



CASE STUDY | THE SWARM FLIGHT SYSTEM PROJECT

KARI



“
Swift Navigation’s high-precision RTK GPS delivers the precision required for drone accuracy at a price that enables us to apply it to a swarm of drones.
”

—SungTae Moon, Senior Researcher

CUSTOMER

KARI

PRODUCTS

Original Pixsi,
Pixsi Multi

USE CASE

UAV

The Swarm Flight System is a project at the Korea Aerospace Research Institute (KARI) in South Korea focused on developing an indoor/outdoor multiple drone control system.

Founded in 1989, KARI contributes to the development of the economy and lifestyle enhancement of South Korea through the exploration and technological advancements, development and dissemination in the field of aerospace science and technology.

Challenge

With increasing interest in drones, various applications using drones have been introduced such as surveillance systems and delivery services. Recently, drones have been used for demonstrating choreographed aerial maneuvers. SungTae Moon, who is a senior researcher at KARI and developed the system, has focused on the synchronized drone swarm flight for choreographed aerial maneuvers. What began as success with indoor swarm flight systems evolved into the development of outdoor swarm flight systems.

Moon says that reliable communication with many drones and precise position estimation are required with robust control for the outdoor aerial choreography. Precise position estimation is an especially big technology challenge for the swarm flight.

Solution

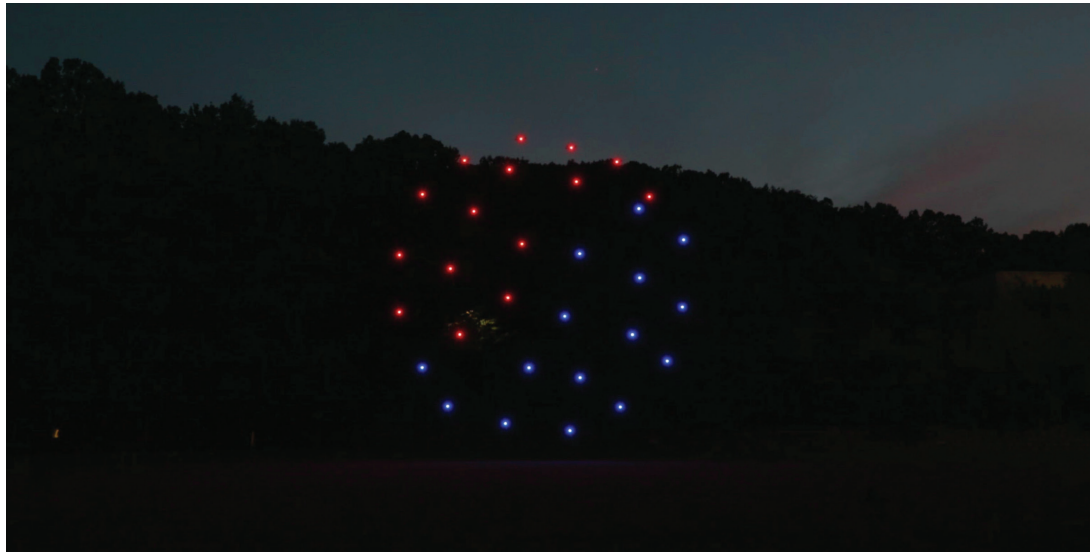
Precise position estimation is extremely important to drone swarming to ensure flights go as planned. To achieve the required precision, Moon explored varying sensors including motion capture, ultra-wideband (UWB), camera, LiDAR, GPS and real-time kinematic (RTK) GPS. After considerable testing, he found RTK GPS to be the optimal solution for position estimation. Other sensors did not suit a

swarm system due to difficulties with installation and low precision results when implemented. Though RTK GPS delivered the accuracy required by—and was easy to apply to—the swarm system, he initially felt it was an expensive solution that was not always stable.

Moon first learned about Swift Navigation and its Piksi® receiver during its Kickstarter in 2013. Piksi's affordable price and comparable performance to competing receivers made it an attractive option for his drone swarming objectives. When Piksi Multi launched in 2017, he integrated the multi-band, multi-constellation receiver into his program. An example of his drone swarms can be viewed [here](#).

Results

As Swift continues to provide firmware updates—at no cost to customers—the performance of Piksi Multi becomes more and more precise, reliable and stable. That stability allows Moon's swarm system to become more robust. Being able to rely on Piksi Multi's performance has allowed him to improve his swarm flight system and continually increase the number of drones flown simultaneously. An example of such a flight can be viewed [here](#).



Most recently Moon demonstrated his drone swarming for the South Korean Presidential Advisory Council on Science and Technology which included the Minister of Finance and Economy in attendance. He anticipates continuing to expand and improve upon his synchronized drone swarm flights and Swift looks forward to providing him with RTK GNSS receivers to deliver the precision and stability to do so.

Contact Swift to learn how RTK accuracy can help your UAV program take flight.