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Squawk ForeFlight

“Safety at Your Fingertips”





Garrison Grimaud -
Bachelors of Science in Aviation
Administration and Operations -
Team Lead

Zachary Pennington -
Bachelors of Science in
Mechanical Engineering -
Lead Engineer



Kamron Dildy -
Bachelors of Science in
Aviation Administration
and Operations -
Team Editor &
Creative Liaison



Will O'Hare -
Bachelors of Science in
Aviation Administration
and Operations -
Lead Designer and Artist





Team's Faculty Advisor



Dr. Samuel (Matt) Vance

PH.D in Aviation Science from Saint Louis University

M.S in Aeronautical and Astronautical Engineering from Purdue University

B.S in Aerospace Engineering from Michigan



Objectives

- Explain and represent how Squawk Foreflight can save your life
- Discuss how we came up with and made this product
- Learn how we plan to implement our product into aviation



Project Goals

- Send your Squawk code and location to local ATC, emergency services (911), and to other pilots using the application
- Be cost-effective for the user and also profitable for us as the developers
- Easy to access and use as well as reliable





Project Squawk Foreflight

- What is Project Squawk Foreflight
- Who are we
- How will we save your life?





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Imagine This





What is the Problem

- Inefficiency in the emergency response time/procedure
- Using smart tech with avionics and the ipad, we can eliminate wasted time and get the pilot's focus back onto what matters
- “Improve traveler’s transportation experiences and the efficiency of the national aviation ecosystem”- What we were tasked to accomplish



What is the Problem (continued)

- FAA states 450 General Aviation pilots die a year due to Loss of Control (Fly Safe, FAA)
- FAA Pilot Handbook of Aeronautical Knowledge claims that electronics have helped with flying and hurt situational awareness (PHAK)



Solution(s):

Aviation Instructor's Handbook states these (1-3) as solutions and here is how we implemented it:

1. Identify the Hazard: Time spent wasted relaying emergency communication and location
2. Assess the Risk: Increased pilot errors and potential for disaster causes Loss of Control
3. Mitigate the Risk: Remove an entire portion of the emergency flows and replace it with a simple one-button solution



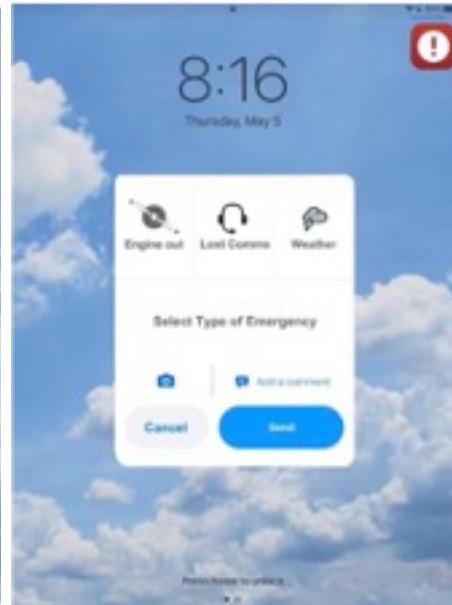
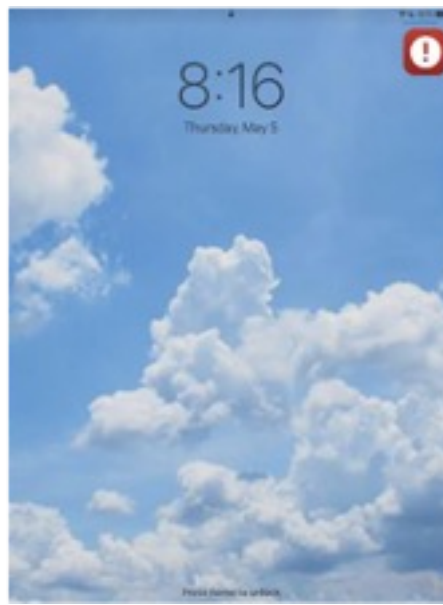
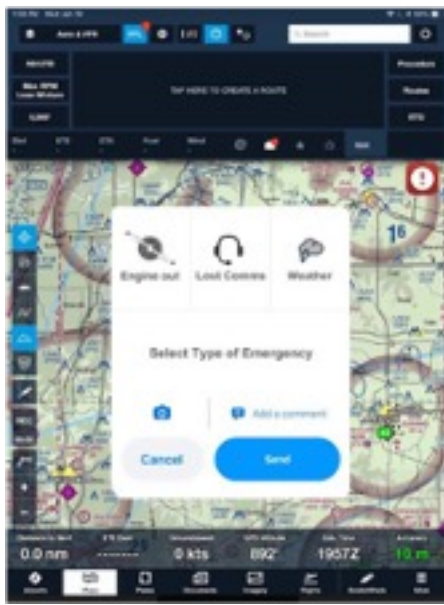
Solution(s):

- Aviate Navigate Communicate
- ABCDE emergency method
- Instead of removing the previous two, we simplified them
- Airspeed, Best place to land, Checklist, Declare emergency using squawk foreflight, execute the emergency landing





Solution Graphics





Team Solution:

- Total time spent on declaring emergency was only 6 seconds!
- Sim emergency represents how the pilots maintain situational awareness
- Notice how after using squawk foreflight, the pilots had plenty of time to focus on the landing





Team Solution (Continued):

- Without Squawk ForeFlight: Declaring Emergency was around 20 seconds
- In flight, 20 seconds is long enough to become distracted and lose airspeed
- Squawk ForeFlight allows the pilot to avoid a Loss of Control event and focus on flying
- Originally planned on partnering with ForeFlight
- Decided on an independent application (discussed further in presentation)





Implementation of solution

- Bluetooth paired with Avionics system
- Squawk your needed code automatically
- Notify Air Traffic Control of your emergency and what type
- Notify ground rescue of your emergency and location
- Ping other Squawk Foreflight users within your area of the emergency (this is helpful for ATC to have other pilots locate and assist if needed)



Risk Assessment

- Response Time from Device
- Device's BlueTooth Reliability: Bluetooth 5.3 is significantly more reliable.
- BlueTooth 5.3 is twice as fast, has four times the range (Svetlik, Scarrott)
- Human Error/Accidental Selections
- Avionics and Radio System Reliability





Outreach & Professional Opinion

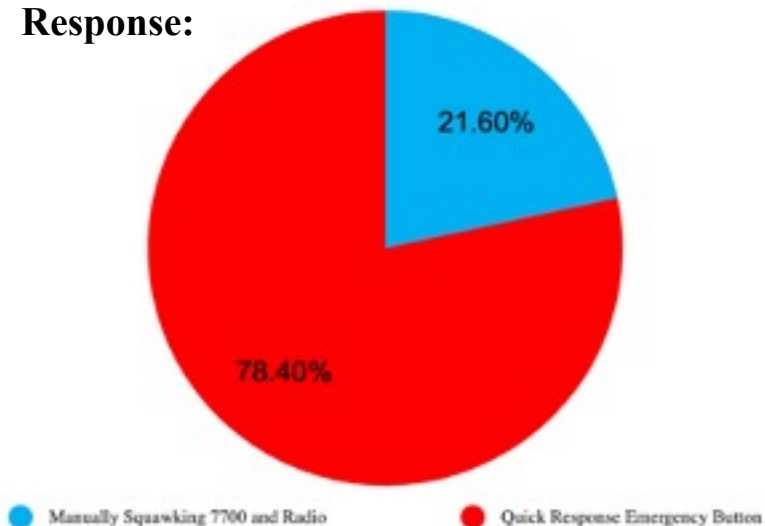
- Identifying stakeholders
- Importance of quality feedback
- Quick and simple



Peer Input

What if there was an easily accessible emergency declaration button on ForeFlight, Garmin Pilot, and/or Avidyne that would immediately declare the type of emergency, relay your location to the surrounding controllers, report mayday on guard, and squawk 7700 for you all within two clicks on your screen?

Emergency Pilot Response:



Quick Response Emergency Button



Manually Squawking 7700 and Radio





Input from Team Advisor

Dr. Vance:

- Relatability to the projects implications
- Suggestions to the name
- Expanding our idea to more than just “7700”





ForeFlight's Input on Squawk ForeFlight

- Struggles with contacting ForeFlight
- What we learned from those struggles
- How our idea has improved because of those struggles



Implementations of Opinions

- Improvements to the project because of the feedback we received
- Project support

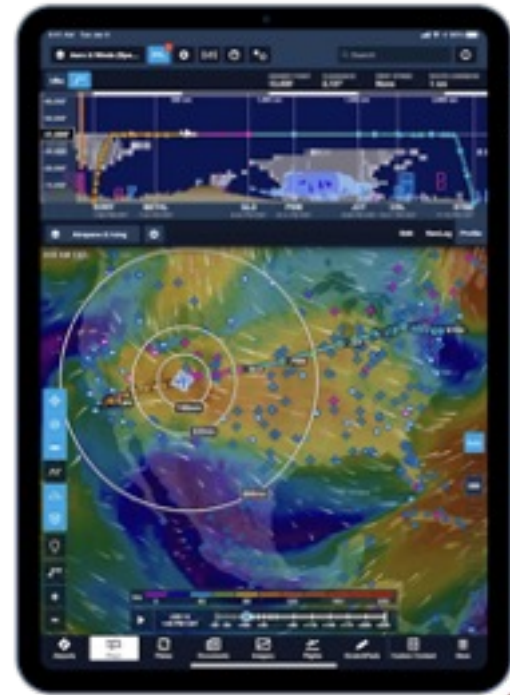




Project Construction & Development



 **SAFETY FIRST!**



Constructing a Prototype



Testing a Prototype



Feedback



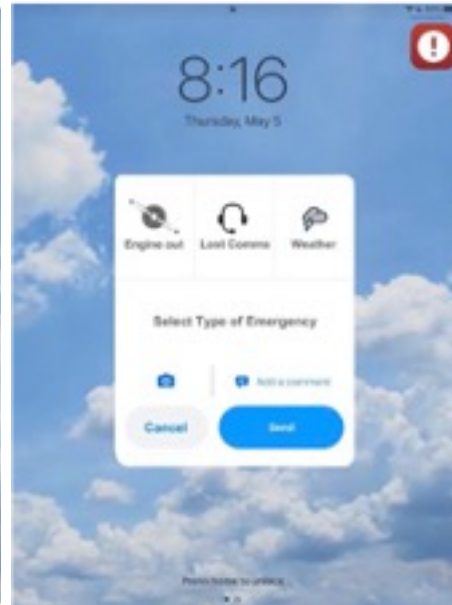
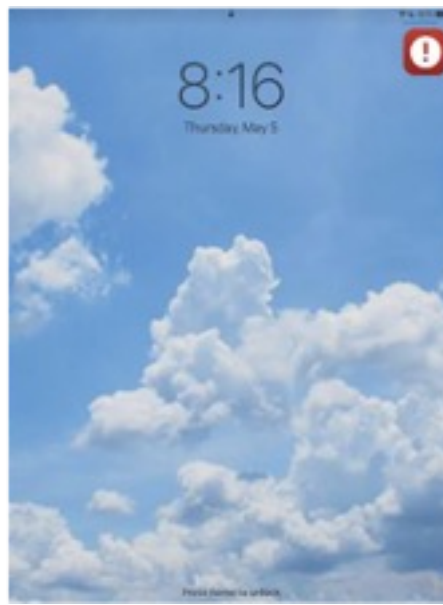
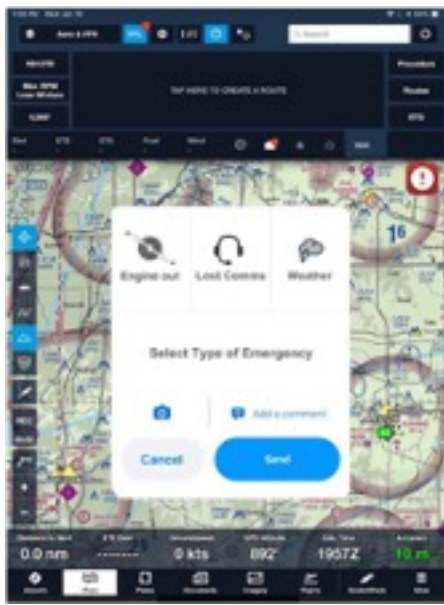
Project Update

- ForeFlight to Self-made
- Updated to a Subscription-based program
- Moveable Emergency Interface





Final Solution





Project Objectives

- Project your location to local ATC, emergency services (911), and to other pilots using the application
- Be cost-effective for the user and also profitable for us as the developers
- Be easy to access and use as well as reliable





Cost Analysis

| Project Budget | | | |
|-------------------|-----------|-------------------------------------|--|
| Items | Price | | |
| Coding Department | \$107,000 | per person a year | |
| App Testing | \$11,450 | 10% of Coding dept + Implementation | |
| Field Testing | \$91,600 | 20% of Coding dept + Implementation | |
| Implementation | \$7,500 | \$25/hr = 300 man hours | |
| Estimate Total | \$217,550 | /Year | |





| Objectives | TASK TITLE | TASK OWNER | START DATE | DUE DATE | DURATION | % OF TASK COMPLETE |
|------------|---|-------------|------------|----------|----------|--------------------|
| 1 | Project Conception and Background Research | | | | | |
| 1.1 | Research | All Members | 3/1/22 | 3/6/22 | 5 | 100% |
| 1.2 | Define the Problem | Garrison | 3/3/22 | 3/6/22 | 3 | 100% |
| 1.3 | Stakeholders | Kamron | 3/3/22 | 3/6/22 | 3 | 100% |
| 1.4 | Defining Previous Solutions | Zach | 3/4/22 | 3/8/22 | 4 | 100% |
| 1.5 | Team's Solution | All Members | 3/4/22 | 3/9/22 | 5 | 100% |
| 1.6 | Implementatoin of Solution | Will | 3/9/22 | 3/10/22 | 1 | 100% |
| 1.7 | Risk Assesment | Zach | 3/9/22 | 3/11/22 | 2 | 100% |
| 2 | Outreach and Professional Opinion | | | | | |
| 2.1 | Advisor's Input | Garrison | 3/5/22 | 3/15/22 | 10 | 100% |
| 2.2 | ForeFlight and Garmin's Input | Garrison | 3/1/22 | 3/20/22 | 19 | 100% |
| 2.3 | Implementation of Opinion and Solution | Garrison | 3/20/22 | 3/22/22 | 2 | 100% |
| 3 | Project Conception and Development | | | | | |
| 3.1 | Contracting a Prototype | Zach | 3/15/22 | 3/22/22 | 7 | 100% |
| 3.2 | Testing Prototype | Kamron | 3/22/22 | 3/25/22 | 3 | 100% |
| 3.3 | Feedback | Will | 3/22/22 | 3/25/22 | 3 | 100% |
| 3.4 | Project Updates | Zach | 3/25/22 | 3/26/22 | 1 | 100% |
| 3.5 | Final Solution | Kamron | 3/26/22 | 3/31/22 | 5 | 100% |
| 4 | Project Performance / Monitoring | | | | | |
| 4.1 | Project Objectives | Kamron | 4/1/22 | 4/14/22 | 13 | 100% |
| 4.2 | Quality Deliverables | Garrison | 4/1/22 | 4/21/22 | 20 | 100% |
| 4.3 | Effort and Cost Tracking | Zach | 4/1/22 | 4/21/22 | 20 | 100% |
| 4.4 | Project Performance | Will | 4/1/22 | 4/30/22 | 29 | 100% |



Squawk ForeFlight

Objective and Description of Effort:

- During the event of air in-air emergence, a pilot already has a responsibility to react to the situation leaving communication as the last step. The goal of Squawk ForeFlight is to reduce the pilot's workload by it possible for a more efficient emergency response system built into a device that pilots are familiar with.

Technical Approach:

- Working with ForeFlight, our team was able to create a future working partnership.

Image:



Team & Management Approach:

- Garrison G. Grimaud: Team Lead
- Will O'Hare: Lead Designer and Artist
- Kamron Dildy: Editor and Creative Liaison
- Zachary Pennington: Lead Engineer

Schedule:

1. Project Conception & Background Research: 3/1-3/11
2. Outreach & Professional Opinion: 3/1-3/22
3. Project Conception & Development: 3/15-3/31
4. Project Performance/Monitoring: 4/1-4/30

Cost:

- Coding Department: \$107,000/person a year
- App Testing: \$11,450-10% of Coding dept + Implementation
- Field Testing: \$91,600-20% of Coding dept + Implementation
- Implementation: \$7,500- \$25/hr = 300-man hours
- Estimate Total: ~\$217,550 /year



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Squawk ForeFlight Today



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