

AN-012 Android Phone Radar Gun

Introduction

You've probably experienced more than once before. You live on a relatively quiet street, maybe kids play on the sidewalk, and cars aren't supposed to be going more than 25 mph. But every now and then, someone goes speeding by as if your street is their private raceway. Besides the "Kids at Play" sign, you'd like to do more about it.

And now you can. In this application note, we'll explain a quick, easy way to turn your Android phone into your own personal radar gun. Now you can capture the speeder in the act along with how fast over the speed limit they're driving.

Hardware and Software

The list of items needed is short and your own personal radar gun comes together in a matter of minutes. The main items needed are listed in Table 1 below and shown in Figure 1.

Table 1 Hardware/Software Requirements

Item	Notes
1. Android Phone	USB OTG support
2. USB cable Micro to A	Shorter is better
3. USB cable Micro/Mini to Female	Micro/Mini depending on phone connector
4. OPS241-A Short Range Radar module	
5. Droidterm app	



Figure 1. Hardware Requirements

First, check that your Android phone supports USB OTG. USB OTG allows the USB port on the phone to act as a USB host thus powering and communicating with many devices including the OPS241-A radar module. A good number of phones now support USB OTG including most Samsung, LG, and Sony models.

Next, go to the Google Play Store, search for the DroidTerm app, and download it (Figure 2). The app is free and provides a USB serial port connection to the OPS241-A module. When the OPS241-A module is powered up, it's default operation begins actively scanning and calculating the speed of detected objects. The speeds are then reported out the USB connection. DroidTerm reads the speeds over the serial port and renders the values.

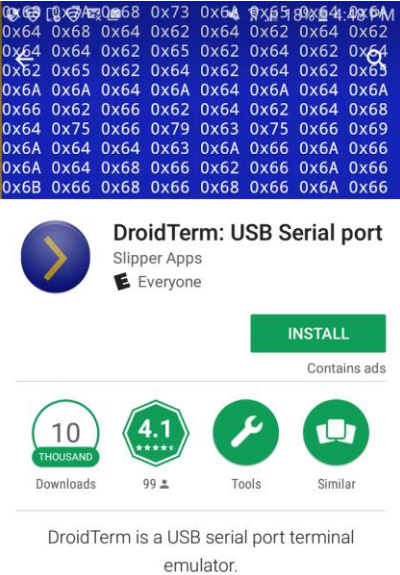


Figure 2. DroidTerm Serial Port Emulator

Next, connect the USB Mini/Micro to Female cable into your phone. Take the USB A to Micro cable and plug it into the Female connector. Then plug the micro connector into the OPS241-A module. You should see the module LED lights start up as shown in Figure 3. There is a green heartbeat LED which flashes every second and tells you the module is operating correctly. You'll also see a brighter red or blue LED. These are reflecting actual motion detection by the OPS241-A. If your hand was moving towards the module, the red LED will be lit and if moving away, the blue LED lights up.

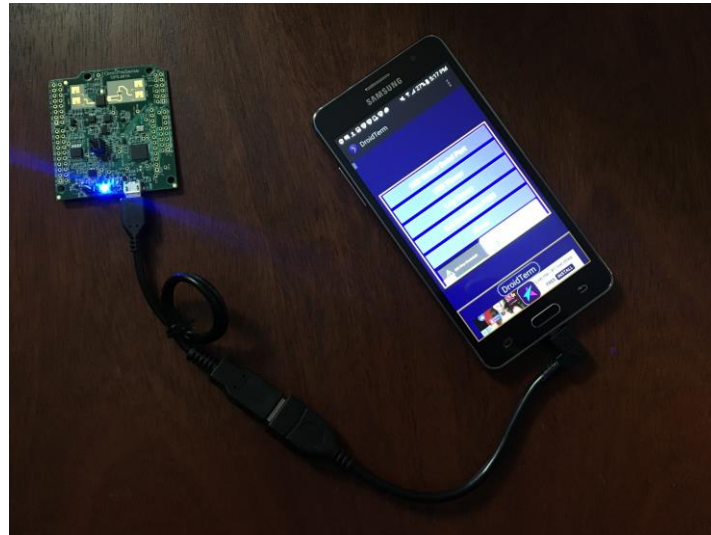


Figure 3. Hardware Connection

When you first start up DroidTerm you'll see a window like Figure 4. Select USB Virtual Serial Port which will bring you to Figure 5. Press Connect and the data from the OPS241-A will start to flow to the main screen of DroidTerm as shown in Figure 6.

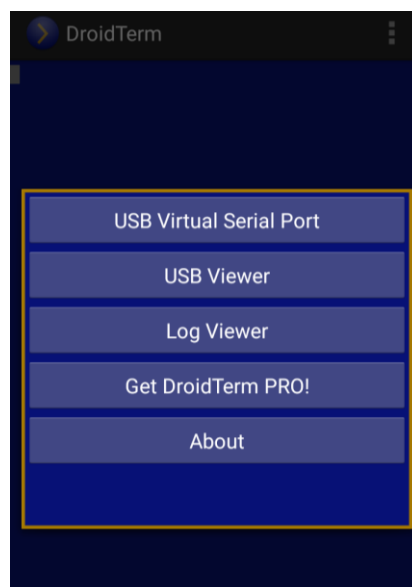


Figure 4. DroidTerm Start Menu

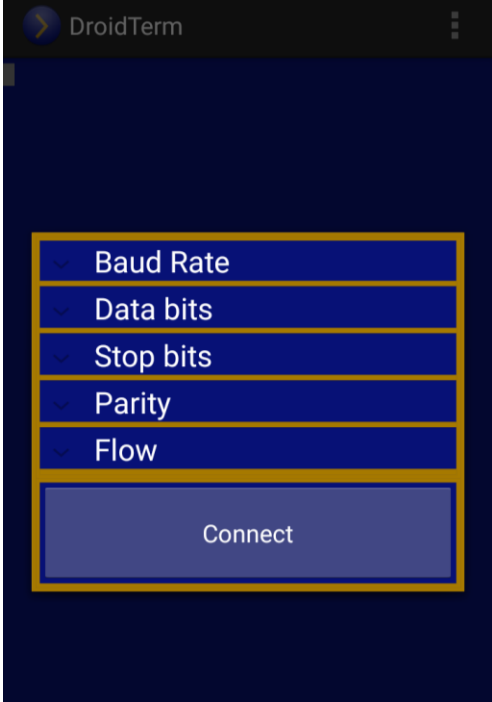


Figure 5. DroidTerm Connection Selection

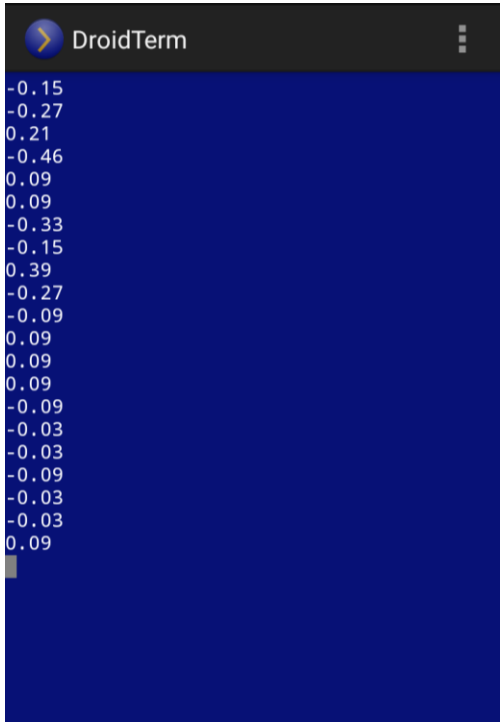


Figure 6. Speed Data Reporting on DroidTerm

The data flowing onto the screen in Figure 6 is the calculated speed of the fastest object in the OPS241-A field of view. The negative numbers indicate an object moving away from the module, positive is towards the module (mirrors the red and blue LEDs). The default setting shows the speed in m/s but this can be changed to mi/hr, k/hr, cm/s, or ft/s. These are all under control by the API commands which are described completely in [AN-010 API Interface](#) document. As an example, in DroidTerm, tap the blue screen to pull up the keyboard and type 'UK' and enter. You'll see the response command as shown in Figure 7 which tells you the speed data is now being reported in km/hr. Additional API commands control power, duty cycle, and squelch limits.

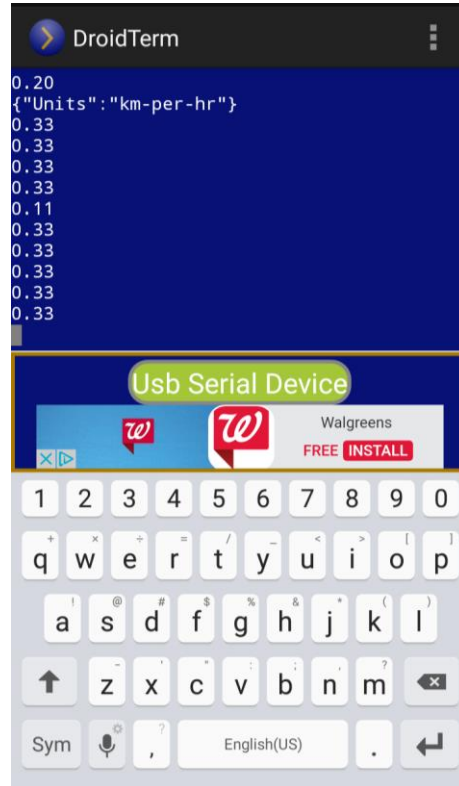


Figure 7. API Control Using DroidTerm

Conclusion

And that's how simple it is to turn your Android phone into a radar gun. To try it out, stand at a safe distance near the street and point the OPS241-A module outward towards traffic. The module is facing outward when the patch antennas on the top side of the module are pointing towards the direction you want to detect. The effective range for the module is 10-15 m (30-50 ft) for detecting cars and trucks. The accuracy of the module has been tested to within $\pm 0.5\%$ which meets the same requirements police radar guns must meet in the United States. Do keep in mind that depending on the angle of the module to the oncoming car, the reported speed will be lower than the actual speed due to the Cosine Error. See [AN-011 Cosine Error](#) to understand how to adjust for the actual speed from the measured or reported speed.

Revision History

Version	Date	Description
A	Apr. 20, 2017	Initial release.