

# Hi, we are EagleEye

Team #S20-35

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# 70,000 deaths

“The average number of deaths and missing people due to natural disasters occurring worldwide, such as earthquakes, hurricanes, forest fires, and floods, from 2006 to 2015 was approximately 70,000”

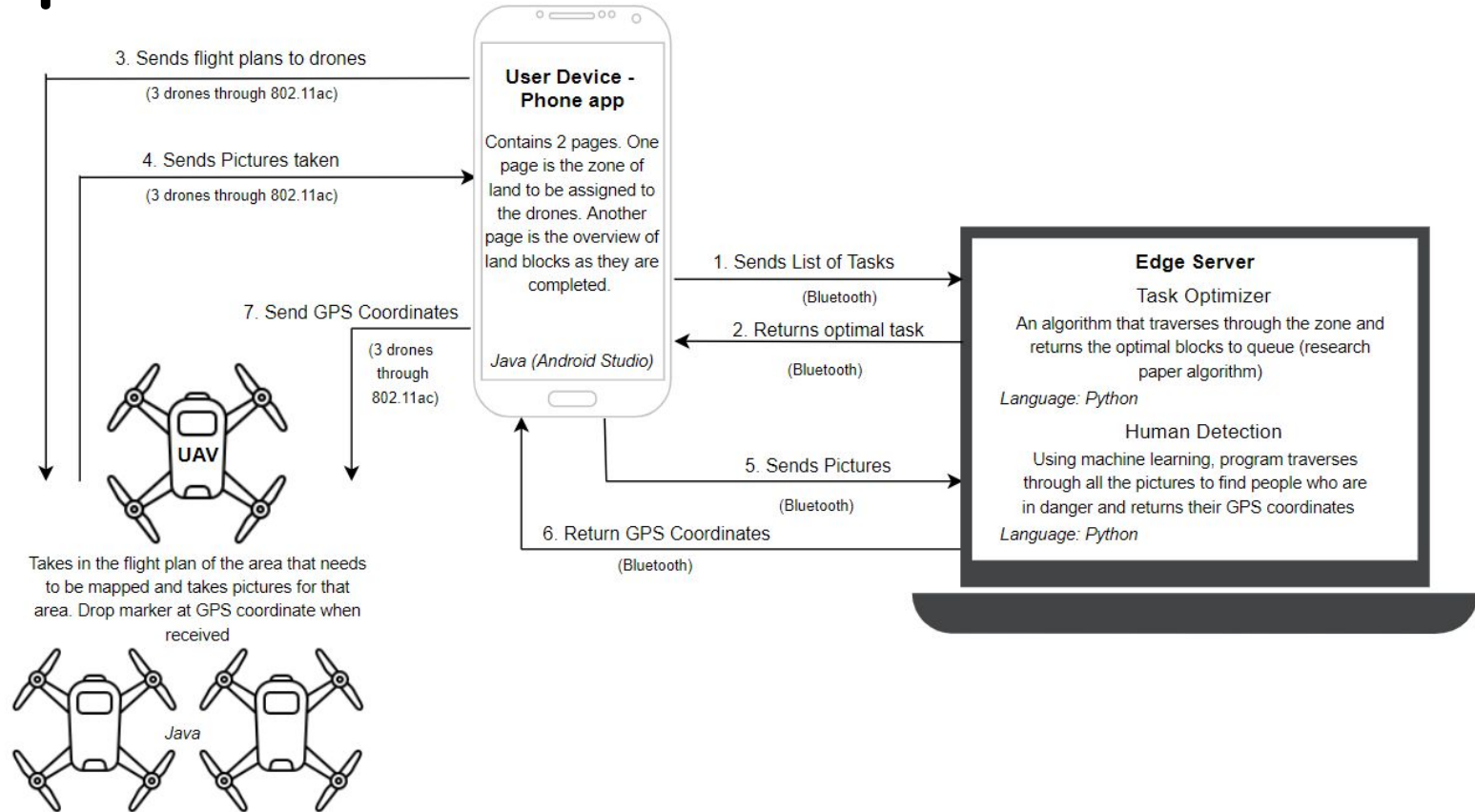
## UAV Issues

Limited computational power per UAV (High computational overhead in Pattern recognition and Image/Video processing) resulting in very slow speeds

# Minimal Viable Product

1. **RECON:** To efficiently schedule a drone to explore a particular area to scan and take images of that area. Then return these images to the edge server.
2. **IDENTIFY:** Process images on the edge server to identify people using ML algos. Then return GPS coordinates of the identified objects to the drone.
3. **RESCUE:** UAVs are sent out to these coordinates to drop a Note of Assurance.

# Pipeline



# Economic Benefits of Eagle Eye

- Industry Drones can cost anywhere from \$6000 to over \$10,000 per each Drone. Where as the Bebop 2 Drone costs around \$200. At minimum you are saving around 97 percent
- Project is extremely versatile
  - COVID -19 - Delivery of masks, sanitizers, etc.. Detection of individuals breaking social distancing practices or Curfew laws.
  - Agriculture - Distribution of nutrients to soil. Identification of defected fruits or vegetables.
  - Security - Recon missions to detect hostile personnel, or detection of friendly hostages. Patrolling Important individuals for threats.
  - Rutgers Buses - To know when to deploy more buses during congested times
  - Sustainability - Detecting litter on beaches and bodies of water. Oil Spill detection.
- Project is expandable
  - Due to the limitations with COVID-19 we created an MVP with one drone. Eagle Eye is flexible enough to expand to use a network for multiple drones

# Beyond the MVP

- Drone communication between several drones
  - Eagle Eye is expandable to have network of drones to survey land.
- Optimizing ML algorithm
  - Right now we are using 50% accuracy. If we had more time we would have trained our model on more sample pictures to better identify humans from drone perspective
  - We can train our model on other items too other than people to expand scope
- Calculate the exact GPS coordinate of human, using the pixel coordinates in conjunction with the GPS coordinate
- Map longitude and latitude of flight zone
  - Integrate Google Maps API to select region of interest (ROI)
  - We can calculate the optimal path of flight for drones based on shape of the ROI

# Business Plan

## Target the Public Sector

Clients that are included in our target market include Firefighters, Emergency Medical Services personnel, Red Cross, law enforcement units, and city/state government agencies

## Product Development

Mostly completed - finish Multi-UAV and more accurate GPS tracking



## Target the Private Market

Once success proven in these public markets, we'll diversify into the private market, targeting farming, construction, and more

## Commercialization

Sell this product as a service to our clients

- Have an initial setup and product cost, and then yearly service cost
- Survey their specific use-cases and adapt our Machine Learning algorithm to match their desires
- Train their staff to use our mobile app and install the server program, as well as how to charge the drone
- Consistently update the ML model based of our client's needs

# Additional Information





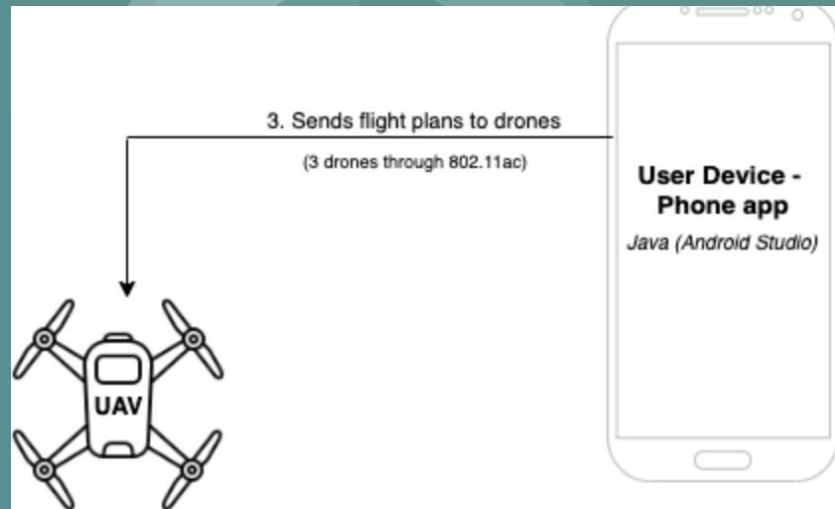


2:58 -  
Demonstration  
Starts

5:48 - Technical  
Details

### 3. Send Flight Plan to Drones

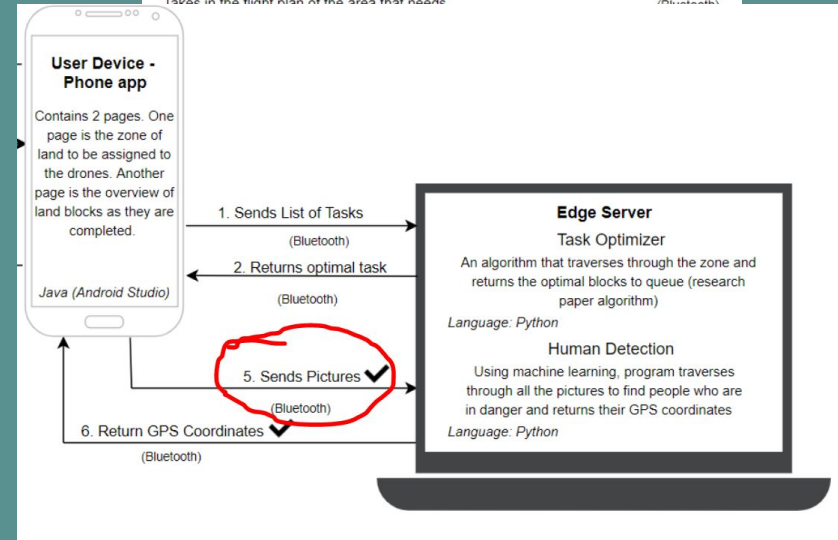
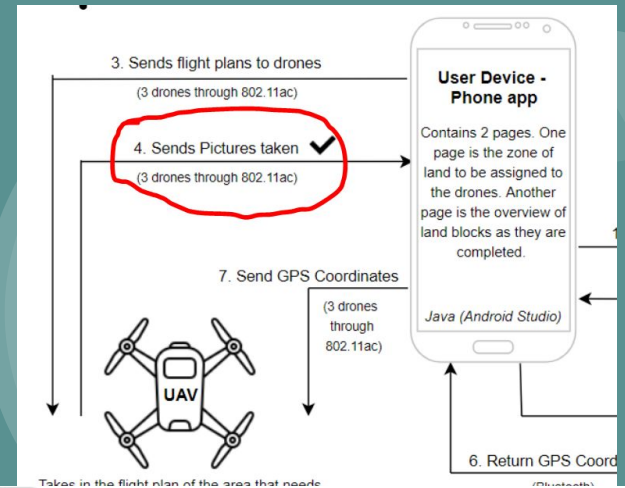
- **Flightplan**
  - Drone SDK provides framework for autonomous flight
- **QGC Format Messages**
  - Formatted messages that the Drone understands
- **Process:**
  - Create a Mavlink File with necessary commands
  - Upload file onto drone through FTP
  - Send a signal to drone to execute file.



Flightplan												
1	QGC WPL 120											
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# Fetching Medias

- Pictures
  - Drone takes and stores pictures on its internal storage
- Drone to Phone
  - Using Drone's API, the phone app downloads the pictures Drone's photos in phones memory
- Image Formatting
  - Formats the image into a stream of bytes
- Phone to Edge Computer
  - Packages the bytes and sends them via bluetooth to the computer (raspberry pi)



# 6. Human Detection

- Detects humans and outlines them if algorithm is  $>50\%$  certain
- Use ImageAI library, a Machine Learning algo that utilizes Deep Learning and Computer Vision
- **Output** - All the images, with humans outlined
  - a list of the photo filenames that have humans recognized
- **Future Plans** - calculate the exact GPS coordinate of human, using the pixel coordinates in conjunction with the GPS coordinate

