Communicating with groups of people during an emergency situation is an extremely important and challenging task. The Cloud Control project aims to relay messages from a ground control system to a target audience under a drone without being physically present.

- **Ground Control System:**
  - User interface running on Raspberry Pi touch screen with a microphone
  - Drone controller with user interface and mic
- **Drone Module:**
  - PCB with speaker system mounted on drone

**User Interface**

- Welcome to the CloudControl user station application! To begin recording, press the start recording button and drone goes on line. The status LED is red when recording and green when playing back. The remote display shows if the drone unit is connected. The remote display shows if audio is sent to the speaker system.

**Software Design**

- **Ground Control System:**
  - Python user interface running PyAudio which passes binary audio samples to be sent over the NRF module
- **Drone Module:**
  - NRF receives the binary audio samples and passes them to the microcontroller
  - The microcontroller passes the samples to the audio codec which converts and outputs an analog signal to the speaker system

**Critical Hardware Components**

- **Ground Control System**
  - Raspberry Pi 3B+
  - Touch screen user interface
  - Microphone for recording

- **LPC4088 Microcontroller**
  - Main chip on PCB
  - Receives audio samples from NRF and passes them to codec

- **NRF24 Wireless Module**
  - Connected to ground control and drone module
  - Sends/receives digital audio samples

- **Audio Codec**
  - Converts digital audio samples and outputs them as an analog signal

- **Speaker System**
  - Receives analog signal, amplifies it, and outputs it pointing directly down from the drone towards the audience