Area Swarm Positioning System (ASPS)
Localized Positioning Network for GNSS-Denied Environments

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**All references and content available on GitHub

Motivation

GNSS is an ideal system due to its highly precise positioning and low cost, but SAR environments commonly have unreliable (or zero) access to it.

The "Last Mile" of Rescue is Almost Always GNSS-Denied

Intentional sabotage and denial of standard GNSS is relatively easy, making it a target for bad actors

But... GNSS is Complicated!

Yes it is, however much of that complexity is related to the fact that GPS/GNSS is deployed in medium earth orbit (MEO) and is "always on".

ASPS however...:

➔ Does not have to be active 24/7
➔ Is deployed close to the earth's surface and it is not in orbit
➔ The system itself can be precisely re-positioned on-demand to best fit the operational environment
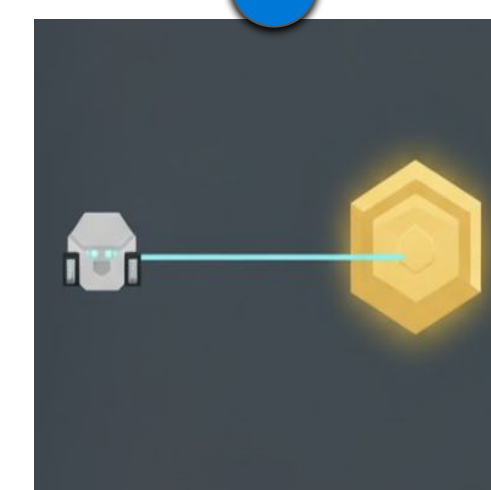➔ Much stronger signals and bi-directional communication

How it Works
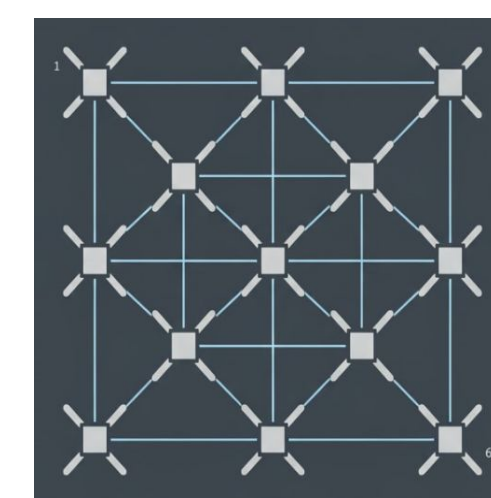
ASPS Network is Deployed
The network is formed using a small cluster of specialized aerial agents
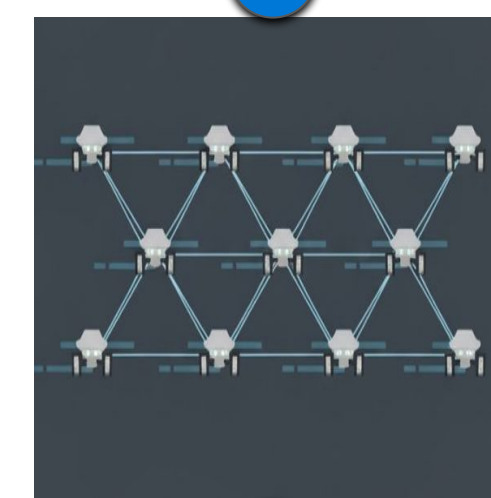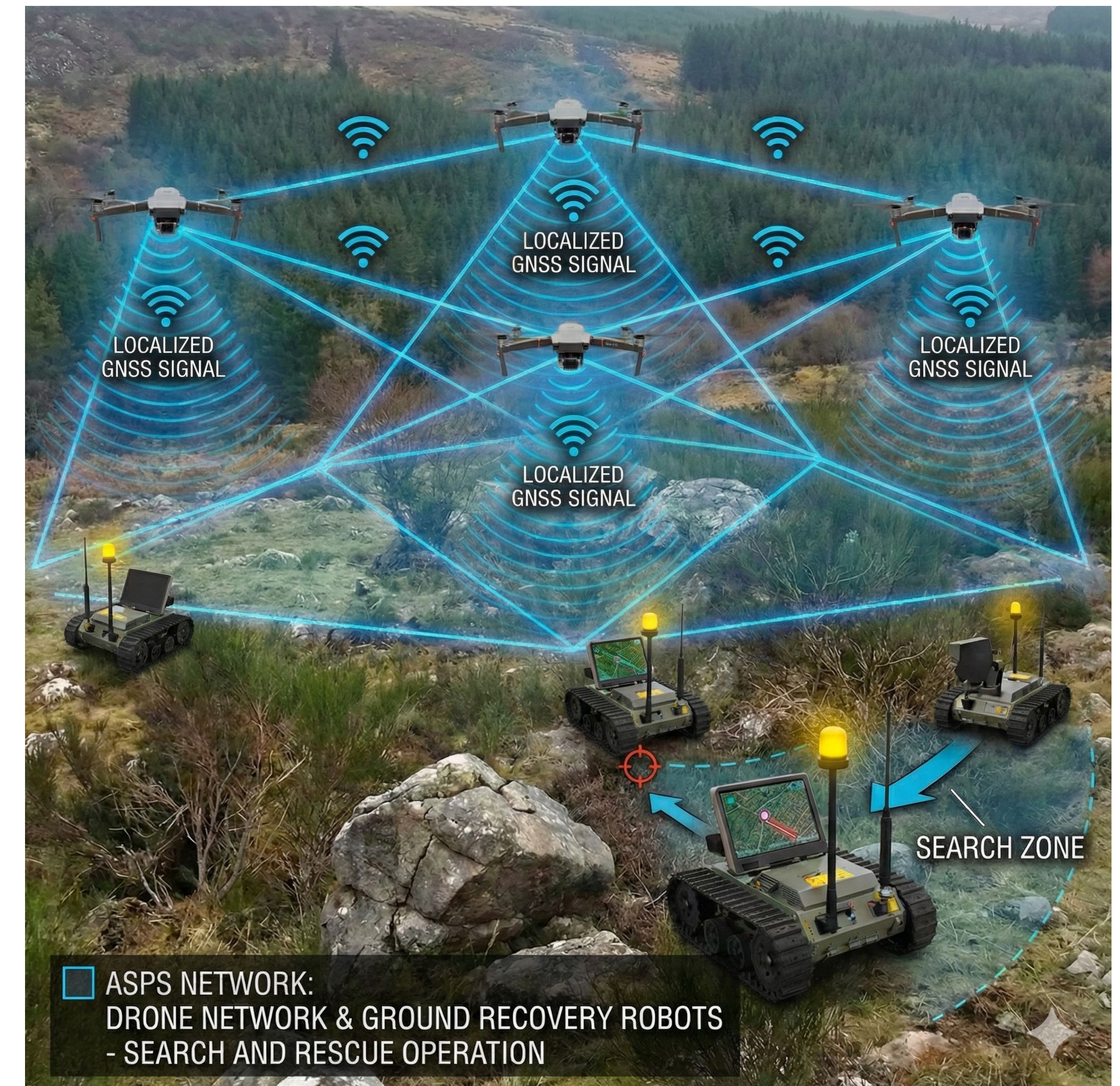
Recovery Agents are Deployed
Cheaper, simpler, robots are deployed as a swarm for pathfinding and target acquisition and recovery

ASPS Network Utilized for Target Recovery
ASPS replaces GPS for precise positioning enabling faster, rescue

LOCALIZED GNSS SIGNAL

SEARCH ZONE

ASPS NETWORK: DRONE NETWORK & GROUND RECOVERY ROBOTS - SEARCH AND RESCUE OPERATION

Societal Impact

➔ Shrinking the "Golden Hour" - In trauma medicine, the first hour after injury is critical. The faster a victim can be extracted, the more likely that life is preserved.
➔ "You are not alone" - For a trapped victim, the silence is terrifying. A navigation node that doubles as a communication relay provides an immediate psychological lifeline.
➔ Making SAR Accessible - ASPS can be made cheaper and more accessible than existing high-cost, low availability methods