IMPROVING AVIATION COMMUNICATION

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PROBLEM OVERVIEW

- Pilot - ATC communication systems are not optimal for efficiency.
  - Congested VHF spectrum (radio frequency).
  - Subpar audio quality.
  - Slow exchange of information.
  - Language barrier communication problems.
  - Lack of coordination automation between units.
  - Misunderstandings, incorrect commands.
  - Flight delays, cancellations and potential safety risks.

RESEARCH AND ANALYSIS

According to the FAA statistics, 20-25% of all scheduled flights in the US experience delays.

<table>
<thead>
<tr>
<th>Total Cost of Delay in the U.S. (dollars, billion)</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airlines</td>
<td>5.6</td>
<td>6.4</td>
<td>7.7</td>
<td>8.3</td>
</tr>
<tr>
<td>Passengers</td>
<td>13.3</td>
<td>14.8</td>
<td>16.4</td>
<td>18.1</td>
</tr>
<tr>
<td>Lost Demand</td>
<td>1.8</td>
<td>2.0</td>
<td>2.2</td>
<td>2.4</td>
</tr>
<tr>
<td>Indirect</td>
<td>3.0</td>
<td>3.4</td>
<td>3.9</td>
<td>4.2</td>
</tr>
<tr>
<td>Total</td>
<td>23.7</td>
<td>26.6</td>
<td>30.2</td>
<td>33.0</td>
</tr>
</tbody>
</table>

- This percentage equates to approximately 1 Million flight delays, and 40,000 flight cancellations per year.
- $30B+ in losses for the American economy.
- Airline companies are hit with lost demand.
- Taxpayer money is wasted.

CONCEPT DIAGRAM I

CONCEPT DIAGRAM II

FINANCIAL IMPACT

- Over the 4-year period between 2016-2019, delay costs have on average increased by 14% annually. Considering the fact that 2020 and 2021 have been unusual years for the whole world, the forecasts for costs have been made by taking the pre-pandemic years as basis.
- This project aims to reduce the number of delays experienced by 2% annually since the vast majority of delays occur due to unpredictable circumstances.
- All things considered, the costs related to delays will continue to increase at an even higher rate due to increasing inflation and global costs.
- The real impact of the new system is depicted in the chart below:

PROTOTYPE DESIGN

The system is planned to be deployed on tablet-like devices. On the right are screenshots from the prototype.

The diagram above shows the process an air traffic controller executes to send instructions to the pilot. The process begins with an instruction method input; either keyboard or speech. The air traffic controller has the option to enter his instruction by typing it on the device’s touchscreen keyboard or speaking into a microphone connected to the audio input port. After the instruction has been input to the system, the air traffic controller has the ability to attach a media file as supplementary information to the instruction. Examples of media attachments include maps, landmark images, and weather data.

PROJECT SCHEDULE

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