



# **A Unique Approach for Automatic Courier Receiving System**

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**ABSTRACT:** Automation can be seen everywhere these days. Automated systems are reducing the human efforts as well as their presence. With the increase in e-commerce the number of persons who are buying items online has increased. As the items bought by them has to be delivered to them, it requires their presence. Thus, the need for a system that will tackle this situation i.e. a system which could be able to receive the courier in the absence of a person is of great importance. This paper presents the noble solution for the above problem. A system has been described which make use of the various available technologies to enable the user to receive the courier remotely.

**KEYWORDS:**DTMF, Arduino Uno, Stepper motor, IVR system

## **I. INTRODUCTION**

With the advancements in technologies and the accessibilities to the internet the e-commerce [1] is increasing. The number of people utilizing this facility is increasing day by day. The e-commerce websites have also increased. Now people can buy almost everything online from groceries to electronics. This is basically designed for the people to save their time for shopping. So, this system helps them to perform shopping without their physical presence. Though, for receiving the courier their presence is required. Hence, the full meaning of the e-commerce is not fulfilled. The need for a system arises which could deal with problem of the physical presence of the person to receive the couriers. The safety features should also be present.

This paper presents a noble idea for the automatic courier receiving with the use of the DTMF technology [2].The use of interactive voice response system makes it more user friendly and the use of IP camera increases the security features.

## **II. OVERVIEW OF THE SYSTEM ARCHITECTURE**

The system design consists of a user end cell phone which is used to send the commands to the entire system, a remote cell phone which receives the commands from the user, DTMF module which is used to get the DTMF frequencies and convert to a proper form to send it to the Microcontroller ATMEGA 328 P [3] which acts as a main controller, the IVR system [4] conveys the option to be selected, the user has to select accordingly and the microcontroller generates the control signal for various purposes, stepper motors [5] are used for controlling the slideable windows, IR sensors [6] is used to conform that the courier has been received and an IP camera [7] is used to get the live feed of the entire system. **Figure-1** depicts the overview of the system architecture.

### **1. DTMF TECHNOLOGY**

The DTMF technology is used to convert the dual tone frequency to a suitable form to be send to the microcontroller. The different frequencies for the different keys are obtained. Now frequency mapping is used to perform the various operations. The Table 1 below shows the various DTMF frequencies range [8] for the keys pressed.

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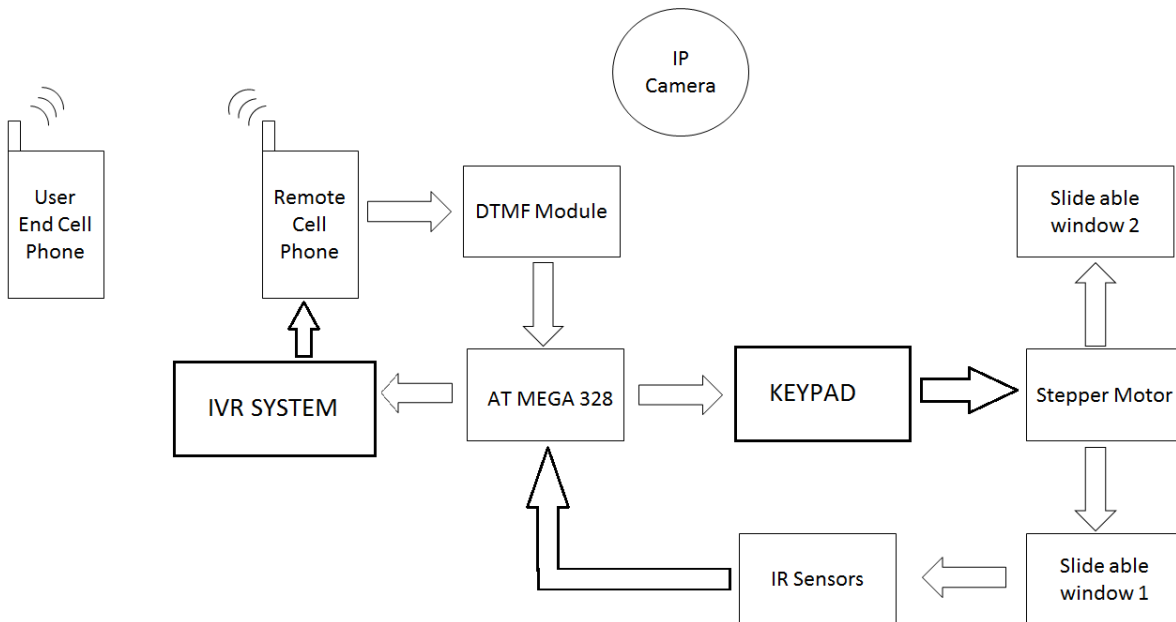


Figure1. Overview of the System Architecture

S. No	Key Pressed	Frequency (Hz)
1.	1	697-1209
2.	2	697-1336
3.	3	697-1477
4.	4	770-1209
5.	5	770-1336
6.	6	770-1477
7.	7	852-1209
8.	8	852-1336
9.	9	852-1477
10.	0	941-1336
11.	*	941-1209
12.	#	941-1477

Table1. Superimposed frequency components for the keys pressed.

## 1. Interactive Voice Response System (IVRS)

The IVR system enables the voice commands to make it an interactive system. When the user calls the voice command is sent to access the various commands. The IVR system can be made using the visual studio and can be interfaced to the micro controller ATMEGA 328 P. Hence, we can have the voice responses for the keys we press and the operations which we perform.

## 2. IP CAMERA

An IP camera i.e. internet protocol camera is used for monitoring the entire system. The IP camera makes the live feed of the entire system available to the user, which can be accessed from any remote place using the internet and connecting to it. Thus it helps for ensuring the authenticity and safe receive of the courier.



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### 3. Arduino Uno

Arduino Uno is the ATMEGA 328 P microcontroller based board and it is used to program the entire process. By interfacing it with the DTMF module the commands are taken and the control signals are send for the various purposes. It is used with Visual studio to enable the voice commands for various operations and the user is able to know which process is in progress.

### III.WORKING

The flowchart shown below in Figure 2 shows the detailed working of the entire system.

- At first if you are away from home the Courier man/delivery boy calls the user.
- The user then calls to the remote cell phone attached to the system.
- The Interactive voice response system activates and the user has to enter the password.
- On entering the password the user selects the option for enabling the keypad.
- The delivery boy is commanded to press the button to open the delivery window.
- When the window is opened and the parcel is placed the IR sensors senses the parcel and closes the parcel window after the confirmation.
- Voice command is played to proceed further and the user opens the second window where he can place his signature stamp or the money in case of the cash on deliveries.
- Once everything is completed the user locks the second window and end the call.

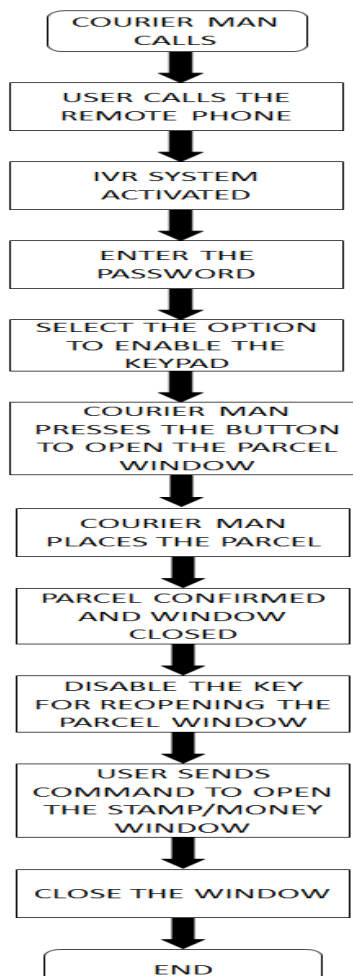


Figure 2.Flowchart for the entire process



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The entire activity is monitored using the IP camera which helps in the proper and secured delivery. The most important block for the working of the entire system is the microcontroller ATMEGA 328 P. When the user calls to the cell phone which is attached to the system and is on auto answering mode, the IVR system asks to enter the password. The password checking is performed using the frequency mapping technique, as explained earlier for each key pressed there is a different range of frequencies and by using it the combination of the keys can be used and it ensures the security of the entire system. The frequency mapping is done by making use of the ATMEGA 328 P which gets the frequency ranges for the various key pressed through the DTMF module. Once the password is correct the option is available to enable the keypad/ button which is present at the door for the delivery boy. When the key is pressed the microcontroller receives the signal and using the stepper motor the window is opened for placing the courier. Once the courier is placed the IR sensor senses it, which in turn send the signal for closing the window to the microcontroller. On receiving the signal the controller closes the window and locks it and the courier reception is confirmed. Now the user is asked to provide the signature stamp and the money, if required which can be placed along with the stamp. For this purpose another window is used. The user send the commands using his cell phone and again using the DTMF module and frequency mapping technique the processing is done and the window is opened. Now the courier boy uses the stamp to get the signature and the money if required and presses the end button to finish up the process. After it the window is closed and the message is relayed to the user for the successful completion of the automatic courier service. The IP camera is used to monitor the entire process and helps for the secured and successful conduction of the entire process. The user can lock the entire system if some kind of problem persists.

The Table 2 below shows the various commands for operating the entire system.

S. No	KEY PRESSED	Action Performed
1.	1	Opens the Slideable window 1 to receive the courier.
2.	2	Opens the Slideable window 2 to provide the signature stamp for the courier man.
3.	3	Closes the Slideable window 2 to provide the signature stamp for the courier man.
4.	4	Turns ON the IP Cam
5.	5	Turns OFF the IP Cam
6.	6	Resets the entire system

Table2. Assigned keys for the mobile operation.

The flowchart for the system is shown in **Figure 4**. The process starts up when one calls the remote phone. The IVR system helps to keep track of the process also it makes the application user friendly. Always there is an option to abort the entire process at any point of time. The IP camera is used to monitor the entire process.

## IV. RESULTS AND DISCUSSIONS

The automatic courier system has been implemented and tested. The various blocks of the system architecture were realized. The block diagram for the working of the DTMF module [9] is shown in **Figure 3**.

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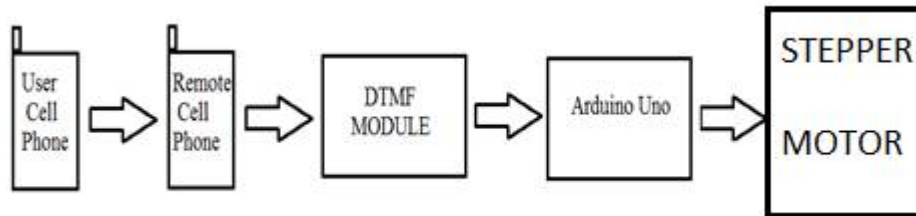


Figure 3. Block diagram of the DTMF module

The DTMF module used acts as the translator for the commands what we send through the cell phone and after converting to a suitable format it sends the commands to the Arduino Uno which in turn sends the control signals to the stepper motors. A typical DTMF module is shown below in Figure 4 with the connections to Arduino Uno [10].

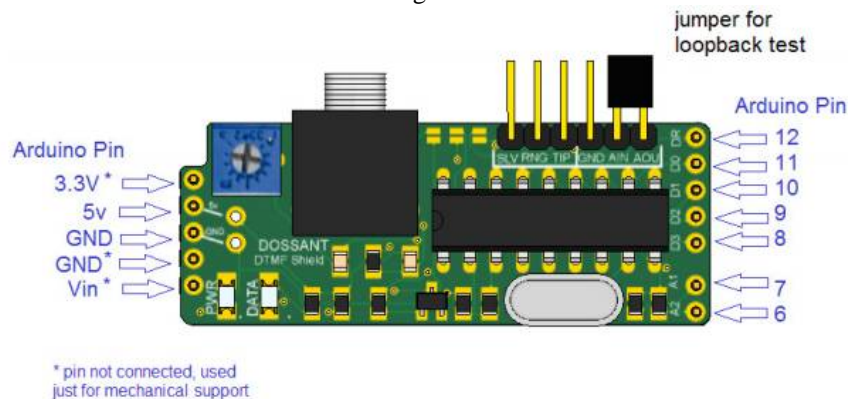


Figure 4. DTMF module connection with Arduino Uno pins

We have made use of the rack and pinion [11] arrangement for the working of the slideable windows. The prototype for the complete system has been tested and the various operations has been verified. The slideable windows are operated remotely and the entire system is monitored using IP camera.

## V. CONCLUSION

In this paper a unique approach to provide the automated courier receiving services is described. This approach will help to solve the problem of unable to receive the courier when someone is not at home and also helps to attain the completely automated e-commerce as at any point of time the human presence is not required. The use of the DTMF technology and the cell phones make the system available at very low cost which can help this system to be used by a large number of people. The IP camera is the added feature and helps to attain the full-proof system as it enhances the security.

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