Software Development for Human–Humanoid Robot Interaction

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Whistle-Controlled Drone

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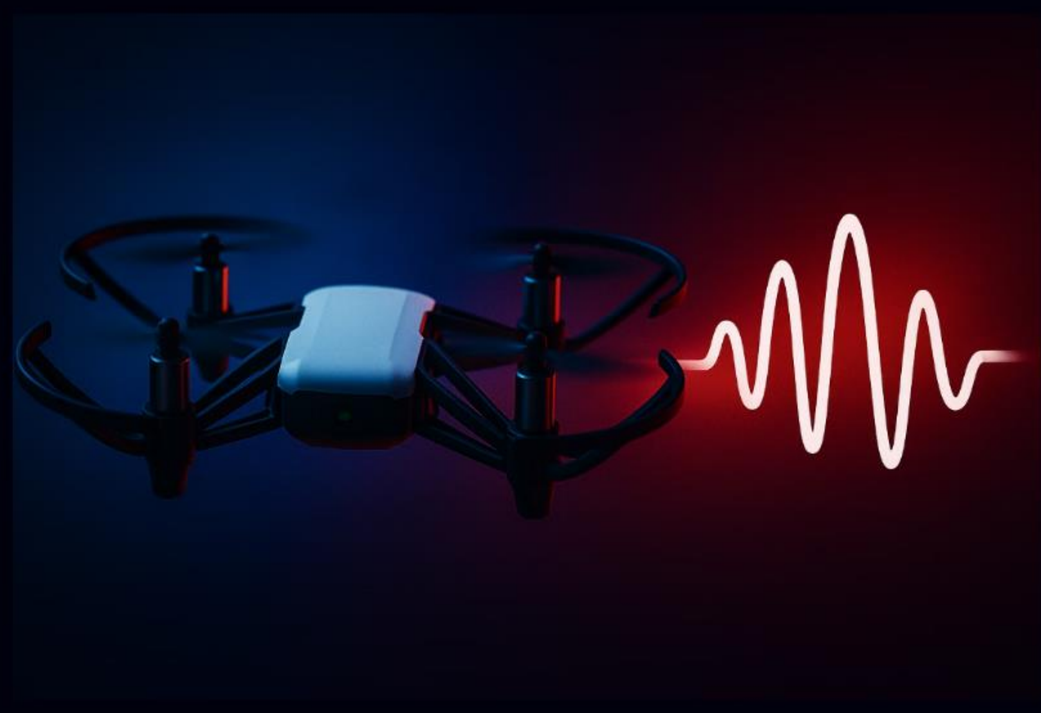
Whistle-Controlled Drone: Real-Time Human–Drone Interaction via Audio & AI

Project Concept

Inspired by "Yondu's arrow" from "Guardians of the Galaxy", a DJI Tello drone responds exclusively to the pilot's whistle. The system processes real-time audio, converting it into precise, hands-free flight commands.



Technical Challenges

- Converting whistles into smooth, accurate 3D flight control.
- Eliminating speech, background noise, and irrelevant sounds.
- Identifying the pilot’ s unique whistle in real-time amidst other sounds.

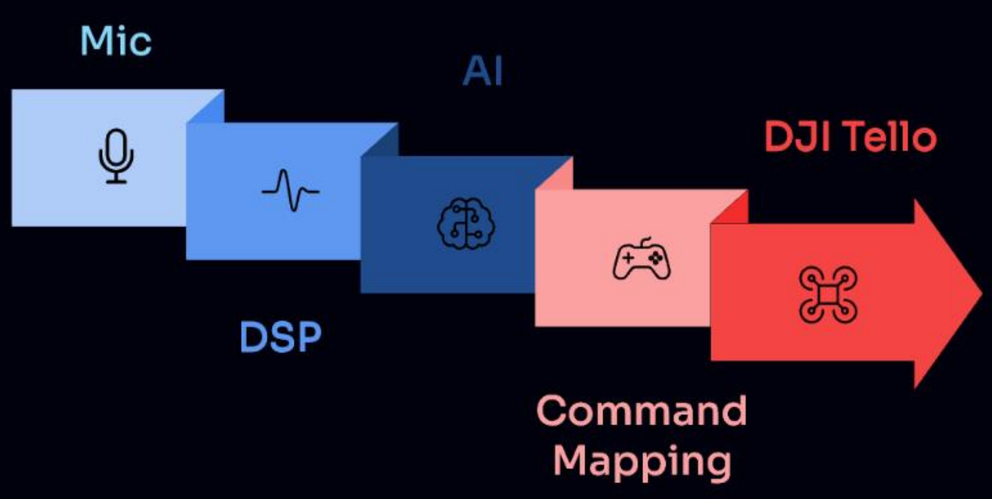
Filtering System

- **DSP Stage:** Band-pass filtering and pitch/volume extraction for whistle-like sounds.
- **AI Stage:** Neural network classifier ensures only the pilot's whistle is accepted, rejecting others.

Command Mapping

Forward speed	**Pitch** • Lower pitch→ Slower forward movement • Higher pitch → Faster forward movement
Altitude	**Volume** • Softer volume → Drone descends • Louder volume → Drone ascends
Rotation	**Pitch Change** • Low pich to high pich → Rotate right • High pich to low pich → Rotate left

Pipeline Diagram



Testing & Results

- ~80% accuracy distinguishing the pilot's whistle from others.
- Stable, responsive control even in noisy environments.