Honeywell
AEROCHALLENGE 2017

Ladies and Gentlemen! Flight HS 735 to Ahmedabad is ready for departure. Please fasten your seatbelts.

Brief

How might we design trustworthy & reassuring experiences towards enhancing Situational Awareness for Communication and Surveillance?

Research

WHO IS AT FAULT?

Shortage of ATC personnel, few modern equipment and lack of upkeep of existing infrastructure contributes to the rising potential of an air tragedy hence justifying the need for increased Situational Awareness.

(Source: DGCA and Hindustan Times, 22 Aug 2016)

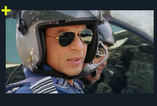
"A shortage of ATCs compromises with the safety of thousands of fliers every day. We are waiting for a disaster to act."

- S S Panesar, Former Head of flight safety training divisions, Indian Airlines

WHAT USERS HAVE TO SAY

Opportunity areas as highlighted by Pilots and Air Traffic Control personnel during interviews.

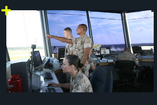
PILOTS



While flying over ATCs of foreign countries, it is difficult for us to understand the accents of the traffic controllers, despite English being the common language to communicate.

We need efficient allocation of airspace to save more time, money and hence more fuel. It would be good to know the estimated landing time when we enter each zone so that we can increase or decrease our speed accordingly.

ATC



The lives of millions of passengers is in our hands. In this high stress work environment, visualizing the high density of traffic especially in adverse weather conditions could become better.

We rely largely on visual information based on what we see out of the window, supplemented by the screen. In adverse weather conditions, the drop in visibility is a problem as we cannot see the runway and airport properly.

CASE STUDIES

2 September 2013

Minutes to Death

Indigo and Spicejet narrowly missed 3 successive collisions due to miscommunication within the ATC followed by wrong instructions from ATC to the pilots.

12 April 2010

Polish President Killed

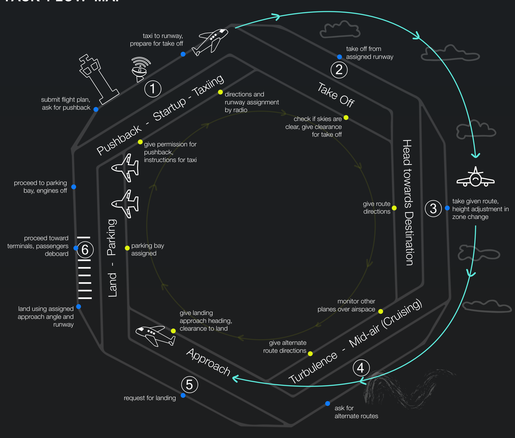
Language problems between Russian ATC and Polish pilot aided by dense fog conditions led to this crash. Technical errors ruled out, human errors to be blamed.

22 September 2016

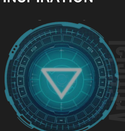
Emergency Landing

A baby suffered a heart problem mid-air and ATC had to clear airspace and reschedule landing of many flights to arrange for a priority landing.

TASK FLOW MAP



INSPIRATION



Solution

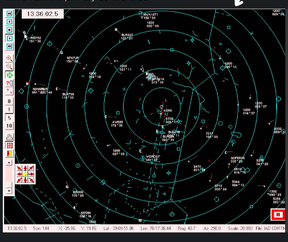
Based on the principle that technological innovation needs to be reformed by an understanding of human work practices in a way that allows us to design technologies for the future that will not only work, but more importantly, work well for the user. Here are 3 solutions:

1. 3D VIEW in ATC RADAR (Surveillance)

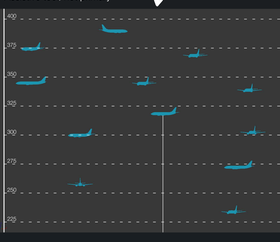
+ Allows ATC personnel to visualize the air traffic better, cognitive load reduced.
+ Lets them keep aircrafts in the most efficient position for a long duration, crossing patterns better managed.
+ Height visualization provided on toggle view can help make altitude separation tighter, saving fuel + time

MOCK UP

ATC Radar Screen (Used Currently) :
will remain the primary control area



Toggle for Height visualizatiion :
Assistive tool, not primary



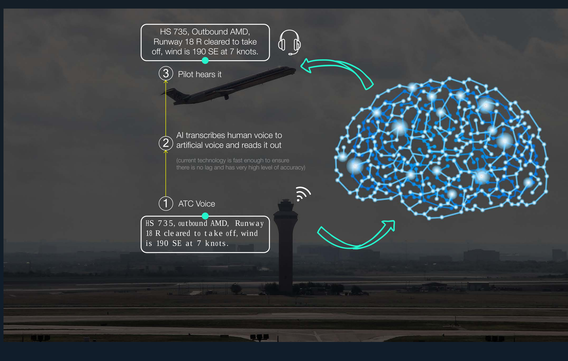
2. NIGHT VISION (Surveillance)

+ Assists ATC personnel in fog and other adverse conditions to visualize traffic on the runway
+ Aircraft delays can be cut down and crafts can land using ILS; ATC can give landing clearance.
+ In addition to real time view, the rotate option in 3D can help view larger area of airport and airspace.

MOCK UP

3. ACCENT CORRECTION WITH ARTIFICIAL INTELLIGENCE (Communication)

+ When Air Traffic Controller speaks into the microphone, an artificial voice is heard by the pilot & vice versa.
+ Can reduce miscommunication and hence probability of accidents.
+ In airport area, communication can be over wifi to reduce disturbance due to radio interference.



Impact

+10 YEARS

- 3D view in ATC radar with viewport toggle
- Night Vision and Infrared Image Mapping
- Accent correction with Artificial Intelligence

NOW

- 2D radar with layers of information
- visual judgement in adverse visibility
- Radio frequency disturbance + accent

Observe + **Orient** = **Situational Awareness**

relaxed alert — baseline goals & action plans — better decision making → ENHANCED TRUST + SAFETY

- Based on OODA Loop developed by Air Force Fighter Pilot and Military Strategist - John Boyd

Ladies and Gentlemen! Welcome to Ahmedabad. Local time is 12:03 pm and temperature is 43°Celsius. Thank you for flying with Hotel_Sierra. We are looking forward to seeing you onboard again.

Harshika Jain — Salil Parekh

National Institute of Design
Team: Hotel_Sierra

Special Thanks to

Ahmedabad Air Traffic Control office

JET AIRWAYS