

Technical Report

To assist pilots in various situations, a set of additional features were developed for Avare. These features were encapsulated by an intuitive menu, which could be accessed through pressing or long-pressing the Emergency Icon (Figure 1). The menu was designed to assist pilots when operating in each “Contextual Control Mode” (Hollnagel, 1993). These states included reactionary, procedural, and optimizing.

Support for Reactionary CCM

In a majority of emergency situations, the pilot must land as soon as possible. Due to the time sensitive nature of emergencies, the pilot would be thrown into a reactionary state. To assist pilots in landing as quickly and safely as possible, an “Emergency Feature” was implemented. This feature allowed users to search for nearby airports with specified parameters. This feature was accessed by clicking the Emergency Icon. The Emergency Icon was located in a static and easily accessible location on the main screen (Figure 0). This placement allowed the pilot to access life-saving emergency information in just one click.

Quick Visual Overview

Once pressed, a new window appeared at the bottom of the screen, and the 10 nearest airports were highlighted on the map (Figure 4). The nearest airport was then set as the destination. The destination’s information such as distance, bearing, and controlling frequency were displayed in gray. The distance information was vital to pilots in ensuring whether a plan has enough fuel or a long enough glide to reach the airport safely. The bearing information was useful in determining whether an airport was reachable during situations where directional control was limited (ex: bad wind or rudder jam). The frequency information was also vital to pilots. The information allowed pilots to quickly declare an emergency to the airport and nearby traffic. The default frequency displayed is Tower “TWR”, however, if the airport does not have a tower, the areas Unicom frequency is displayed instead “UNIC”. The user could quickly cycle through the nearby airports by using the gray left and right arrow buttons. Through interviews, it was determined that pilots like to know when they were approximately 20 miles away from the airport. This was so that the pilot could prepare for arrival and contact control. To aid pilots visually in this, the feature automatically showed distance rings at 5, 10, and 20 nm.

Sorting Categories

To ensure the airports listed were safe to land at due to aircraft performance or environmental characteristics, a pilot could change the airport filter through the various parameter buttons at the top of the screen. These buttons were (from right to left) ILS, Minimum Runway Length, Runway Quality, and Additional Preferences. During situations of poor visibility, pilots must rely on their instruments to land a plane. Only runways with ILS were able to be landed at during inadequate visibility. The ILS parameter allowed pilots to filter out airports with no ILS runways to ensure safe landings during inclement weather. Runway length and runway quality were vital metrics for pilots to know whether an aircraft would stop within the length of runway. The additional preferences contained more parameters such as runway surface types, landing fees, and runway

lights (Figure 7). Once a parameter was changed, the new list of nearby airports was automatically created.

Another set of features could be accessed through long pressing the Emergency Icon (Figure 8). The two new buttons that appeared (from top to bottom) were Search and Checklist.

Support for Procedural CCM

When flying an aircraft, a pilots, at some point, must follow an ordered set of tasks. An example of this is the takeoff procedure. During a takeoff, a pilot must adjust the flaps to a certain degree, maneuver the aircraft into the wind, apply power, check for oil temperature, maintain alignment, pull elevator back, etc.. For some procedures, the list of tasks could be long, and the pilot may forget crucial steps. To combat this, the Checklist feature was created. When the Checklist button was pressed (Figure 2), a window appeared containing various procedures corresponding to the aircraft. Users could select different checklists from the tabs at the top of the screen. This feature was a quick and effective way for pilots to reference a variety of procedures.

Support for Optimizing CCM

When a plane reaches cruise, a pilot does not have to focus as intensely as in takeoff or landing. A pilot may have spare time to attend to other tasks. One of these tasks could be altering the route for an earlier arrival time or better fuel efficiency. There were several features within Avare that could assist pilots in adjusting routes, however, most of these features could not be easily found. To assist pilots in the optimizing state, the state in which a person has ample time to make the best possible decision, the Search feature was created. This function allowed users to find and use features rapidly by just typing in a relevant word. When the search button was pressed (Figure 3), a search bar appeared on the screen, and to the right of the search bar was a blue toggle button (Figure 10 & 11). The toggle button allowed for the user to select whether to search for a feature in the application, or search the user manual. An example of searching for a feature is shown in Figure 12 and 13. An example of searching the manual is displayed in Figure 14.

Figures



Figure 0

Main Screen

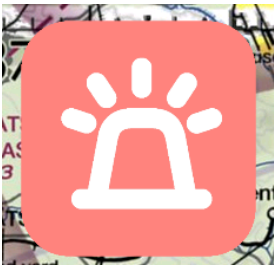


Figure 1 Emergency Icon

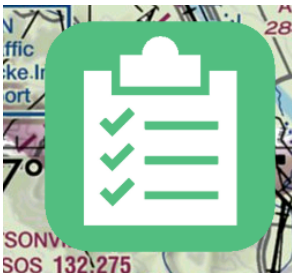


Figure 2 Checklist Icon

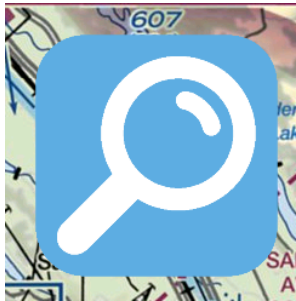


Figure 3 Search Icon



Figure 4 Emergency Window

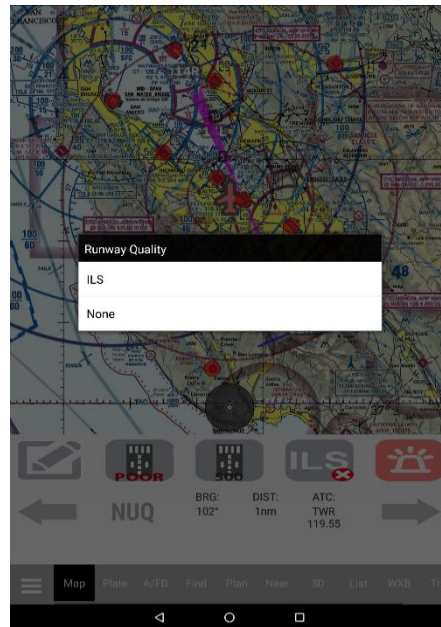


Figure 5 ILS Parameter Select



Figure 6

ILS Button State Change from Off to On

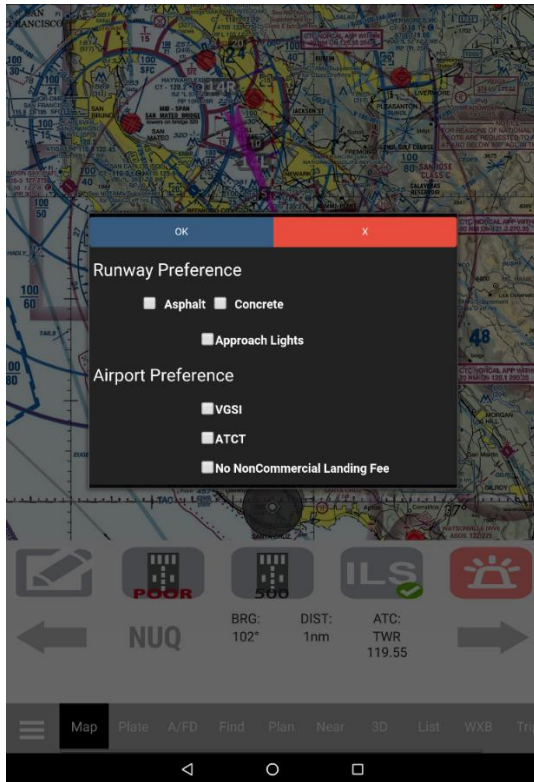


Figure 7 Additional Preferences Window



Figure 8 Long Press Menu

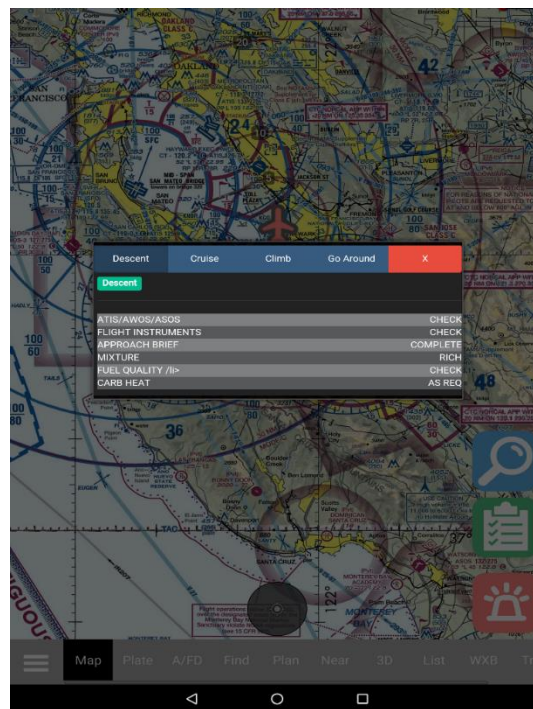


Figure 9 Checklist Example for Cessna 172p



Figure 10 Search Bar set to search Help Manual



Figure 11 Search Bar set to search features in Application

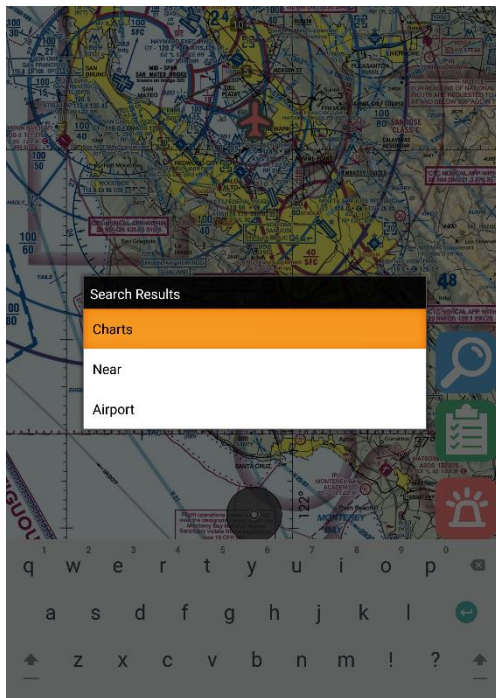


Figure 12 Example when "charts" is searched

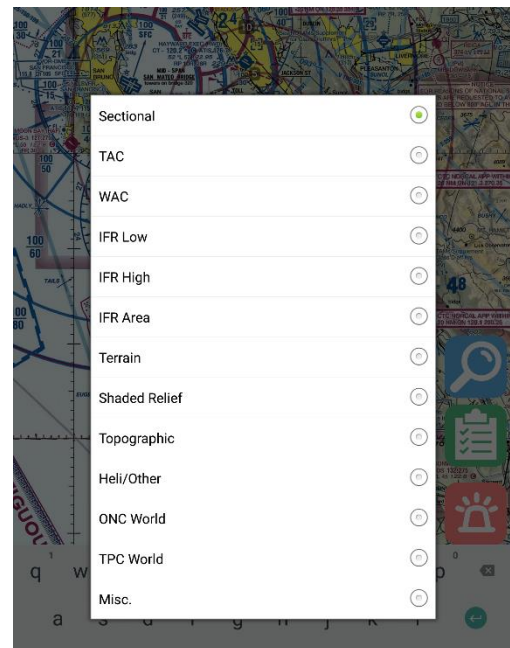


Figure 13

Selecting Charts brings up the Charts menu

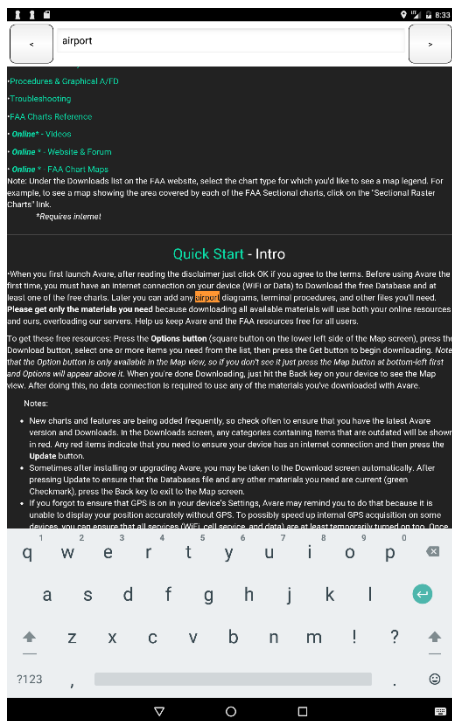


Figure 14

Example of searching for “airport” in the Help Manual

Reference

Hollnagel, E. (1993). Human reliability analysis: Context and control. London, UK: Academic Press.