interaction. As mentioned in the methodology section, the list of activities is as follows:

- Identification of accounts
- Interaction type (touch-based vs. touchless)
- User login - Number selection using hand gestures
- Moving the cursor over the simulated PIN pad and clicking it Transaction selection - Screen turning to the chosen transaction - Entry of transaction information - Transaction confirmation - Termination of ATM session

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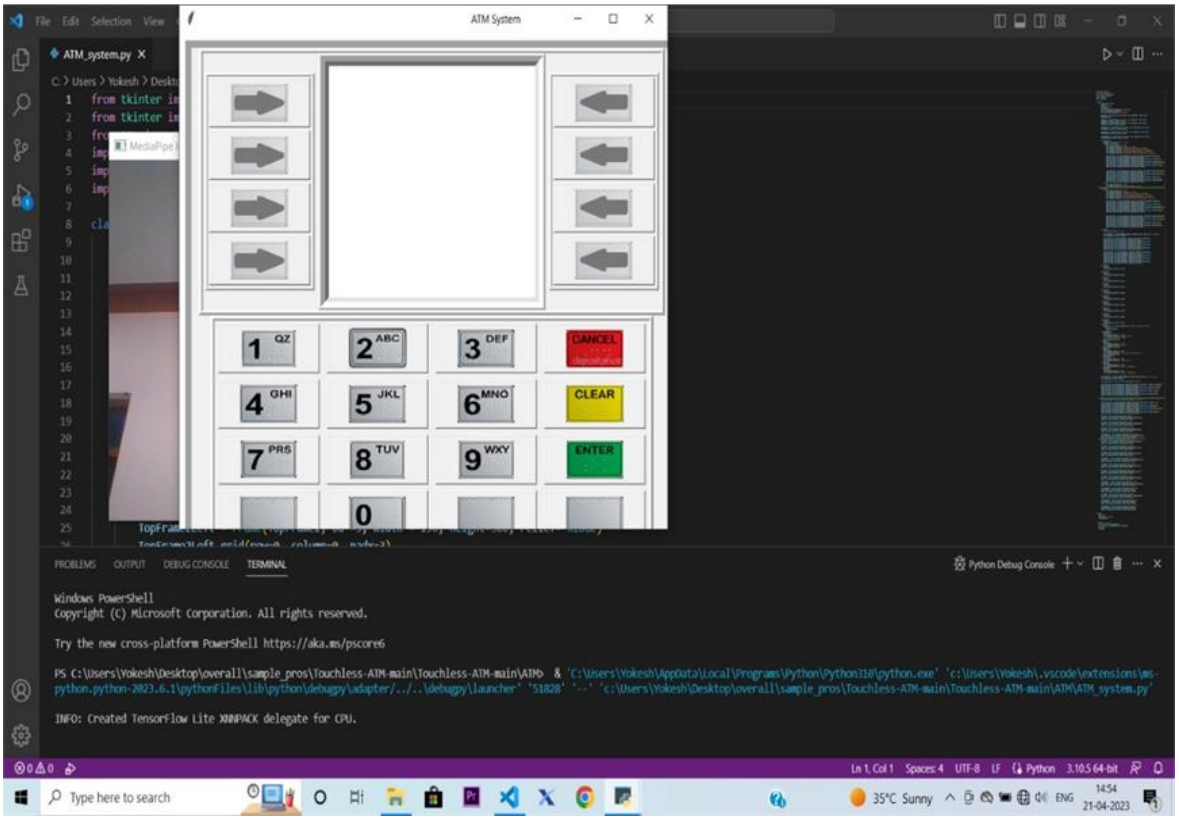


Figure 1. irtual ATM key

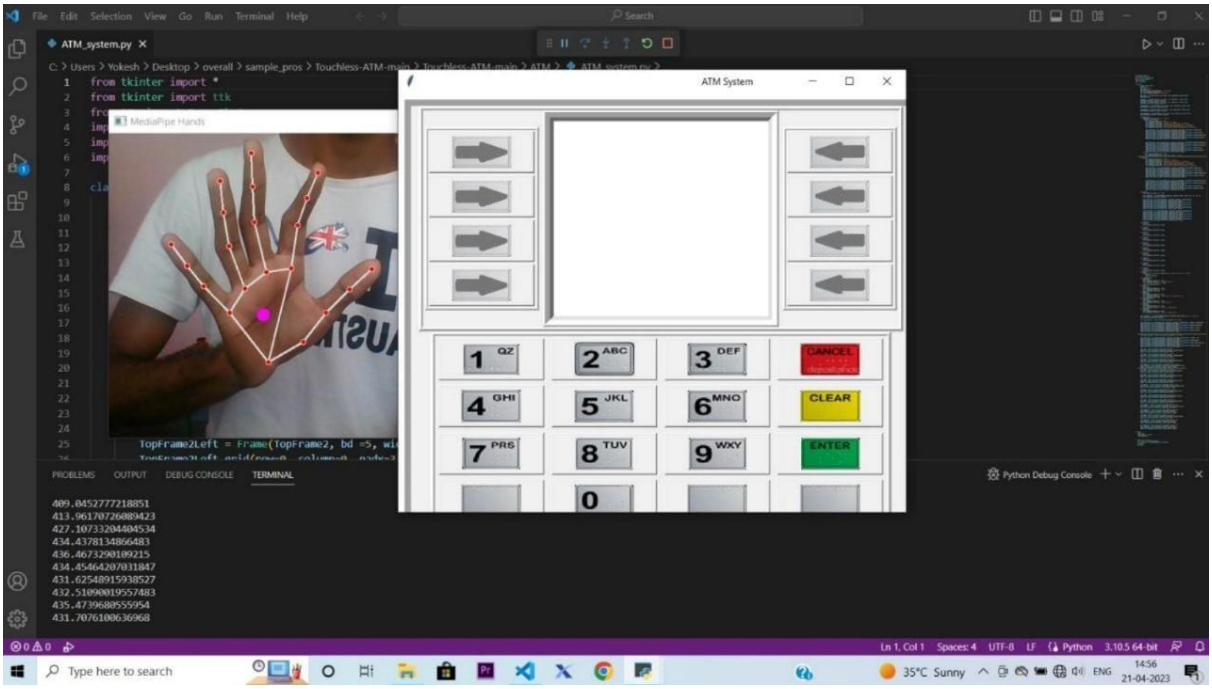


Figure 2. Recognition of hand gesture

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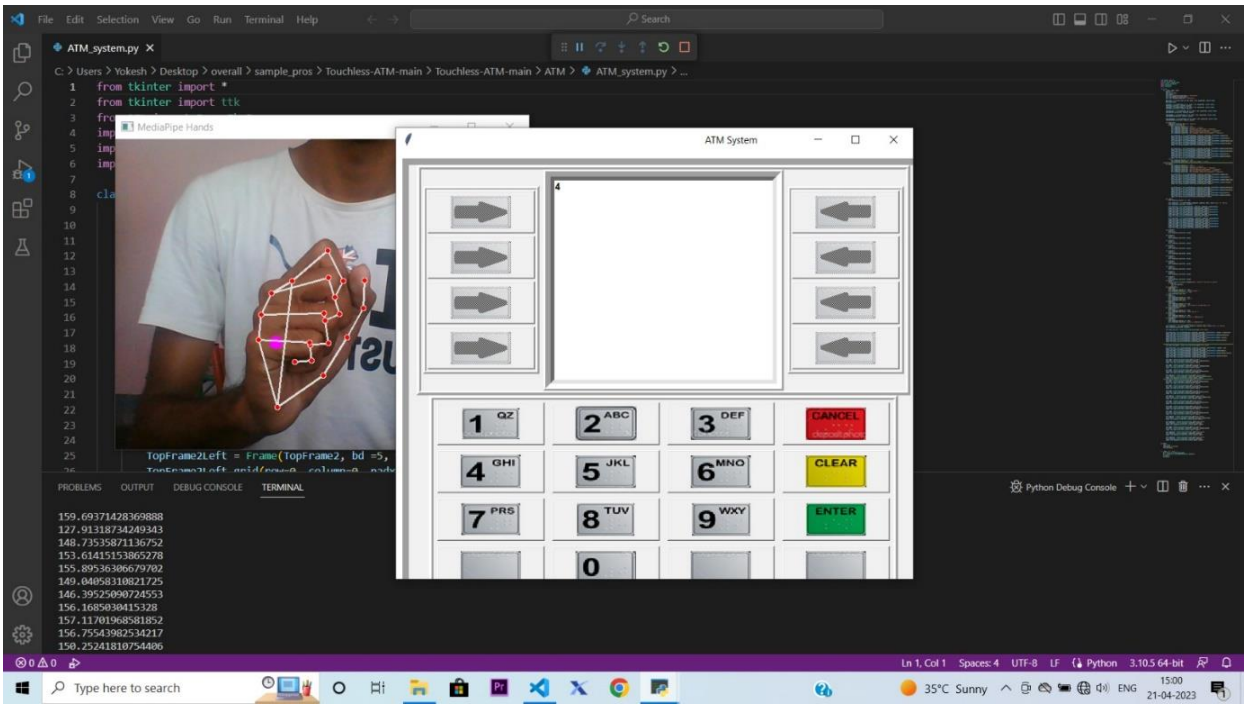


Figure 3. Selection of keys

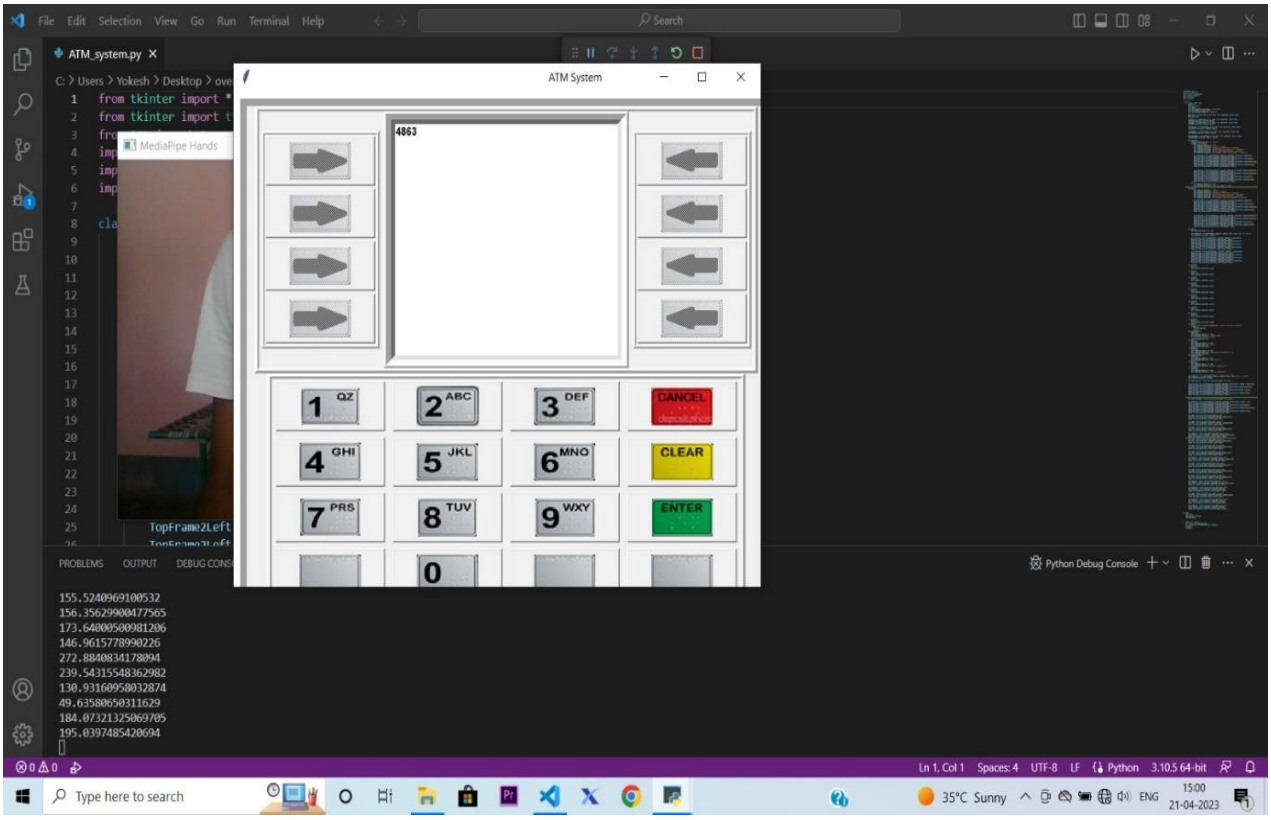


Figure 4. Pin number entered with handgestures

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## V. CONCLUSION

In this study, we present a model for the usage of ATMs in the Corona pandemic that additionally considers the fact that hand gestures might be used to corroborate verbal instructions. The user has now been recognised, and the recognition has been verified. The identification camera on the ATM recognises the user's hand motions using a computer vision model. Therefore to prevent the spread of infectious disease and viruses among the humans through the physical touch of the common surfaces like ATM keypads.Thus to avoid thiskind of direct contact with the infected surfaces these technologies were introduced and are still developing for the future world.

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