

SPARR⁺OW

SGM 4/26

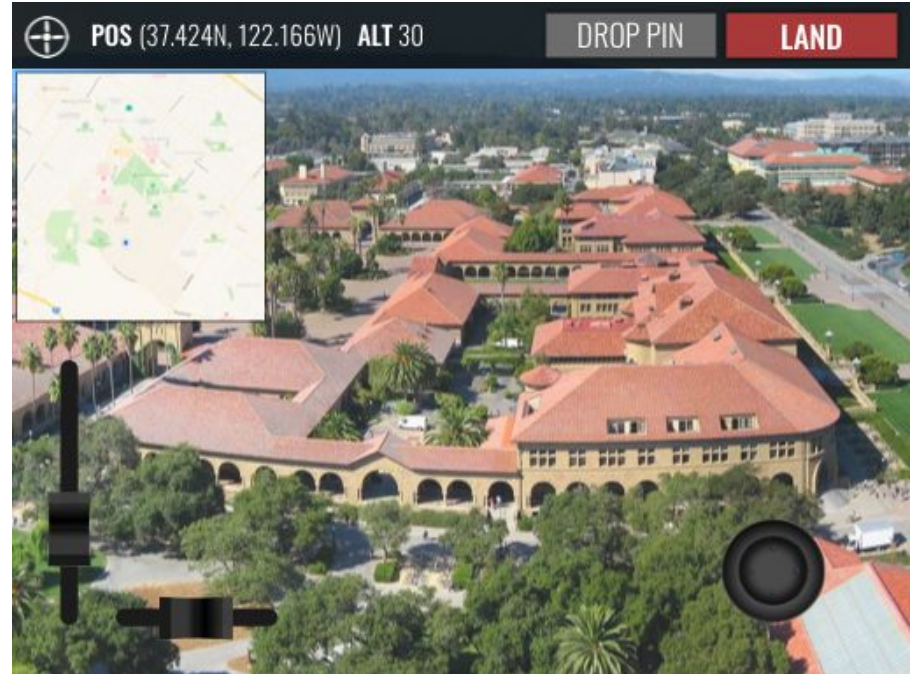
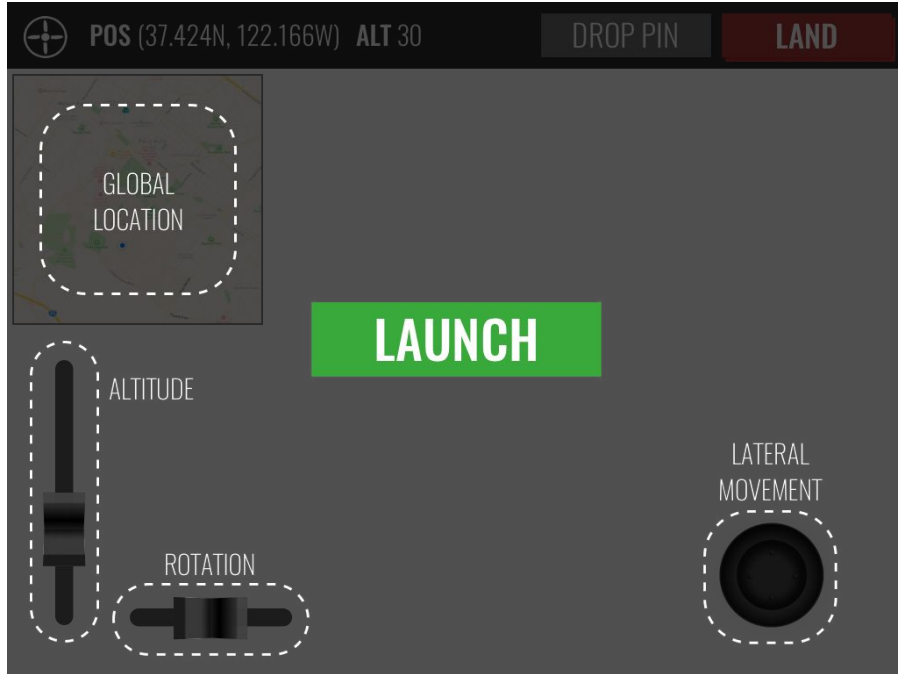


Development Trajectory Discussion

- Have been discussing our goals for the rest of this quarter
- As we described at our customer presentation last week, we're shifting our focus from inventory management to SAR & have been doing research/organizing meetings on this
- Our main goal is still indoor autonomous drone navigation
- We have decided to also pursue a UI component (iPad app) so that users can gain some value from our product and to reduce idle cycles



UI Goals





UI Update

- Can control the drone from the iPad application: take off, land, altitude changes, rotation changes, joystick for lateral movement
- Map view updates to Tango's current GPS location, is zoomable and scrollable
- Video feed is getting to the server (need to verify that payload is not corrupted when extracted from renderer?), so we have to send it over to the iPad



Drone Updates

- Decided to switch from **writing our own PID controllers** to **modifying the Arducopter firmware to not use GPS, and to use Tango localization instead.**
- This allowed us to fly the drone indoors! We flew it in 717 (broke a couple propellers but still exciting)
- We figured out how to modify and load new ArduCopter firmware on Solo
- Found locations in code where GPS location can be replaced with relative location. We have to decide whether or not to use the Tango's local reference frame, or convert the coordinates to ECEF to geodesic (lat/lon) coordinates.
- Tango mount fell in a crash a while back - getting a new one, rush ordered so it should arrive today.



Meeting with Kevin Mott

- Sam introduced us to Kevin, who is one of the other members on his team. He was a HQ Company Commander at the US Army and developed wealth of combat experience learned in Iraq and Afghanistan
- Gave us reinforcement that our product would be valuable and the military would be interested.
 - Laid out the current use of drones in the military, and told us to **look for teams/areas with limited assets**.
 - Large UAVs, e.g., Predator, Reaper. Fixed wing, high altitude, HD cameras, can be armed. But, they cost **\$50M**, and the Air Force is crunched for pilots. Obviously can't go indoors
 - Small UAVs, e.g. Puma, Raven. Fixed wing, "pretty crappy," shaky video feed, cost **\$700K (!!)**, can't hover.
 - Verified that the video feed alone (without post-processing/computer vision) from inside a building would be extremely valuable.
 - Explained that stealth is a niche case (i.e., for most cases the drone would not need to be small and unobtrusive)
- He emphasized the importance of having a drone be **autonomous**, because:
 - Manual control would require more, unwanted pre-deployment training
 - Right now, the military is exploring micro-drones, like the Black Hornet, for indoor navigation, but they require an human operator, which reduces their situational awareness in a combat environment and effectively reduces the # of team members by 1-2.
- Sam's most valuable suggestion for us right now was that we could have predefined search patterns based on LKP programmed into our app.



Questions

- For the breakathon, we are primarily planning to have testing of the iOS application's control of the drone. Does this seem reasonable?
- Thoughts on our development trajectory & plan moving forward?