The Syria Airlift Project

Open-Sourcing Humanitarian Airlift

Mark Jacobsen  Jessie Mooberry
The Medical Crisis in Syria

- 212,000 living in besieged areas
- 4.8M living in hard-to-access areas
- 610 medical personnel killed
- 233 attacks on 183 medical facilities
- Transporting medical supplies punishable by torture & death

“Why do the nations abandon us?”
- Dr. Mohamad, Aleppo
Areas of Need
3 minute video at syriaairlift.org
Swarming Airlift

- Planes cost $500-$1000 apiece
- Built from cheap materials like insulating foam and broomsticks
- Aiming for 2kg/4lbs at 50km/30mi range & return (enough to reach Aleppo from Turkey)
- Can iterate to larger designs
- Low mass capability still suitable for medical supplies, vaccines, vitamins, baby milk, etc.
Swarming Airlift

• Survivability
  • Almost impossible for most radars to track
  • Not worth the price of MANPADs
  • Fly at night to avoid small arms
  • Semi-randomized flight plans
  • Cheap enough to absorb attrition
  • Statistical averages more important than individual planes
A Cargo Conveyor Belt

• 5-minute turn-time between flights is doable for a 2-3 man launch crew
  • 12 flights per hour
  • 8 hours/night = 424 lbs/night per launch crew

• We believe 2-minute turn times are possible
  That’s > 1000 lbs/night per crew

• Key to success: *extreme reliability*
Mission Profile
Delivering 1kg at 30km range

(accumulating distance in orbits)
A New Kind of Air Force
Every Idea is on the Table
“Turn the Lights Back On”
The Volunteer Team

- Stanford PhDs
- A Quaker pacifist
- Engineers from 3D Robotics
- A Science Fiction editor
- A documentary filmmaker
- A Harvard Law student/former AF Intel officer
- The president of an aid group serving Syria
- A Former Syria desk officer from the State Department
- Syrian engineers in Alabama and Germany
- ... and many others!
Where We Are

• All elements of technology under development
• Team working on legal/political issues
• Speaking with many interested stakeholders
• Aiming for pilot project in Turkey in summer
• We need to grow to succeed
The Syria Airlift Challenge

[Images of various activities and people related to the Syria Airlift Challenge]
Planes We Operate
The Waliid
Aleppo 50
Light Utility Vehicle

L U V

LIGHT UTILITY VEHICLE

MTOW - 6.5 kg
PAYLOAD - 2.0 kg
WINGSpan - 3.0 m
CRUISE SPEED - 30 m/s
RANGE @ CRUISE - 130 km
Light Utility Vehicle
Responsible Use Features

- Autopilot self-destruct
- Custom handshake between plane and GCS
- Security certificates
- Remote access denial
- Enforced no-fly zones
Custom ArduPlane Software

- Fence In/Out
- Imminent crash detection
- Data link shutdown
- Airdrop CARP
- Security handshake
Testing in Syria with SITL
SAP Station

• Two purposes for custom GCS:
  • Engineer out the likelihood of human error
  • Facilitate reliable operation of large numbers of aircraft

• At present, goal is to remove human from loop. We want fully automated flight profiles.
Swarmify Flight Plans
SAP Station: Checklists

Confirm Aircraft Type

This flight plan is for an FX-61 Phantom Flying Wing, depicted here. Is this the type of aircraft you are preparing to launch?

Yes, this is the correct aircraft type
No, this is not the correct aircraft type

Incorrect Aircraft Type

This aircraft is not safe to fly. The aircraft you are attempting to preflight is different than the one specified in the flight plan. Please change the flight plan, or else try again with the correct aircraft type.

Abort Launch

Connect Autopilot

Connect the autopilot to the computer using a USB cable. Once it is connected, select continue.

Connected
Disconnected
There is a problem connecting the USB cable.

#STEP id="aircraft_type">
  <TITLE>
    <EN>Confirm Aircraft Type</EN>
    <AR>AR Confirm Aircraft Type</AR>
  </TITLE>
  <PANEL type="media">
    <EN>aircraft_photo.jpg</EN>
    <AR>aircraft_photo.jpg</AR>
  </PANEL>
  <PANEL type="text">
    <EN>This flight plan is for an FX-61 Phantom Flying Wing, depicted here. Is this the type of aircraft you are preparing to launch?

Yes, this is the correct aircraft type
No, this is not the correct aircraft type

Abort Launch

Disconnected

Connect the autopilot to the computer using a USB cable. Once it is connected, select continue.

Connected
Disconnected
There is a problem connecting the USB cable.

#STEP>


Ethical Tensions

• Drones in a combat zone
• Political effects
• Violating sovereign airspace
• Risks of retaliation
• How to build trusted networks
• Open source vs security requirements
How to Help

- Volunteer
- Sponsor
- Donate
- Follow

- Help Uplift Aeronautics grow
Some Software Projects

• ArduPlane: airdrop module
• SAPPlane: enforced no fly zones
• SAPPlane/GCS: security handshake
• SAPPlane: custom failsafes
• GCS: interactive checklists
• GCS: mission scheduling
• GCS: authentication
About four hours ago there was a chemical attack on Sarmin, Idlib. 6 dead, 70 wounded. Sarmin isn’t far from the border but the border is closed to all traffic... If your planes were ready, you could have flown in emergency medicine and gear :-(

So plz study what happened and use it to explain to donors why this project is necessary