The Syria Airlift Project

Open-Sourcing Humanitarian Airlift

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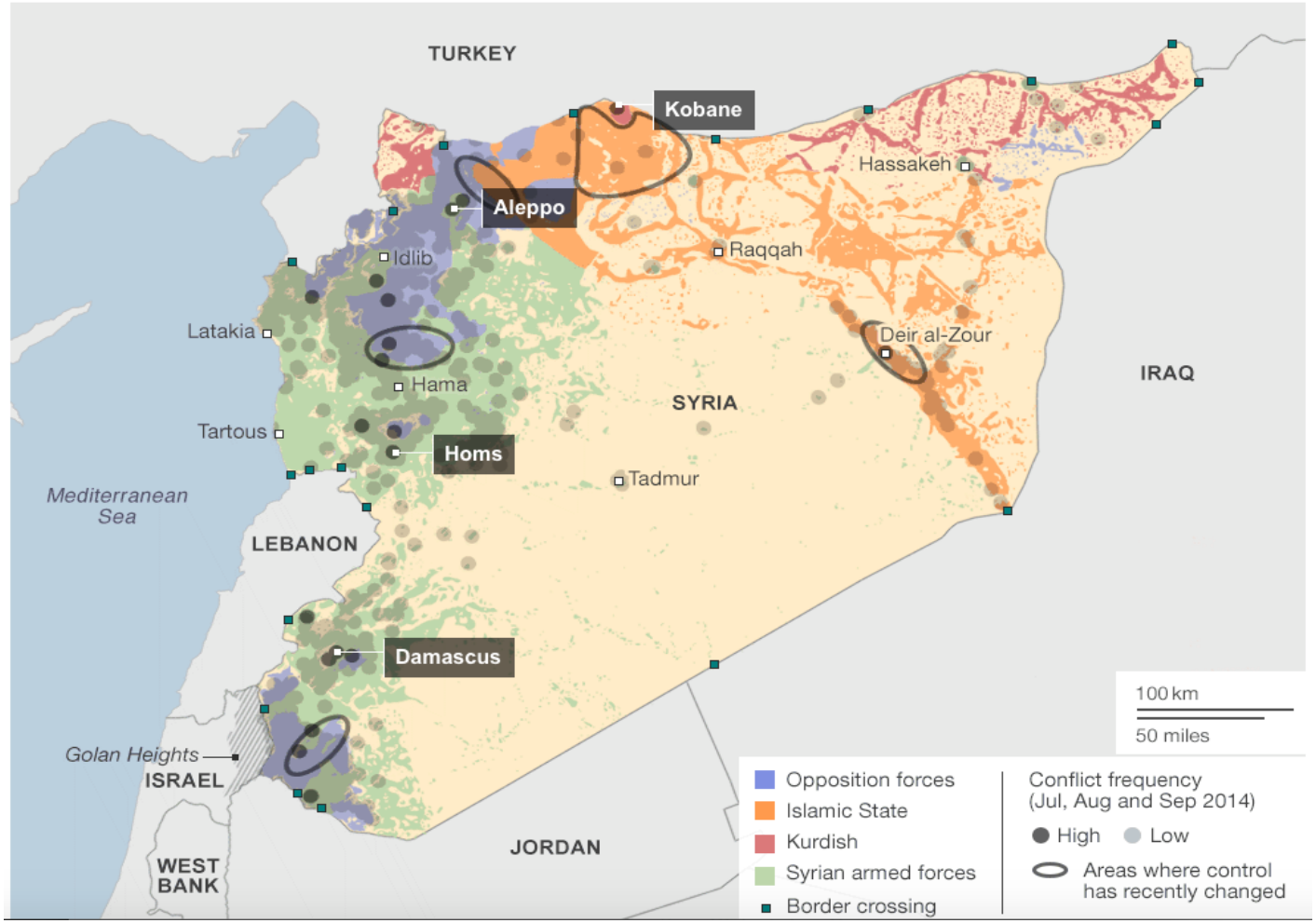
The Medical Crisis in Syria

- 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



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

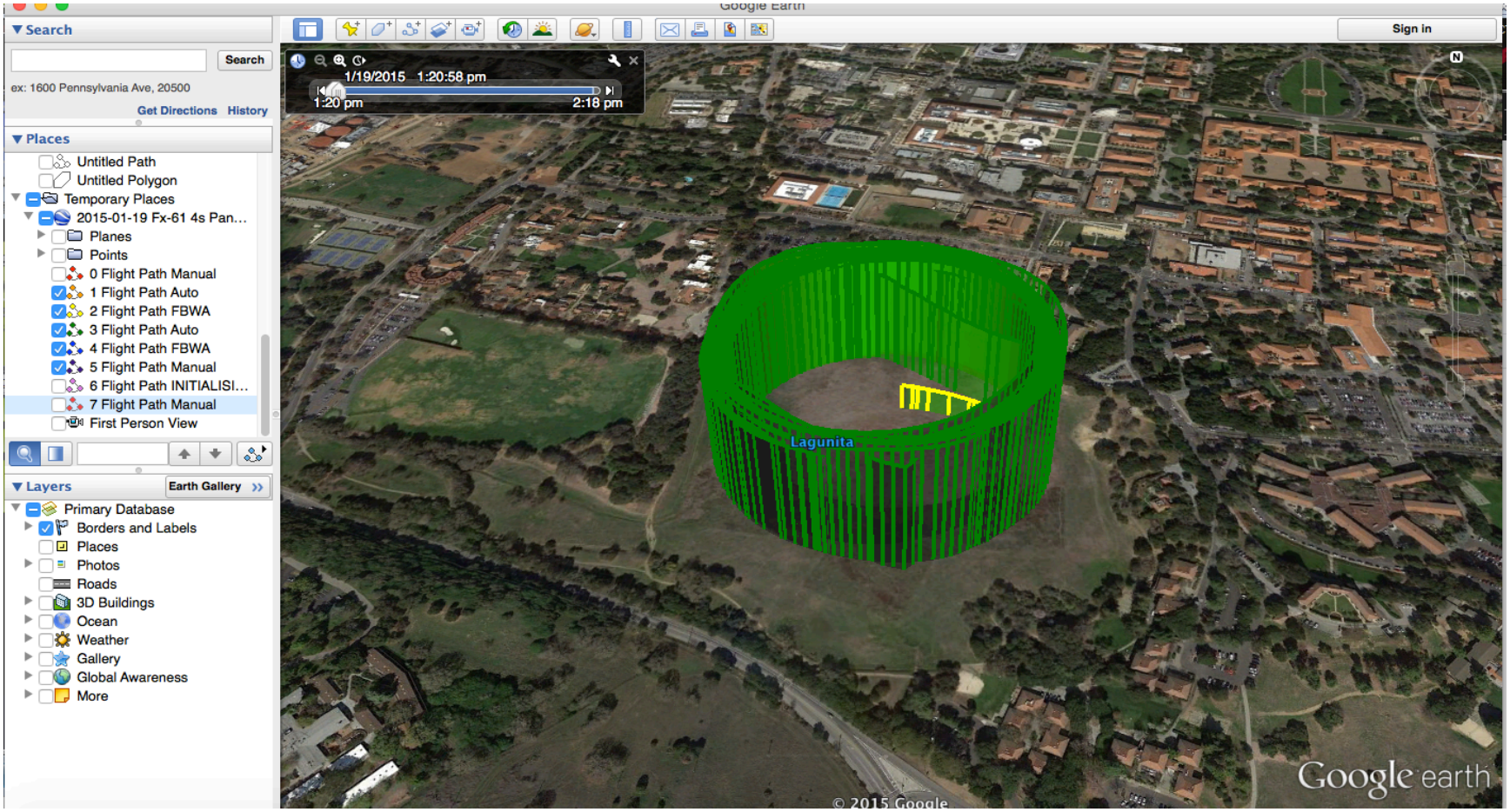
A Cargo Conveyor Belt

- 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*

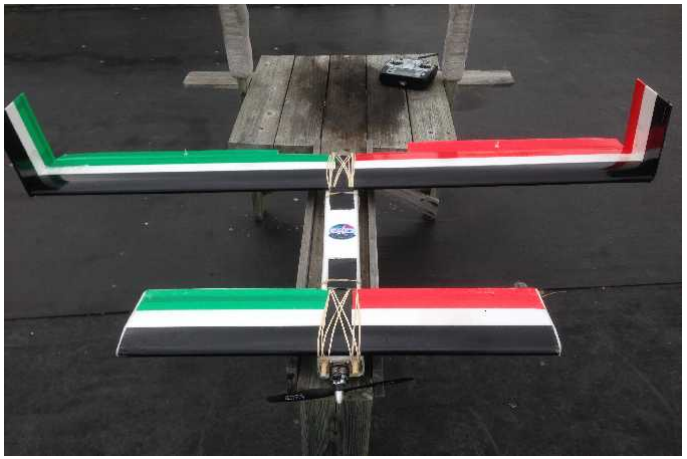
Mission Profile

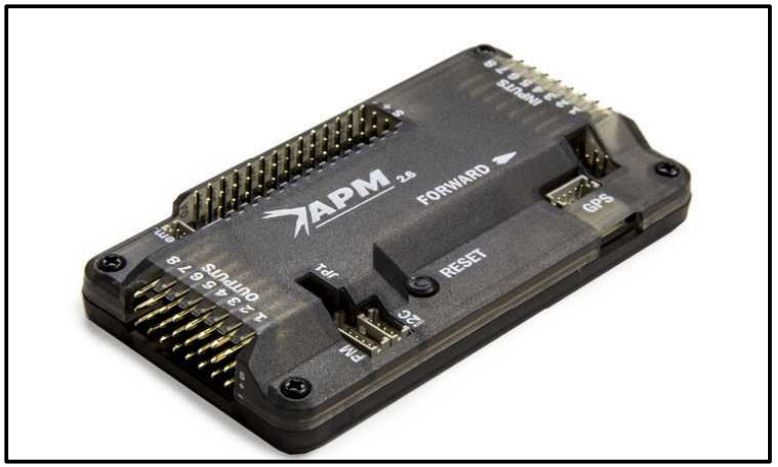
Delivering 1kg at 30km range

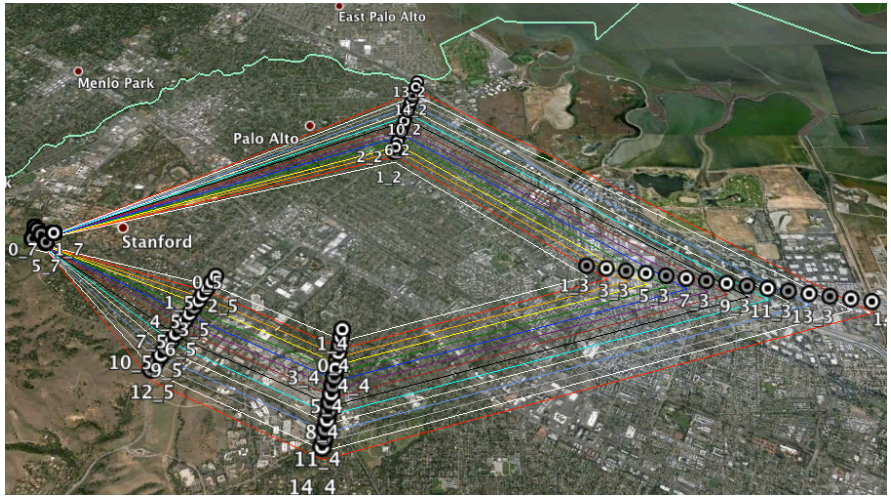
(accumulating distance in orbits)



A New Kind of Air Force

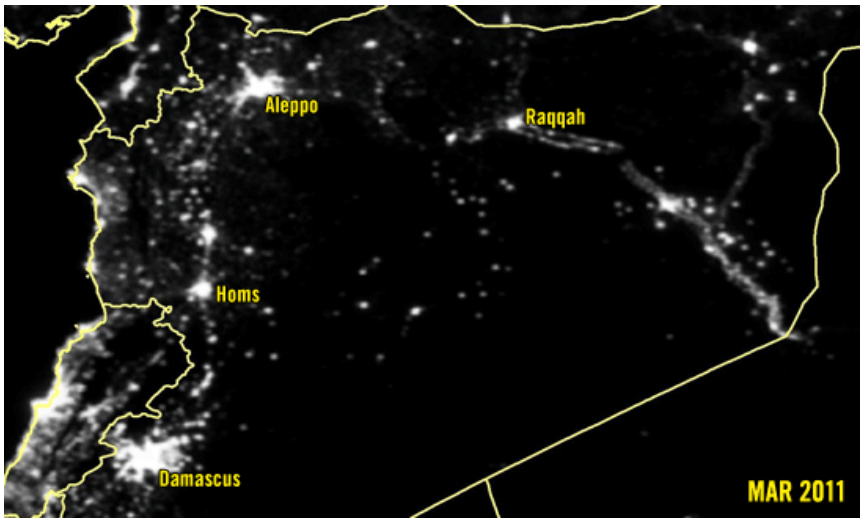


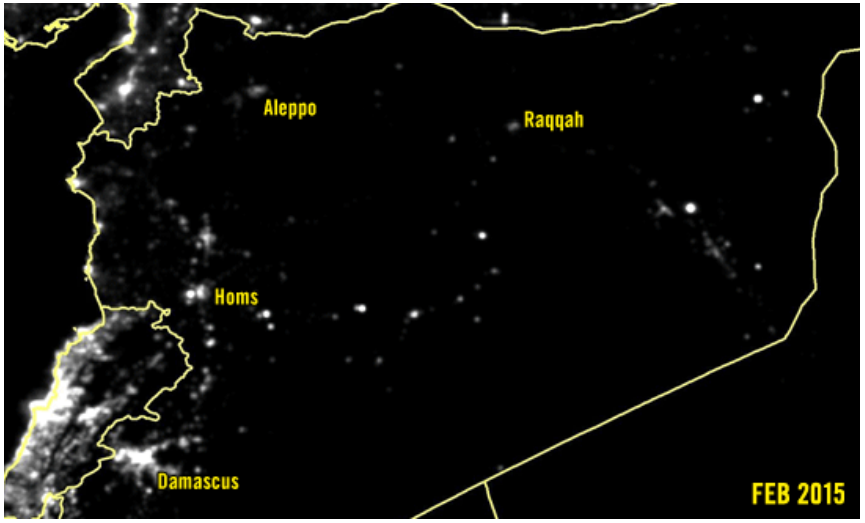




Every Idea is on the Table

“Turn the Lights Back On”





The Volunteer Team

- Stanford PhDs
- A Quaker pacifist
- Engineers from 3D Robotics
- Syrian engineers in Alabama and Germany
- 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
- … and many others!

Where We Are

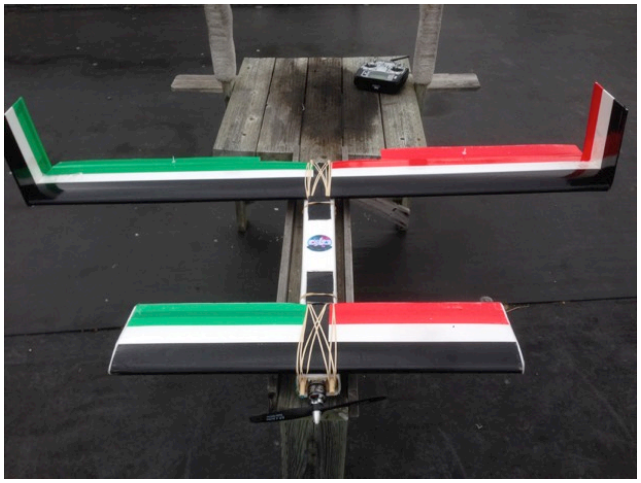
- All elements of technology under development
- Team working on legal/political issues
- Speaking with many interested stakeholders
- Aiming for pilot project in Turkey in summer
- We need to grow to succeed

The Syria Airlift Challenge

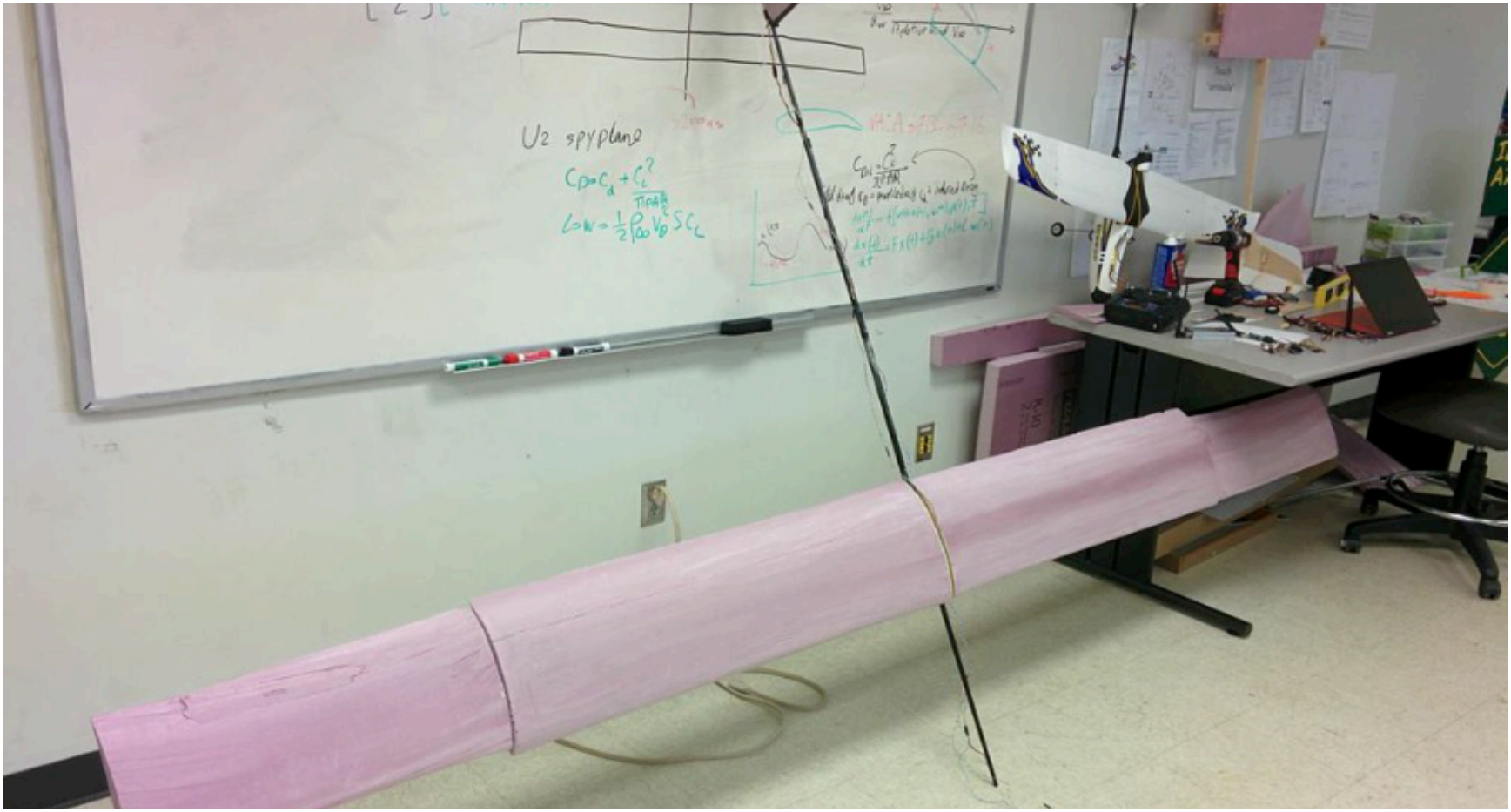
UPLIFT

INNOVATE AID EMPOWER

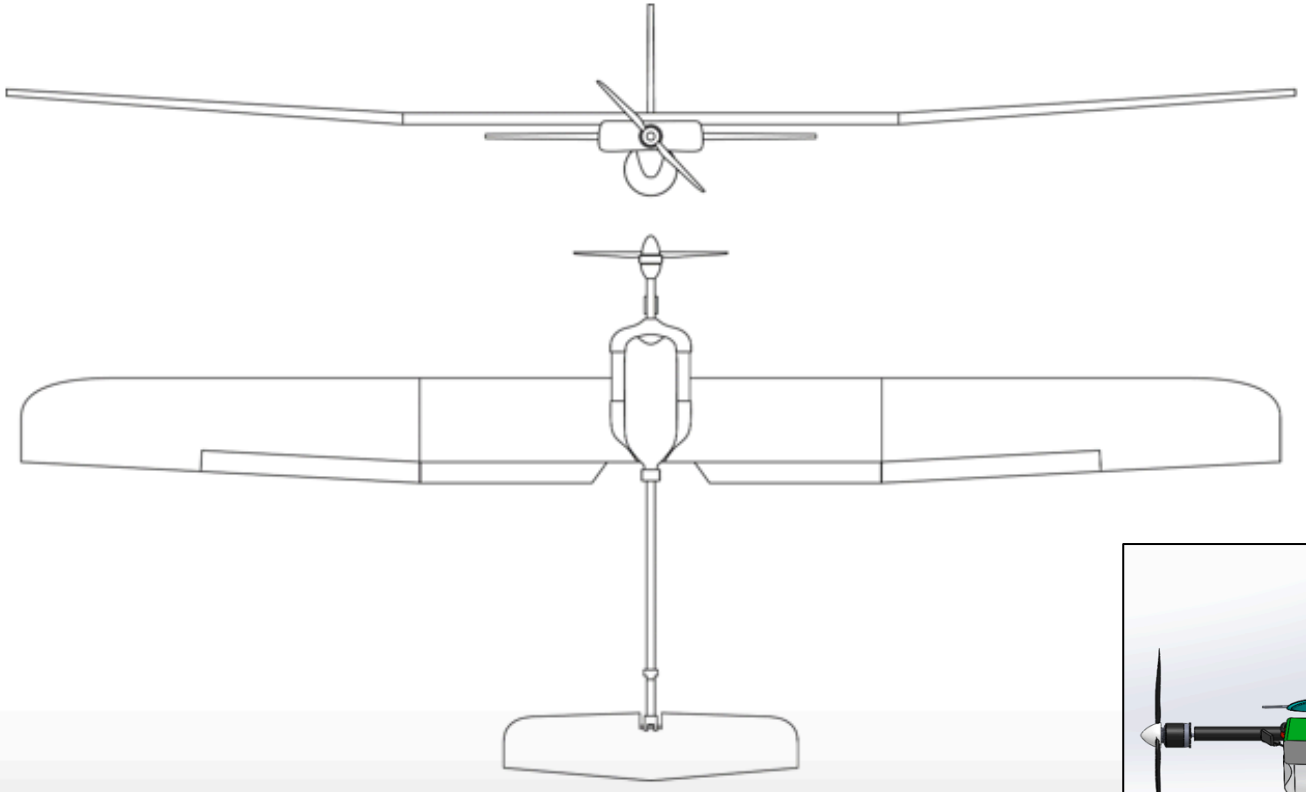
Planes We Operate

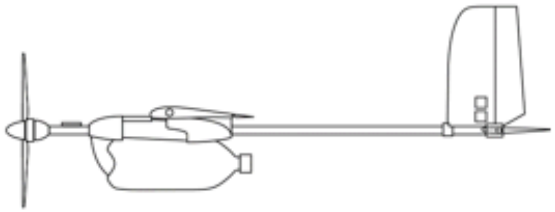


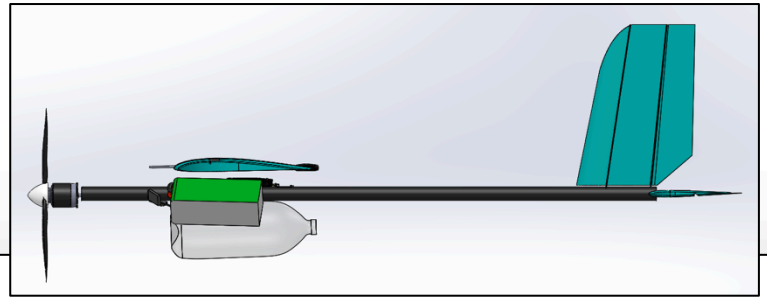
Aleppo 50



Light Utility Vehicle

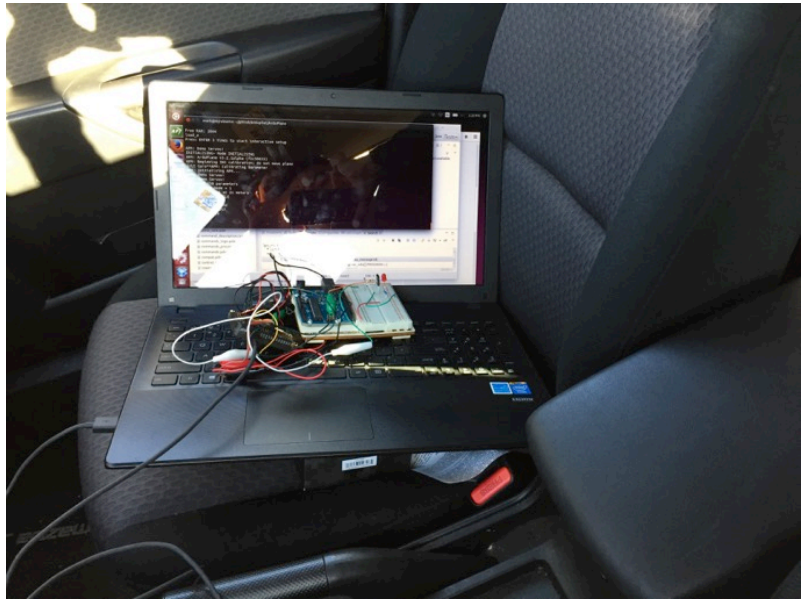






Responsible Use Features

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



Custom ArduPlane Software

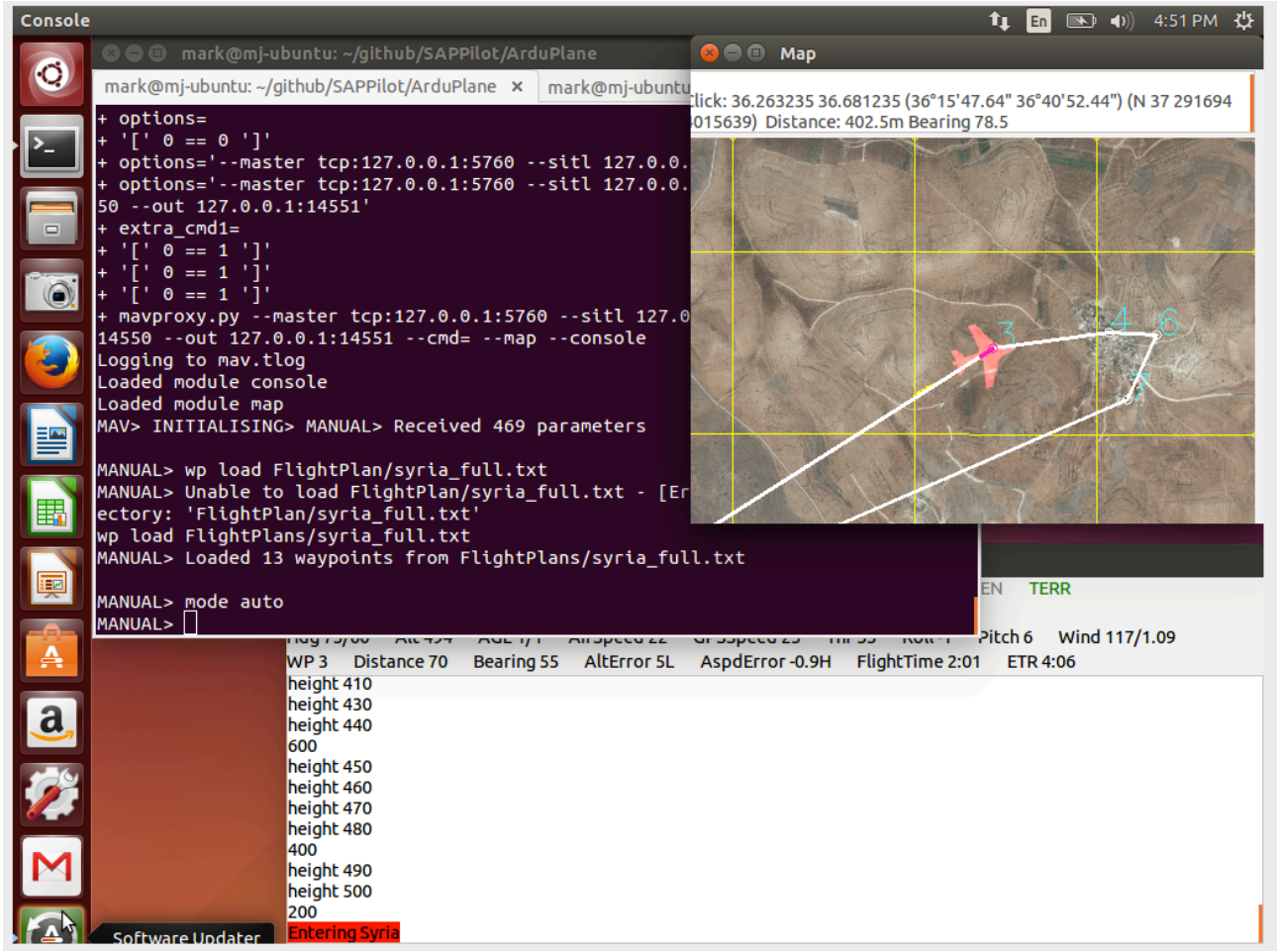
*sap.pde

```
bool inside_syria = FALSE;
bool syria_defined = FALSE;
Vector2l polygon[25];

void build_syria(void)
{
    polygon[0].x = 327726855;
    polygon[0].y = 358393878;
    polygon[1].x = 323091965;
    polygon[1].y = 368214431;
    polygon[2].x = 345059871;
    polygon[2].y = 411336193;
    polygon[3].x = 372575689;
    polygon[3].y = 422672444;
    polygon[4].x = 370636834;
    polygon[4].y = 415886048;
    polygon[5].x = 370974321;
    polygon[5].y = 409153921;
    polygon[6].x = 366651648;
    polygon[6].y = 394489162;
    polygon[7].x = 367115031;
    polygon[7].y = 387883922;
    polygon[8].x = 369199528;
    polygon[8].y = 382415577;
    polygon[9].x = 366275365;
    polygon[9].y = 374649535;
```

- Fence In/Out
- Imminent crash detection
- Data link shutdown
- Airdrop CARP
- Security handshake

Testing in Syria with SITL

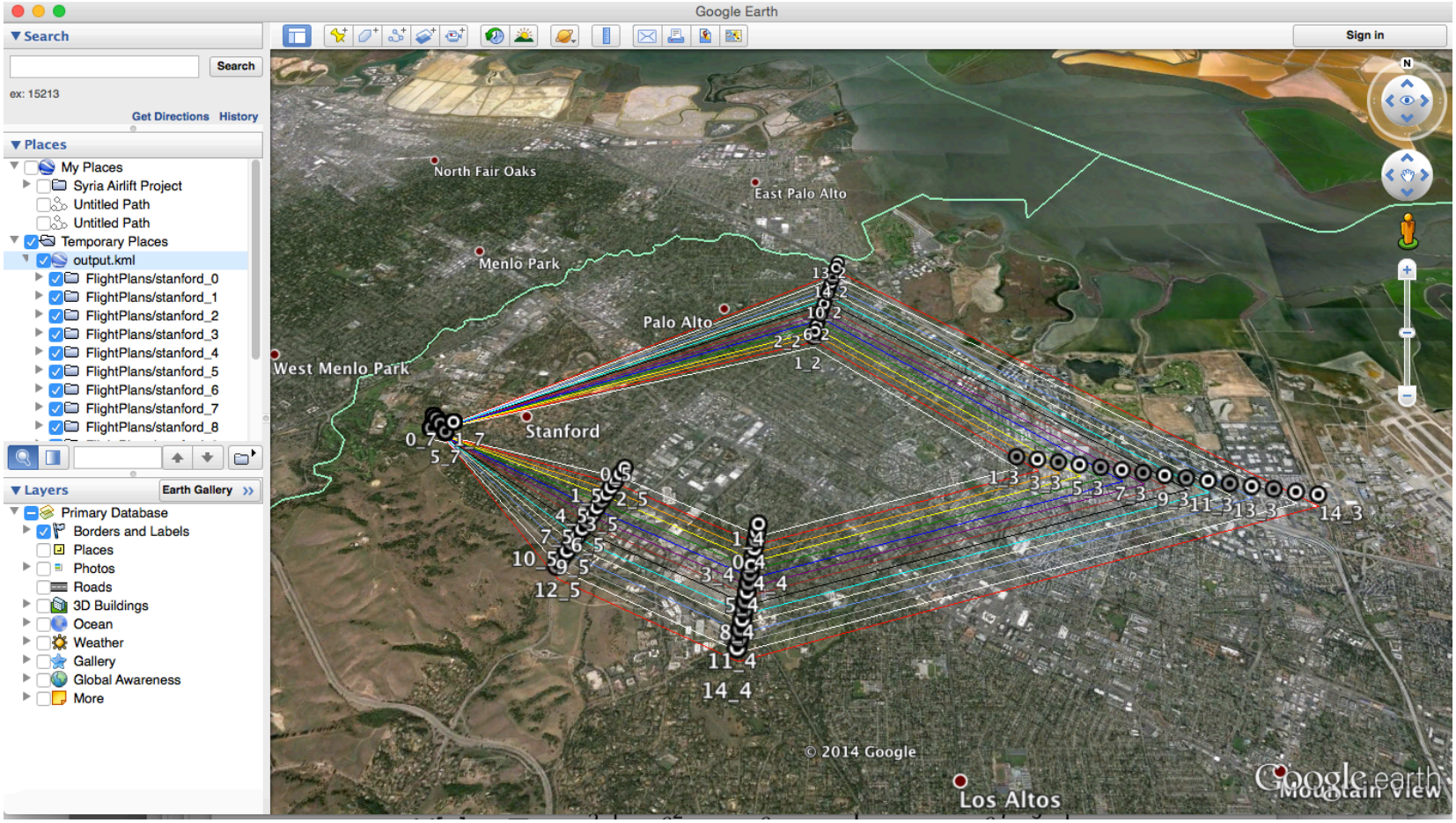


SAP Station

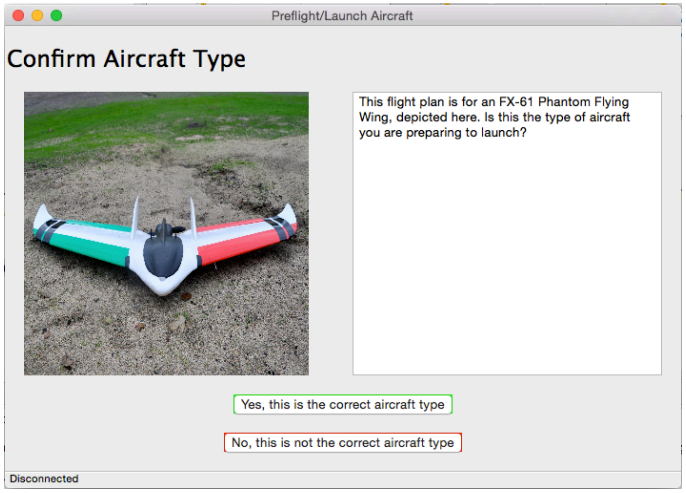
- Two purposes for custom GCS:
  - Engineer out the likelihood of human error
  - Facilitate reliable operation of large numbers of aircraft

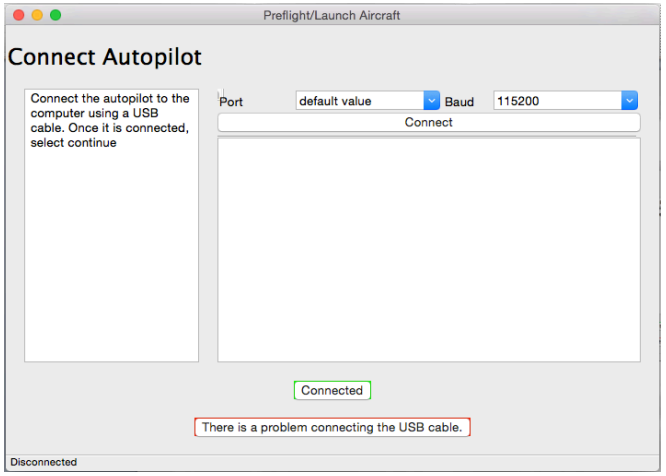
- At present, goal is to remove human from loop. We want fully automated flight profiles.

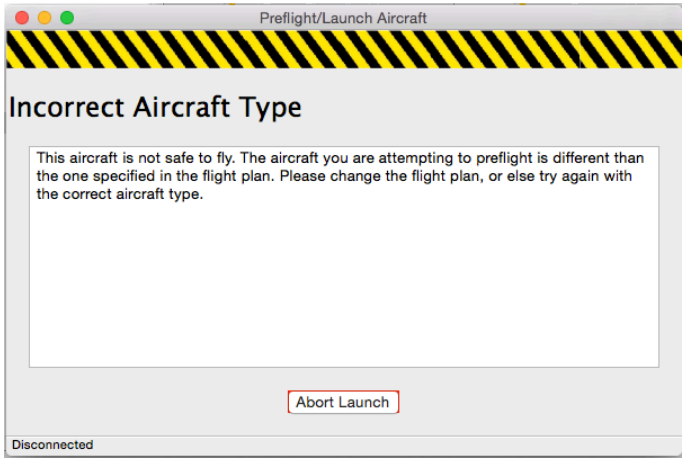
Swarmify Flight Plans



SAP Station: Checklists








```
<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. I
        <AR>AR Expanded</AR>
    </PANEL>
    <BUTTON link="connect_autopilot" color="green" visible="true" enabled="true">
        <EN>Yes, this is the correct aircraft type</EN>
        <AR>AR Yes, this is the correct aircraft type</AR>
    </BUTTON>
    <BUTTON link="error_wrong_aircraft" color="red" visible="true" enabled="true">
        <EN>No, this is not the correct aircraft type</EN>
        <AR>AR No, this is not the correct aircraft type</AR>
    </BUTTON>
</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

www.syriaairlift.org
@SyriaAirlift
@UpliftAero