Advanced Card Systems Ltd.
Card & Reader Technologies

ACR890
All-in-One Mobile Smart Card Terminal

Software Development Kit User Manual V1.00

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1.0. Introduction

The ACR890 All-in-One Smart Card Terminal is the next generation mobile smart card terminal that combines smart card, magnetic stripe and contactless card technologies. It has GPRS functions for mobility and an A8 core for power and faster performance. Having a touch screen capability allows interactive operation through the terminal's screen interface. It also includes a built-in printer which is ideal for performing faster transactions.

This next-generation PIN-pad reader is flexible enough to offer wide range of connectivity choices for any environment, including GPRS, Ethernet, Wi-Fi, USB and serial ports. With its more advanced features, the ACR890 is suitable for more sophisticated applications in the e-Government, e-Banking and e-Payment, e-Health and Transportation sectors.

This user manual contains the description of contents and components of the software development kit. Provided also in this document are detailed guides on how to use the device, configure its settings and simulate a bus fare application.

1.1. Typical Applications

- Transportation
- e-Government
- e-Health
- e-Banking
- e-Payment
- Loyalty Program
- Time and Attendance

2.0. SDK Specifications

Below are the contents, system requirements and supported systems of this software development kit:

2.1. SDK Contents

- ACR890 All-In-One Smart Card Terminal
- 5 pcs. ACOS3 Combi Cards
- 5 pcs. ACOS6-SAM Cards
- 5 pcs. MIFARE® Classic 1K Cards

2.2. System Requirements

- Minimum of 1 GHz Pentium processor or higher
- Minimum of 256 MB RAM
- Minimum of 600 MB free hard disk space
- USB port

2.3. Supported Operating Systems

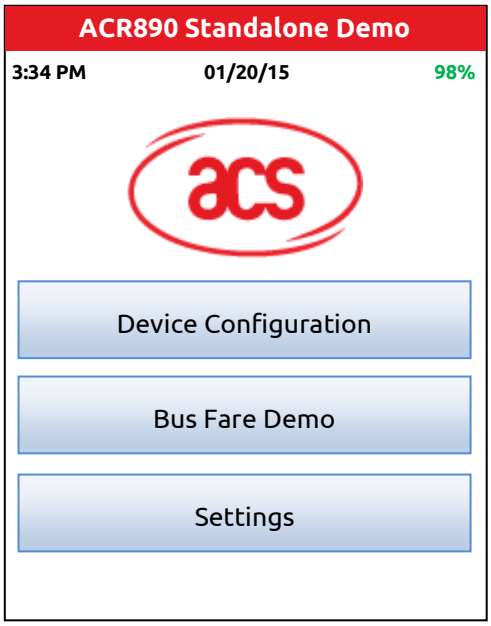
- Windows® 7 (x86 and x64)
- Windows® 8 (x86 and x64)
- Windows® 8.1 (x86 and x64)

3.0. SDK Components

The ACR890 All-in-One Mobile Smart Card Terminal SDK installs the following components:

3.1. ACR890 Standalone Demo application

The ACR890 Standalone Demo is an application that allows you to view device information, test the device peripherals, configure the device settings and simulate a bus fare application. Read the ACR890 Standalone Demo User Manual for a detailed instruction on how to use it.



3.2. Standalone Sample Codes

The following sample codes are provided in this SDK:

- Device Programming
- Card Programming
  - ACOS3 Combi
  - MIFARE
  - ACOS6-SAM
  - Magnetic Card Detection

3.3. User Manuals and Reference Materials

- ACR890 Technical Specification
- ACR890 Reference Manual
- ACR890 Software Development Kit User Manual
- ACR890 Standalone Demo User Manual
- ACOS3 Combi Reference Manual
- ACOS6-SAM Reference Manual
- MIFARE Functional Specification Manual

4.0. ACR890 Overview

4.1. Parts Description

The main components of ACR890 All-In-One Smart Card Terminal are shown below:

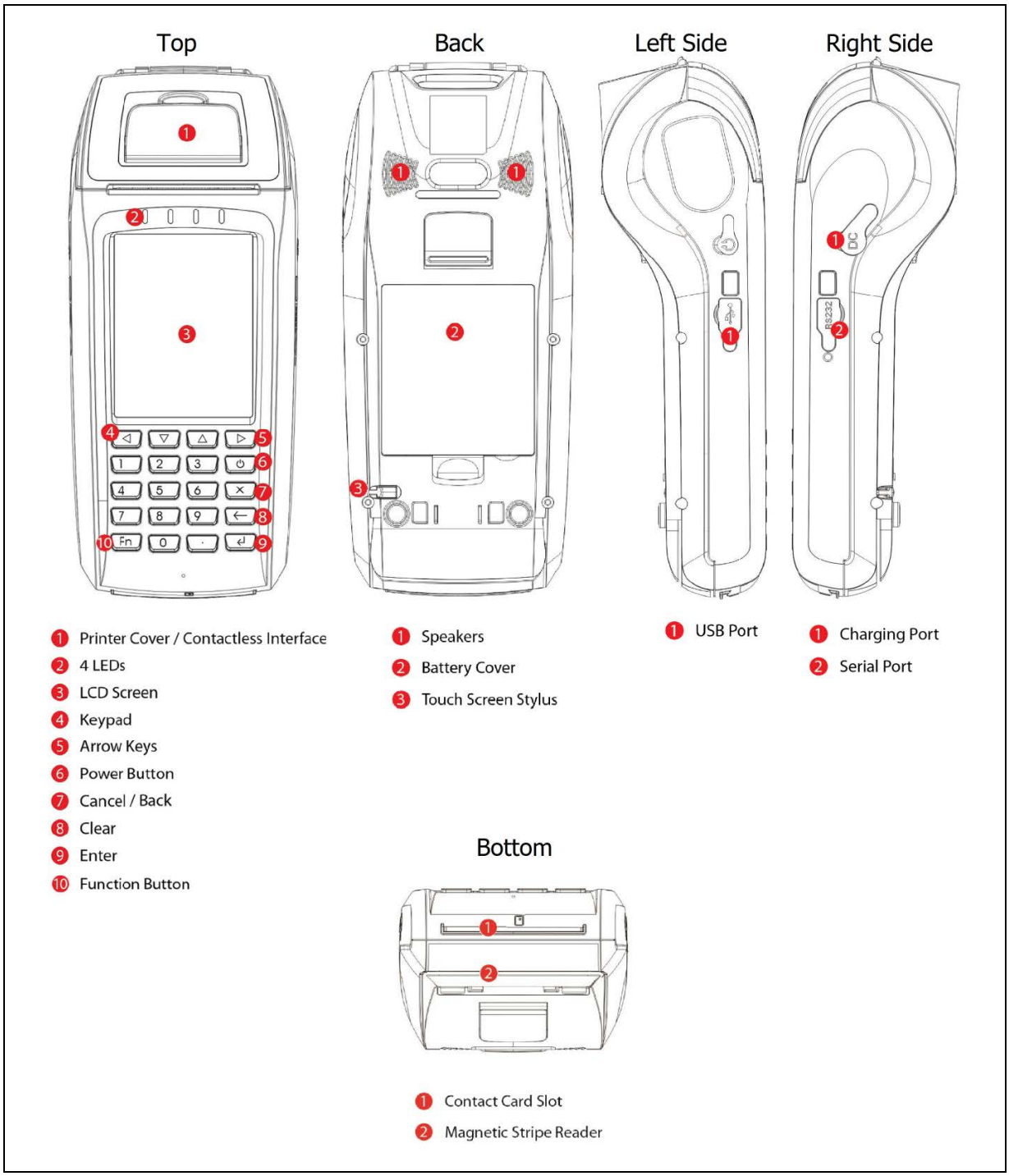


Figure 1: ACR890 – Parts Description

4.2. Inserting/Changing the battery

ACR890 runs on a rechargeable Li-ion battery (7.4 V, 2000 mAh), located at the back of the device.

To insert/change the battery:

1. Remove the battery cover (see **Figure 2**).
2. Insert the battery with the contacts aligning to the terminal of the device.
3. To change the battery, lift the Li-ion battery out of the slot to replace with a new one.

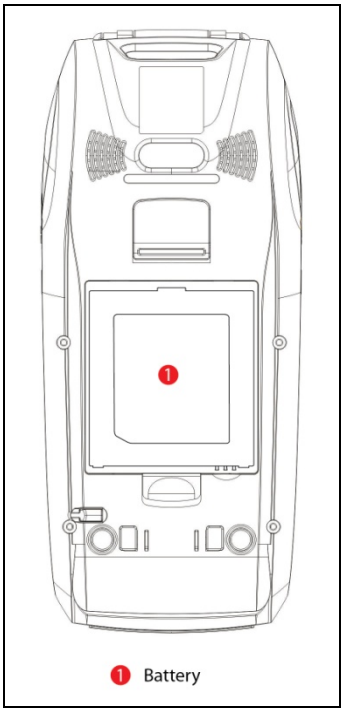


Figure 2: ACR890 – Changing the Battery

4.3. Turning the power on/off

1. To turn on the device, press and hold the power button until the LCD display turns on and the ACS logo appears on the screen. See **Figure 1** for the location of the power button.
2. To turn off the device, press and hold the power button until the LCD display turns off.

4.4. Inserting memory/module cards

ACR890 has one (1) Micro SD card slot, (1) SIM card slot and two (2) SAM card slots located at the back of the device.

To insert or change SAM cards:

1. Remove the battery.
2. The location of the Micro SD Card, SIM and SAM slots can be seen in **Figure 3**.
3. Slide the card slot to open it.
4. Insert the card.
5. Slide the card slot back into place to close it.

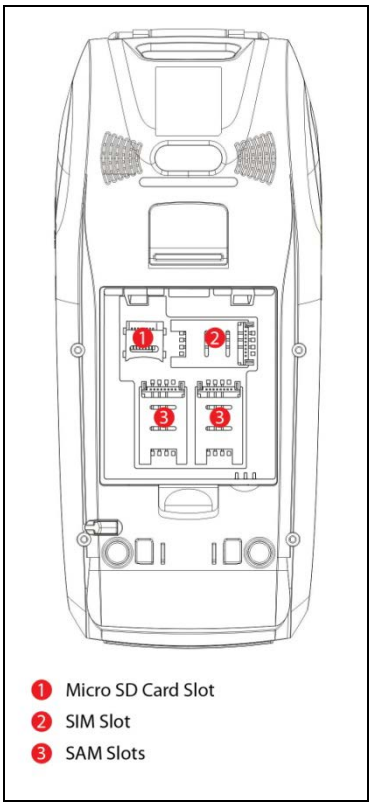


Figure 3: ACR890 – Location of Card Slots

4.5. Placing the paper roll

The ACR890 has a built-in thermal printer located on the upper part of the device where the contactless interface is also located.

To place the paper roll:

1. Carefully lift the tab of the printer cover (see **Figure 4**).
2. Place the paper roll following the proper paper orientation (see **Figure 5**).
3. Close the printer cover.

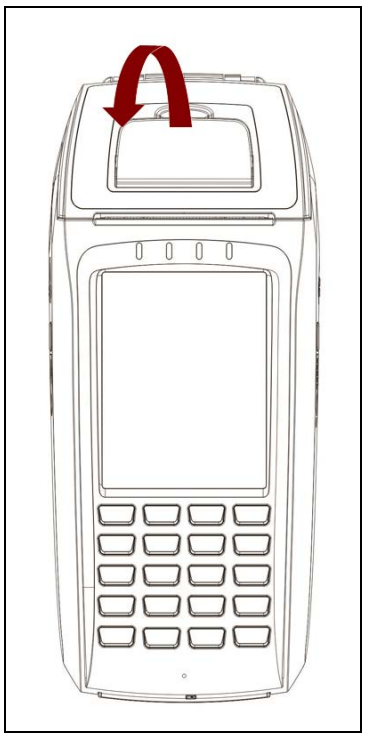


Figure 4: ACR890 – Opening the Printer

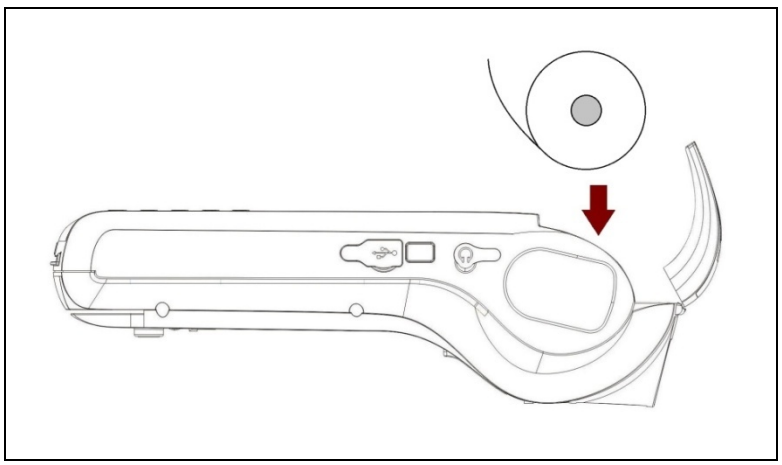


Figure 5: ACR890 – Paper Orientation

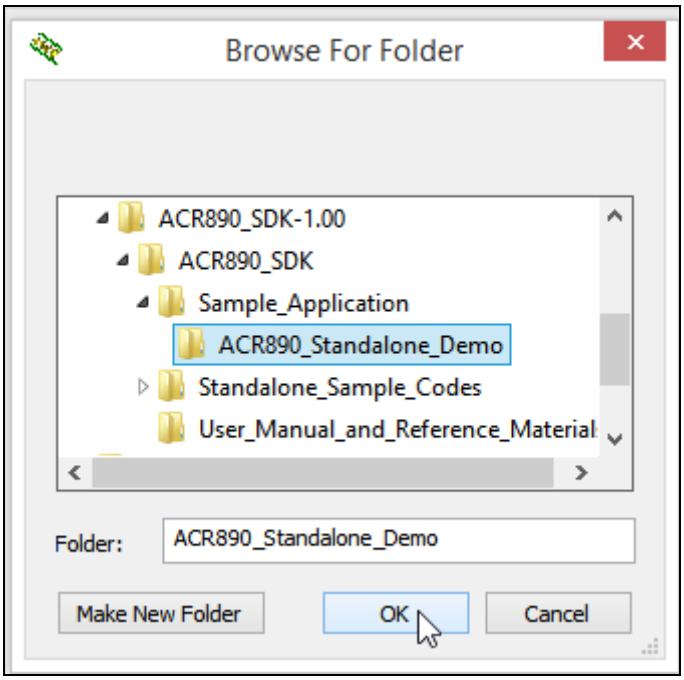
5.0. Loading an application to the device

Before you can load an application (e.g., sample codes, demo application) to the ACR890 device, you will first need the following:

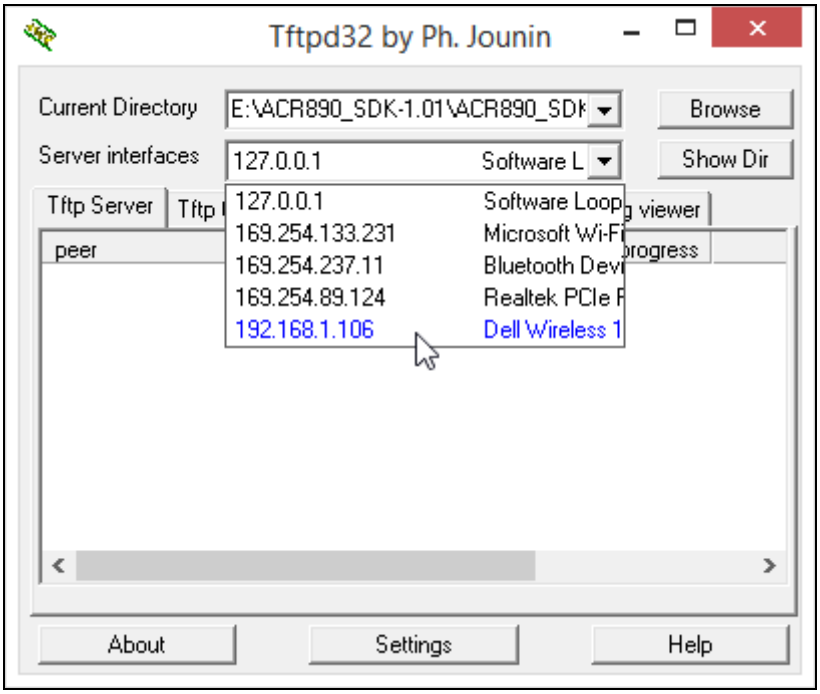
- PC Desktop
- TFTP client application
  - TFTPD32 – http://tftpd32.jounin.net/tftpd32_download.html
- A telnet client and terminal emulator application
  - PuTTY – http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html
- Wi-Fi connection

To load an application:

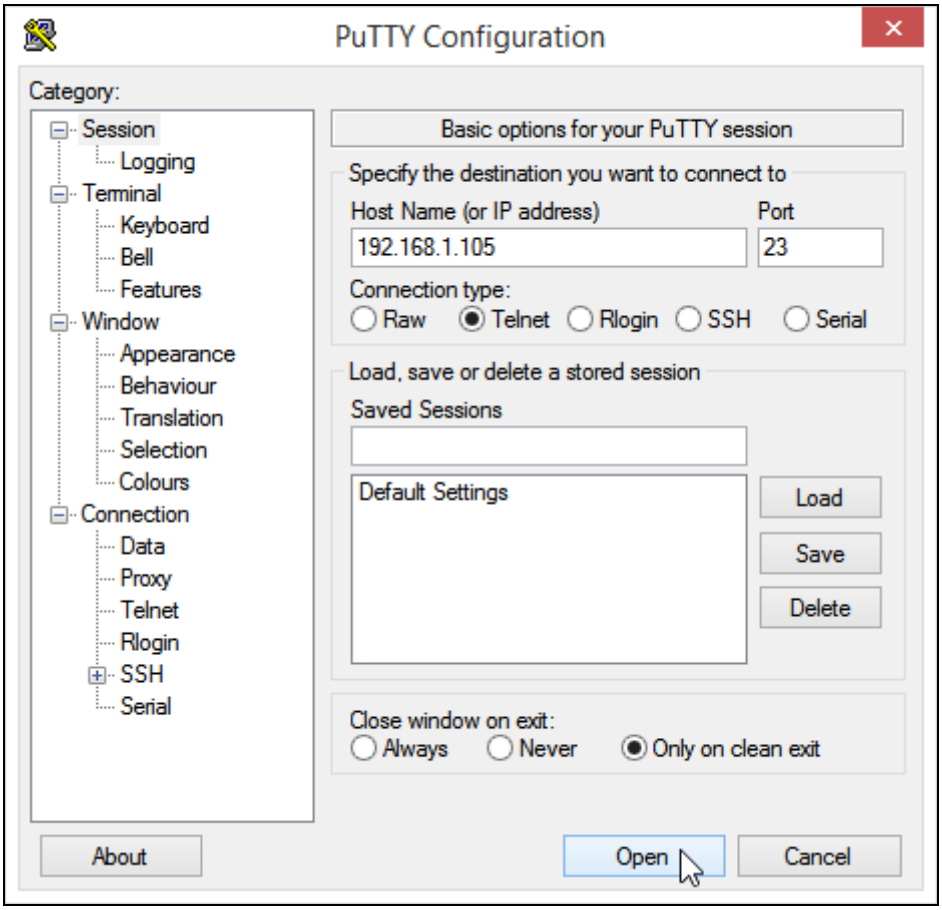
1. Run the **TFTPD32** application.
   a. In the **Current Directory**, click **Browse** to select the location of the application. In this example, we will be loading the ACR890 Standalone Demo application.



b. In the **Server interfaces**, select the IP address of your PC. Minimize the application.



2. Turn on the ACR890 device.
   a. In the main menu, select **Data Communication**.
   b. Select **Wi-Fi** as connection.
   c. In the **Scan Results** tab, select your preferred network.
   d. Select **To Connect** tab, enter your network's password if needed, and then select **Connect**.
   e. Once connected, take note of the device IP address.
3. Run the PuTTY application.
   a. Enter the device IP address as noted in **Step e**.
   b. In the **Connection Type**, select **Telnet**.
   c. Click **Open** to start the session.
      i. To save the IP address, enter a name in the **Saved Sessions**. Click **Save**.
      ii. Double-click the name of the saved session to start the session.



d. The PuTTY window prompt will appear. Type the following and press Enter:

Username: root

Password: 123456

4. Enter the following codes. Replace all *<computer IP address>* and *<application exe file name>* with their actual values.

```
tftp -g <computer IP address> -r acr890-a1.zip
unzip -o acr890-a1.zip

killall acr890_demo
killall acr890-a1_demo
killall acr890-a1_loyalty

rm <application exe file name>
tftp -g <computer IP address> -r <application exe file name>
chmod +x <application exe file name>
./<application exe file name> -qws -display transformed:rot270 &
```

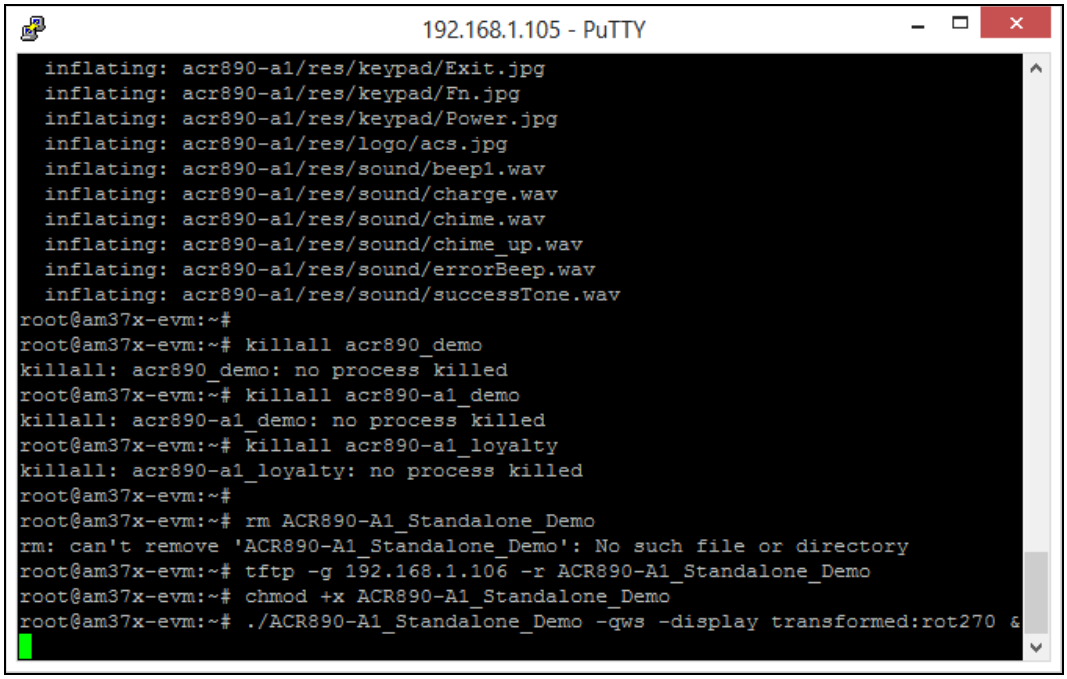
Below is a sample text:

```
tftp -g 192.168.1.106 -r acr890-a1.zip
unzip -o acr890-a1.zip

killall acr890_demo
killall acr890-a1_demo
killall acr890-a1_loyalty

rm ACR890-A1_Standalone_Demo
tftp -g 192.168.1.106  -r ACR890-A1_Standalone_Demo
chmod +x ACR890-A1_Standalone_Demo
./ACR890-A1_Standalone_Demo -qws -display transformed:rot270 &
```

5. Copy the script, and then right-click on the PuTTY window to paste the script text.
6. Wait until it reaches the last line as shown below.



7. Press Enter. The application should load in the ACR890 device immediately.

To make the application **permanently** loaded in the device, continue to:

8. Type `tftp -g <computer IP address> -r <application file name>`, and then press Enter.
9. Type `chmod +x <application file name>`, and then press Enter.
10. Type `cd /etc/init.d`, and then press Enter.
11. Type `vi matrix-gui-2.0`, and then press Enter.
12. Press `i` to edit the file, and add the following code at **line 83**:

```
elif [ -e /home/root/<application file name>];then
/home/root/<application file name> -qws -display transformed:rot270&
```

Below is a sample text:

```
if [ -e /media/mmcblk0p1/startup.sh ];then
   chmod +x /media/mmcblk0p1/startup.sh
   /media/mmcblk0p1/startup.sh &
elif    [    -e    /home/root/<application    file    name>    ];then
/home/root/<application file name> -qws -display transformed:rot270&
   else start-stop-daemon --start --quiet --background -m --pidfile
   $PIDFILE --exec $matrixgui -- $GUI_OPTS   fi
```

13. Press **Esc**, and then type `:wq!`. Press Enter.
14. Type `cd`, and then press Enter.
15. Type `reboot`, and then press Enter. The device will restart with the loaded application.