



AR technology has penetrated every corner of our life. How can AR combined with GNSS provide a revolution for surveying and mapping?



GNSS-AR Combined Technology Benefits the Surveying and Mapping Field Job

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1. What do we know about AR?

If you remain sensitive to technological developments, you must remember the popular game Pokémon GO. It's a game that enables you to explore, catch, and swap Pokémon appearing in the real world. The player can discover and catch Pokémon in the real world, even making battles through their smartphones. The more Pokémons the players catch, the more powerful they become. Subsequently, the player has the opportunity to catch even more powerful and rare Pokémons.

Behind the fun, it is the constant innovation and development of AR (Augmented Reality) technology. This is a technology that calculates the position and angle captured by the camera in real time and adds the corresponding features to the image. The goal of this technology is to apply and interact with the virtual environment on the screen over the real one.

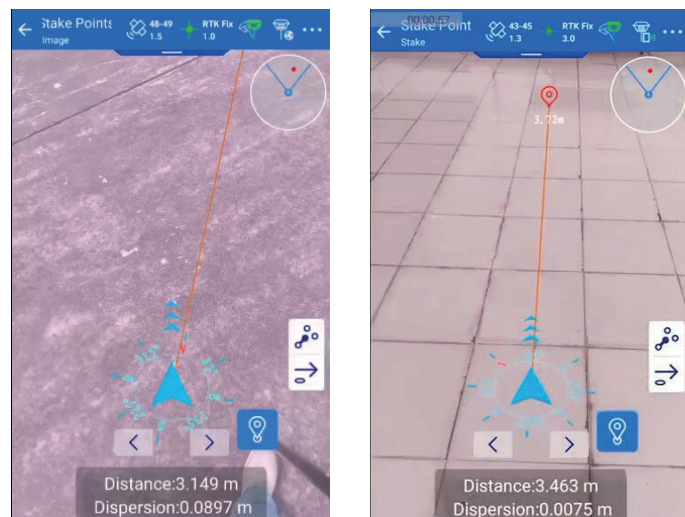
Key Words :

-  AR
-  GNSS
-  Staking Out
-  High-precision

2. GNSS + AR Staking Out

For surveying and mapping industries, the use of AR technology will greatly improve efficiency. We have already noticed several manufacturers experimenting with AR to make fieldwork easier together with the GNSS smart antenna. The data is overlaid and fused with the real field scenes acquired by the camera through algorithmic matching and then displayed on the controller. The user can see the data and targets directly on the screen. It significantly reduces the time on struggling to find buried pipes in the grass.

Now, the combination of GNSS smart antenna and AR brings a new experience to the stake-out. For example, in the case of finding elements on a design drawing, the high-precision position information provided by the GNSS smart antenna can be transmitted wirelessly to the controller. The user can see a virtual marker flashing directly on the display. Combined with the characteristics of the surrounding environment, the user can soon reach the point in reality following the guidance. Then, the user can fix it accurately with the indication.



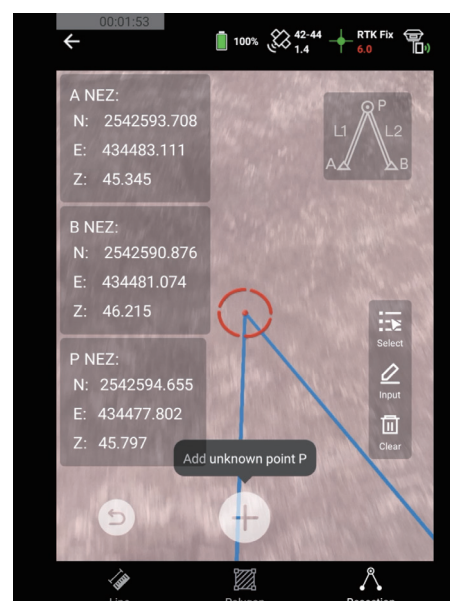
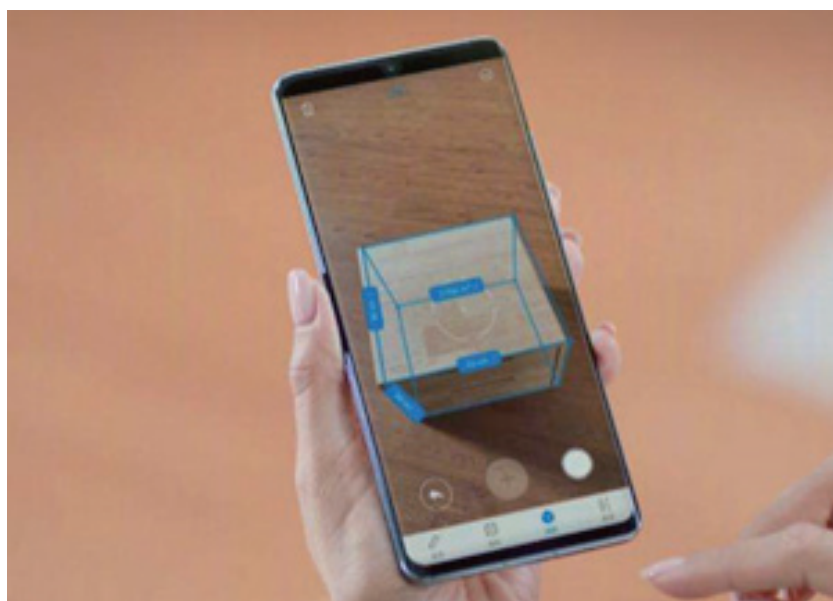
AR Staking Out FIG1

3. GNSS + AR Measurement

In addition to staking out, recent developments of technology have also allowed users to utilize AR on mobile devices to measure length and area. In the beginning, it was unacceptable to use the camera for length measurements. People tended to use a ruler for accurate distance measurements.

However, today, with the rise of the camera and built-in accelerometers, and the better performance of the matching algorithms, the accuracy of the measurements has improved greatly.

The general public accepts the results obtained from AR measurements. After all, there are many scenarios where people just need to get an accurate but less precise figure. Several of the world's major mobile terminal and system giants are currently developing and promoting their self-developed AR measurement engines. They have definitely secured and updated the algorithms. For mobile devices, it is more about a test of the hardware, including the above-mentioned camera, accelerometer, magnetic compass, and even memory, which all affect the accuracy of AR measurements.



AR Measurement by Mobile Phone **FIG2**

In combination with GNSS, AR measurement offers even more possibilities. We often encounter situations where some targets are inaccessible for various reasons. It's difficult to acquire the collection. The use of AR measurement technology allows the calculation and acquisition of coordinates of difficult-to-access locations by means of intersection algorithms. Since the coordinates provided by GNSS are sufficiently accurate and reliable, errors in the initial baseline can be suppressed. Therefore the results attributed to the AR measurement also have a higher level of accuracy and reliability. It should be noted that the results that the system can calculate in this case depend entirely on the environment situation and the accuracy of the AR distance measurement. Hence, different controllers with different configurations in different scenarios may obtain different results.



AR Measurement by RTK GNSS Receiver **FIG3**

To use AR measurement for field surveying and mapping, you must:

- a) Use a handheld controller in Android OS 6.0 and above that supports AR Core 1.25 or 1.26.
- b) Use the Hi-Survey 2.2.0 or above.
- c) Use a Hi-Target GNSS smart antenna.

4. Foresight:

What will the next generation of GNSS smart antenna be?

Multi-source data fusion for high-precision positioning and navigation is developing at a rapid pace. The giants in the industry have made different trials at different stages. In the foreseeable future, new technologies including inertial navigation, vision, and AR will be combined further. New forms of GNSS smart antenna are sure to emerge soon. Let's see how the deeper integrated product applies in more industries soon.



More information at <https://en.hi-target.com.cn/become-our-partner/>

About Hi-Target

Established in 1999, Hi-Target is the first professional high-precision surveying and mapping instrument brand to be successfully listed in China.

Hi-Target provides a wide range of surveying equipment including GNSS receivers, CORS stations, Total Station, 3D Laser Scanners, GIS Data Collectors, UAV/UAS, and Hydrographic products to offer complete commercial solutions for various industries.

As the leading brand in the geospatial industry, Hi-Target invests heavily in research and development, on top of collaborating with more than 100 universities globally to bring the latest positioning technology and innovation for product development.

For over 20 years, Hi-Target has approximately 3,300 employees worldwide, with an established network of 64 subsidiaries, 28 branches and more than 200 partners in over 60 countries to service and support our customers.

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