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Analyze. Predict. Execute.

Pizza Delivery Drone Team 4:

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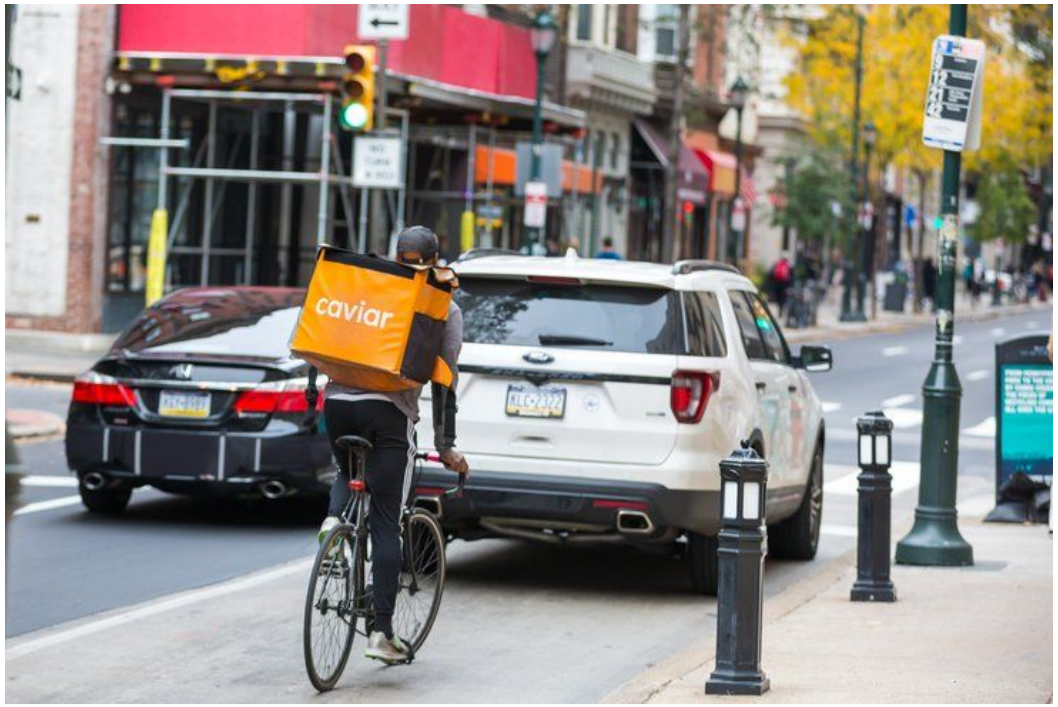
Problem Statement

- Food delivery faces delays and added costs due to reliance on human drivers
- Third party delivery services can charge up to 30% of the price of a pizza for delivery → impacting restaurant profitability
- Restaurant owners struggle with driver availability during peak demand
- Customers dissatisfied due to long wait times and cold food
- Specifically focusing on Pizza deliveries
  - Target market is 2.5 billion deliveries annually in U.S. mainland (not including PR, USVI, AS etc)



Courtesy of phillyvoice.com

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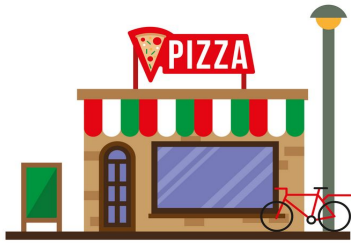
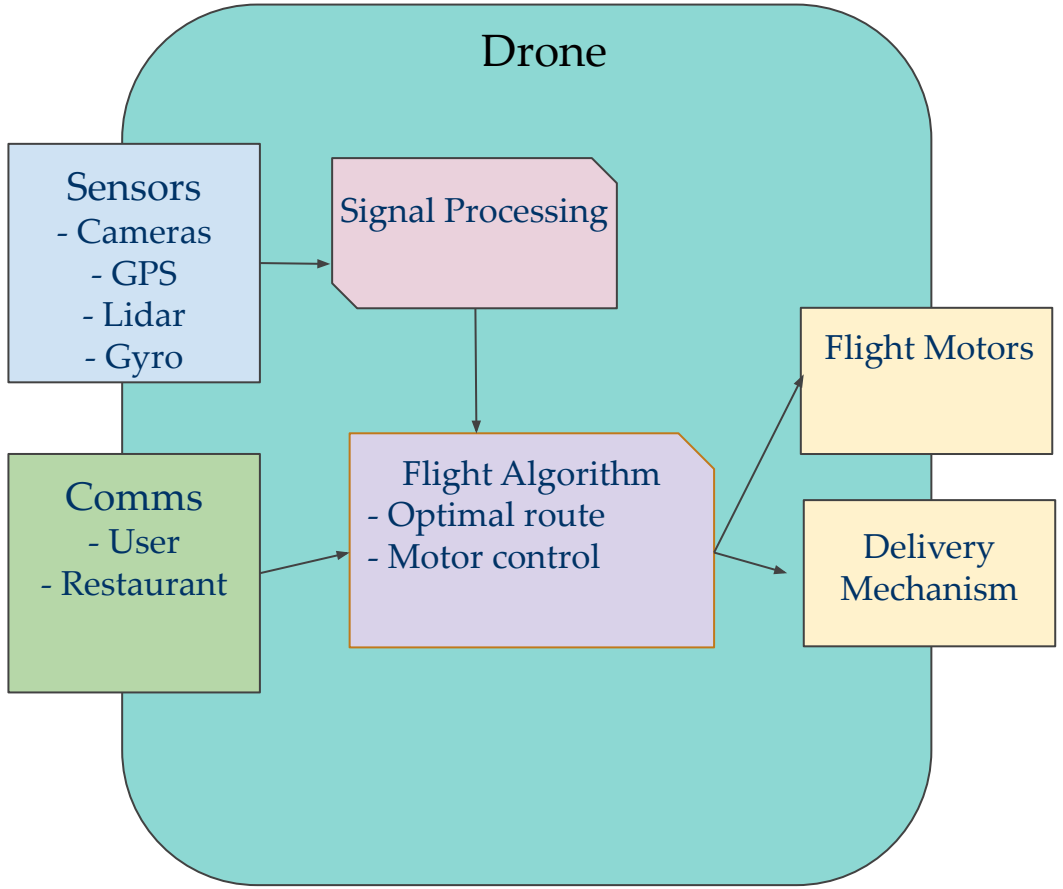
Proposed Solution



- User orders pizza from restaurant
- Restaurant prepares food, attaches to delivery drone

- Delivery drone uses GPS, cameras, route planning, and ML to automatically navigate to customer's home

- Drone delivers pizza to user's door
- Drone returns to pizza restaurant for recharging and re-delivery



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Requirements

- $3000 landed cost per drone
- Drones capable of operating in different weather conditions
- Ensure pizza is delivered in an acceptable condition
- Ensure easy customer access to pizza
- Route optimization

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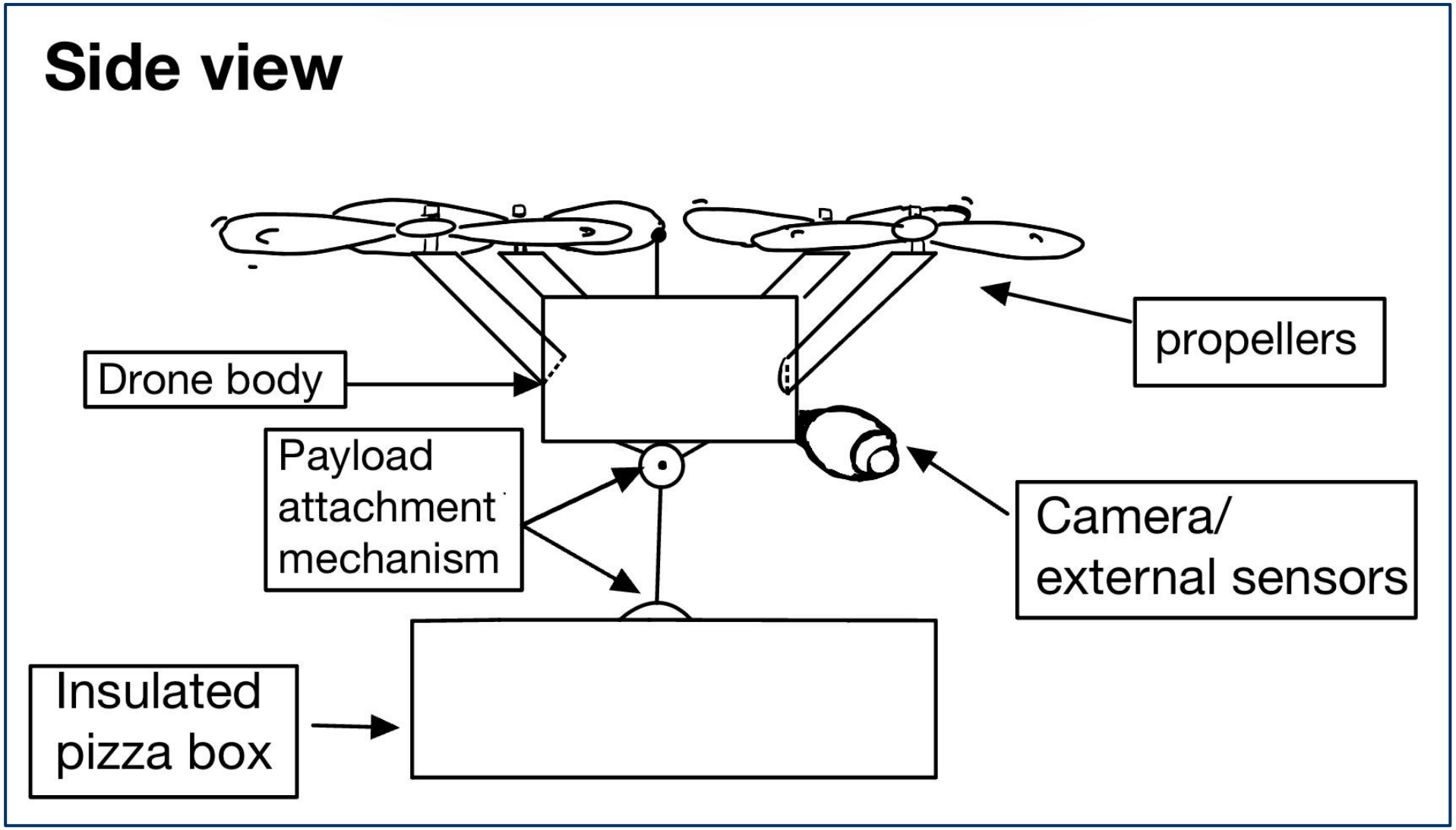
Product Visualization



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Deliverables

- Proof of Concept Prototype
  - Operates successfully in controlled test environment
  - Smaller delivery load capability
- Final Prototype
  - Carrying case capable of maintaining temperature
  - Harness mechanism allows easy access of pizza
  - Keep pizza unharmed under bad weather conditions
  - Under $3000 per drone
  - Compliant with FAA regulations
- Navigation and associated codebase
  - Self-navigate
  - Send alert to customer + pizzeria regarding delivery
  - Prioritize delivery routes if multiple orders are to be delivered in short span of time

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Competing Technologies in Drone Delivery

- Amazon PrimeAir
  - Amazon packages weighing up to 5 pounds
- Wing
  - Fresh foods, medicines, household items and tools
- Zipline
  - Medical products
- Skydrop
  - First-ever FAA-approved drone delivery in the US, partnered with Dominos to deliver pizzas.

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Key Issues

- Engineering:
  - Can the drone get 'lost'? What are the tracking and recovery options ?
  - Accident aversion – can it hit the customer as it starts setting down to deliver?
  - How loud is the drone during operation? Can anything be done to reduce noise without losing performance?
- Commercial:
  - Since this is a point-to-point delivery model the drone has to keep coming back for the next pickup. What battery options are there, and how fast can they charge?
  - Commercial insurance – does it exist and if so what is the cost?
  - How many drone units will be required for peak load vs average load?
  - A Break even analysis will need to be conducted based on capabilities so that restaurateurs can get comfortable with the economics.

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