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# Technological Innovation: New Unmanned Aerial Vehicle Target Tracking Technology

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## Abstract

This article mainly discusses a new type of unmanned aerial vehicle target tracking technology, comprising a drone using a built-in GPS module and a device with a built-in GPS module worn by a human body. When the human body is in motion, the device worn by the human body and the drone generate pseudocodes; Perform pseudorange measurement at a certain moment in GPS time; Obtain a nonlinear equation system related to pseudorange, repeat iterative calculations to obtain accurate coordinates, use Dijkstra algorithm to calculate the shortest path in a weighted directed graph, and the drone flies according to the shortest movement trajectory from the starting point to the human target point; The drone and device of the present invention perform pseudorange measurement at a certain moment in GPS time, and repeat iterative calculations to reduce errors, which is conducive to obtaining accurate coordinates of the device and drone; Based on weighted graph search, the coordinates of the drone and the human body are treated as two endpoints, representing the starting and ending points. The algorithm calculates the shortest trajectory in the graph.

**Keywords:** Unmanned drone; target tracking.



## INTRODUCTION

At present, civil drones are mainly divided into two categories: consumer grade and industrial grade. Among them, consumer grade drones are mostly used in personal aerial photography, entertainment and other fields; Industrial grade drones have many applications in agriculture, inspection, logistics, rescue and other fields. Due to their advantages of high mobility, low cost, and flexible operation, drones have been unprecedentedly developed and applied, among which target tracking is of great value.

For example, in consumer grade drone operations, it can track shooting objects from afar, which is frequently used by filmmakers, video bloggers, and even daily users who want to capture life moments and memories. However, in current drone tracking schemes, due to the target being in motion, it often exceeds the drone's data capture range due to the target's movement, Causing the drone to not follow when the user moves, and furthermore, since the target is in motion with the drone, it is particularly important for the drone to generate a tracking trajectory that can quickly reach the target's position.

This article mainly provides a trajectory generation method for drone target tracking, wherein both the drone and the device have built-in GPS modules, wherein the device refers to a device with built-in GPS, such as a mobile phone or watch, and the human body needs to carry such a device; The GPS system in drones or equipment mainly consists of three parts: space satellite part, ground control part, and user reception part. When the ground control part detects signals sent by space satellites, it processes these signals, confirms the satellite's orbit, and returns the information to the satellite. After receiving the information, the satellite broadcasts it to its own signal frequency band; And drones or devices capture signals transmitted by satellites to obtain the spatial coordinates they need.

The space is composed of 24 satellites, with an orbital period of 11 hours and 58 minutes. At this time, the Earth is also rotating, so the distribution of satellites on the ground will repeat every 23 hours and 56 minutes. This method can enable at least 4 satellites to be observed on Earth at all times, thereby providing more accurate positioning.

The ground control section includes the main control station, injection station, and monitoring station. The main control station is responsible for receiving and processing data sent by the monitoring station, and issuing commands to the injection station. The main control station is the CPU of the entire system, and the injection station is like a command control center. Under the control of the main control station, control commands and navigation messages are sent to the satellite, and the GPS navigation satellite can operate normally through the information transmission method of navigation satellite→monitoring station→main control station→injection station→navigation satellite.

The pseudocode mentioned in this article is the noise code PRN, which has good correlation close to a random sequence and can be reused as a predetermined sequence. It is very suitable for use in communication systems for sending and receiving GPS signals. The Dijkstra algorithmis as follows: Based on a set of vertices and edges between them, each edge can be divided into an undirected graph and a directed graph according to whether it has a specific direction. Adding weights to each edge becomes a weighted graph. The initial set only contains the starting point, and x0 starting from the starting point will search for the closest vertex to itself and add it to the set. After adding, it will search for the closest vertex to itself again. Each time, it will continue to obtain the next closest vertex from the previous set and add it to the set until the set endpoint vertex is added to the set S. This path is from the starting point to the destination endpoint. The shortest path of.

## CONCLUSION

Compared with the prior art, the technologies mentioned in this article has the following beneficial effects:1. Both unmanned aerial vehicles and devices worn by humans are equipped with GPS modules, which measure the pseudo range at a certain moment in GPS time, calculate a nonlinear equation system related to the pseudo range, and repeat iterative calculations to reduce errors caused by atmospheric refraction or electromagnetic wave propagation speed in the atmosphere, which is conducive to obtaining accurate coordinates of the equipment and unmanned aerial vehicles; 2. Based on weighted directed graph search, the edges can be divided into undirected and directed graphs according to whether they have specific directions. Each edge is weighted to form a weighted graph. The coordinates of the drone and the human body are treated as two endpoints, representing the starting and ending points. The Dijkstra algorithm is beneficial for calculating the shortest trajectory in the weighted directed graph.

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