

# ATM System using Augmented Reality Technology

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**Abstract** - The existing Automated teller machine (ATM) is the typical cash distribution machine with classic card swipe and pin technology. However, there is a lot of touch between your hands and the machine, and given the current circumstance, flattening the curve by inhibiting the spread of COVID-19 is crucial. According to research, the COVID-19 virus can spread through commonly used public objects such as ATM keypads. Additionally, existing ATM cabins have cameras installed for security purposes, however with advances in hacking, these cameras might be exploited, and ATM pins could be disclosed by screening fingerprints. The suggested method eliminates the need for human contact throughout the process, and the model includes software that is based on Augmented Reality, allowing everything to be done with just a smartphone camera and no other special hardware or software. Furthermore, because no intruder/hacker has access to the ATM pin, the system is very capable of maintaining its confidentiality. As a result, no physical contact is required to type the pin or pick any other system parameters. Furthermore, touchless Augmented Reality-based ATM systems are simple to use because they reduce the possibility of card skimming. And, given the current COVID-19 situation, it's a great start in limiting the virus's transmission.

**Key Words:** Augmented Reality, Mobile Banking, COVID-19, User Experience, Mobile Application.

## 1. INTRODUCTION

The pandemic of Covid-19 has necessitated the development of equipment that allows people to avoid touching electronic devices. The COVID-19 virus has been proven to be transmissible by regularly used public objects, according to studies. Prior to the outbreak, the world struggled to comprehend the relevance of intangible technology, but this scenario was overlooked. Without research labs, discovery-based technologies that have been approved for study have not been particularly popular. The global pandemic, on the other hand, has transformed that perspective; today, the typical individual can appreciate the value of seamless communication. Not only for health care workers who interface with medical equipment, but also for the rental of ATMs, sales equipment, and learning devices, this technology is critical.

There are numerous issues with the appearance, development, and acceptance of such technologies that must be addressed as quickly as possible. Augmented reality technology, which uses sensory control sensors and communications to establish a bridge between the physical and virtual worlds, allows for non-contact communication. The following areas of research have also tested intangible communication technologies such as Non-touch technology in touch-based technology provision, the use of low-resolution sensors in touch-based medical imaging interactions and interactions with Kinect and Leap Motion devices that aren't surgical.

As a result, it would be preferred to use a technology that allows the user to utilize the keypad without having to touch it. At the same time, there is an option of taking into account the cost of the most recent software or upgrading. A visual keypad can be integrated into a digital image in real time by exploiting the unpopularity of taxes. There is no need for additional hardware or external camera. It is all about a smartphone app that is fueled by real-world taxpayer unpopularity.

## 2. EXISTING SYSTEM

The COVID-19 virus can spread through public objects that are used by numerous people in a similar way throughout the day, such as ATM keypads, gas station keypads, and grocery store self-checkouts. It is just not feasible to disinfect and sanitize the keyboard after each use. In today's ATM system, there is a lot of touch between your hands and the machine, and given the current circumstance, preventing COVID-19 from spreading is vital to flattening the curve. Additionally, existing ATM cabins have cameras installed for security purposes, however with advances in hacking, these cameras might be exploited, and ATM pins could be disclosed by screening fingerprints.

## 3. REQUIREMENT ANALYSIS

Following are the hardware components which are required to construct the cash dispensing mechanism:

1. NodeMCU ESP8266

The NodeMCU is an open-source software and hardware development environment based on the ESP8266, a low-cost System-on-a-Chip (SoC).

The Espressif Systems ESP8266 features all of the essential components of a computer, including a RAM, CPU, Wireless Fidelity (WiFi), and even a current OS and Software Development Kit. Hence it is a great fit for variety of IoT based projects. The NodeMCU is available in a number of different packaging options. In all of the designs, the ESP8266 core is employed. In designs based on the architecture, the traditional 30-pin arrangement has been maintained.

Some designs have a small (0.9") footprint, while others have a wide (1.1") footprint — this is a crucial distinction to keep in mind. The Amica (which uses the conventional narrow pin spacing) and the LoLin (which has a wider pin spacing and a larger board) are the two most popular NodeMCU models. The open-source nature of the base ESP8266 allows the market to create new NodeMCU variations on a regular basis.

## 2. Tower Pro MG995 Servo

The MG995 Metal Gear Servo Motor is a high-speed standard servo that can swivel 180 degrees (60 degrees in each direction) and is used in airplanes, helicopters, RC automobiles, and other RC models. At 4.8V, it delivers 10kg/cm, and at 6V, it delivers 12kg/cm. It's a Digital Servo Motor that accepts and processes PWM signals much more quickly and efficiently. Internal circuitry is complex, allowing for good torque, holding power, and rapid updates in response to external pressures.

They come in a tight, robust plastic container that keeps them water and dust resistant, which is a great feature for RC planes, boats, and monster trucks, among other things. It comes with a 3-wire JR servo connector that is also compatible with Futaba connectors.

## 3. HC-05 Bluetooth Module

The HC-05 is a common wireless two-way (full-duplex) module that can be used in a variety of projects. You can use this module to communicate between two microcontrollers, such as an Arduino, or with any Bluetooth-enabled device, such as a phone or laptop.

Many Android applications are already available, making the process much easier. The module communicates with a microcontroller through USART at a rate of 9600 baud, making it simple to connect to any microcontroller that supports USART.

Using the command mode, the user can also change the module's default values. So, if the user is looking for a Wireless module that can send data from its computer or mobile phone to a microcontroller or vice versa, this is the module for it.

## 4. Jumper Wires

Jumper wires are normal wires having connector pins on both ends of it, that can be used to connect two places without the use of solder. Jumper wires are commonly used with breadboards and other prototyping tools to allow for quick circuit changes as needed. It's quite straightforward. Among all the electrical components, jumper wires are the most fundamental ones. Male-to-male, male-to-female, and female-to-female jumper wires are the most common. The distinction between them lies in the wire's terminating point.

Male ends have a protruding pin and can be plugged into items, but female ends do not have a projecting pin and are used to plug into things. Male-to-male jumper wires are the most frequent and the ones you'll most likely need. A male-to-male wire is required for connecting two ports on a breadboard.

## 4. PROBLEM STATEMENT

In today's ATM system, there is a lot of touch between your hands and the machine, and given the current circumstances, stopping COVID-19 from spreading is vital in order to flatten the curve. According to research, the COVID-19 virus can spread through commonly used public objects which count under essentials such as ATM keypads which have to be kept open irrespective of a critical situation such as lockdown. Additionally, existing ATM cabins have cameras installed for security purposes, however with advances in hacking, these cameras might be abused, and ATM pins could be disclosed by screening fingerprints. As a result, a technology is required that allows users to control the ATM without having to physically touch it. Simultaneously, the data confidentiality must be evaluated as well as the expense of a new system or enhancement.

## 5. PROPOSED SYSTEM

The proposed solution eliminates the need for hands-on interaction during the procedure.

The model uses Augmented Reality software that allows everything to be done with just a smartphone camera and no other special hardware or software.

Furthermore, the technology is extremely competent of maintaining the ATM's confidentiality. As a result, no physical contact is required to type the pin or choose any other system parameters.

## 6. AIM AND OBJECTIVE

The proposed system's aim is to eliminate the possibility of the COVID-19 virus spreading and to strengthen the communication infrastructure.

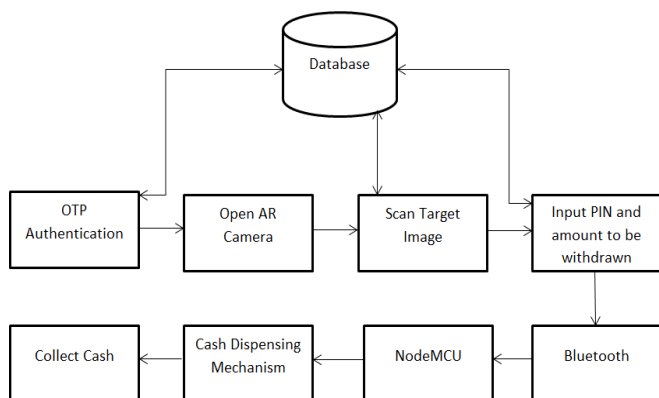
The concept includes a Reality-based software unpopularity that is seen, where everything can be done with a smartphone camera and no other hardware or software is needed.

Augmented reality is a sort of virtual reality in which the physical environment is replicated on a computer. It is seen as a medium that provides people with new attractions and experiences. According to prior study, the usage of Augmented Reality in Banking provides users with a tactile experience during the procedure. Because of the interaction and experience of sending money from an ATM without touching the keypad, the smartphone app can be considered one of the ways to promote AR. The goal of Augmented Reality is to create a system in which the user is unable to distinguish between the real world and its virtual augmented version. Furthermore, because there is no intruder or eye attacker, the method is quite competent of keeping the ATM pin secret. As a result, no physical contact is required to type a pin or select other system options.

**Objectives:**

1. Assisting in the best possible promotion of augmented reality technologies.
2. Avoid frequent contact with the ATM keypad to break the transmission chain. This will keep you safe from the disease.
3. The COVID crisis has taught everyone to value every cent and to spend money wisely on necessities. The suggested system will eliminate the possibility of ATM pins being smoked, resulting in more secure financial transactions.
4. The project will save not only human lives but also financial assets.

**7. IMPLEMENTATION**



**ig.1 Block Diagram**

The system can be divided into three modules: Hardware, Android Application and the Augmented Reality setup.

For the hardware, a NodeMCU is used along with a servo motor and both the components are connected using jumper wires, and an acrylic hinge is attached to the servo motor, which is used to demonstrate the cash dispensing mechanism. The NodeMCU is coded in Arduino IDE software.

The AR based mobile application is developed using Android Studio, and the augmented reality functionality is integrated in the android application in Unity using the Vuforia Engine. A target image is placed on the hardware which is used to trigger the augmented reality functionality in the AR ATM application.

Once the user successfully logs in the application by entering its PIN, it can then withdraw the cash by entering the amount and clicking on dispense cash.

The bluetooth module then transfers the command to the NodeMCU, which then sends the signal to the servo motor and with the help of the hinge the cash is dispensed.

**8. ALGORITHM**

1. Start.
2. Login into the app using OTP sent to the registered mobile number and open AR Camera.
3. Now scan the image from AR Camera and match it with the target image in the database.
4. If match is not found, then go to step 3.
5. If match is found, then display the Homepage AR user interface and wait for user input.
6. Now match the input pin from user with database.
7. If match is not found, then go to step 5.
8. If match is found, then display the account type select and then amount page and wait for user input.
9. Enter the amount to be withdrawn.
10. If the user has sufficient balance then the command will be sent to cash dispensing mechanism and the cash is dispensed.
11. End.

**9. RESULT**

The following are some of the result snapshots of the system:

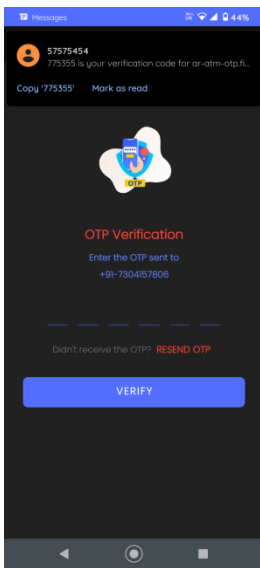


Fig. 2

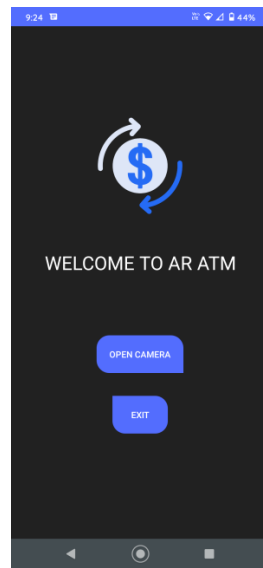


Fig. 3

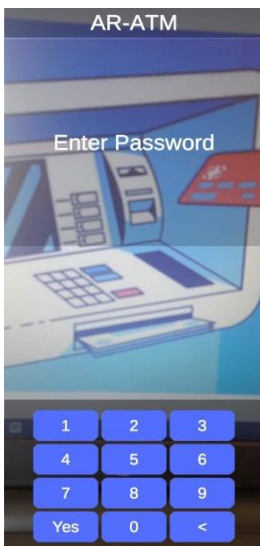


Fig. 4

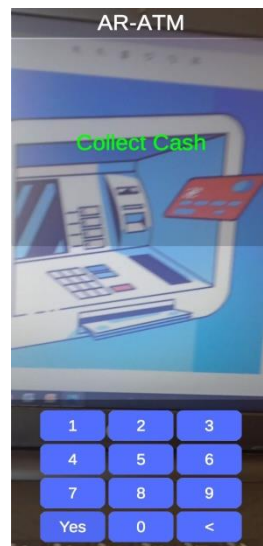


Fig. 5

Fig. 2: OTP received after the user enters its phone number and clicks on 'Get OTP'.

Fig. 3: After the user enters the correct OTP, it is directed to the interface where it can either select the option to open camera or exit.

Fig. 4: After the target image is scanned, the AR interface gets triggered and asks for user's ATM pin.

Fig. 5: Once the user enters the amount and has sufficient balance in its account then a message is displayed indicating to collect the cash.

## 10. CONCLUSION

A mobile application may be considered as one of the strategies to promote Augmented Reality technology,

because of the interactivity and virtual experience that the user can dispatch money from ATM without touching the kiosk's keypad. As a result, no physical contact is required to type the pin or select any other system parameters.

## 11. FUTURE SCOPE

To improve efficiency, a suitable note counting and precise amount dispensing mechanism module could be introduced in the future. In the authentication section, the security can be improved even more by using a face ID or iris scanner module instead of a pin to make the system more secure and futuristic. More modules, such as an e-receipt generator and UI changes, can be added to the mobile application in the future. This contactless system concept can be applied to any vending machine to turn it into a contactless vending machine.

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