Design and implementation of Voice Based Path Planning System for Airborne Vehicles

A B. Tech Project Report Submitted

in Partial Fulfillment of the Requirements

for the Degree of

Bachelor of Technology

by

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under the guidance of

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to the

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CERTIFICATE

*This is to certify that the work contained in this thesis entitled "**Design and implementation of Voice Based Path Planning System for Airborne Vehicles:Design and implementation**" is a bonafide work of **Partha Pratim Malakar** (**Roll No. 170101043**), carried out in the Department of Computer Science and Engineering, Indian Institute of Technology Guwahati under my supervision and that it has not been submitted elsewhere for a degree.*

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November 2020,

Guwahati

Acknowledgements

I would like to show my gratitude to my supervisor, Prof. P.K. Das, and my mentor Komal Bharti, Ph.D. scholar Computer Science Department IIT Guwahati, for their support throughout this project. I am very thankful to them for their guidance which helped me to learn new things and complete my BTP work. I am grateful for their valuable time and constant efforts for helping me out in my BTP work.

Sincerely,

Partha Pratim Malakar

Contents

Chapter 1

Introduction

We will build a software tool to implement path planning for airborne vehicles using voice commands .This software will be used in different airborne vehicles. Our aim is to build a software which can be operated using voice command i.e handsfree, has a menu-based GUI and runs faster to make the path planning easier for pilots. We will use different speech recognition techniques for identification of voice commands and then work accordingly. We will implement every feature that a pilot will need in the software and make them available either through a voice command or a menu based environment.

1.1 Organization of the Report

Chapter 1 provides introduction to the software.

Chapter 2 provides three other apps on path planning systems for airborne vehicles, namely ForeFlight,Logten Pro,Cloud ahoy.

Chapter 3 provides some implementation details ,GUI structure and features names.

Chapter 4 will be containing conclusion and future work.

Chapter 2

Related Work

There are many path planning softwares available in the market.Some of them provide other features than path planning.I wrote about three best softwares among them.

2.1 ForeFlight

The application offers full VFR(visual flight rules) and IFR (instrument flight rules) sectionals, interactive flight planning tools as well as up to date IFR approach and procedure plates. Beside these, it also provides many other features such as an electronic logbook, flight tracking and debriefing, weight and balance calculators, synthetic vision while in flight etc.

2.2 Logten Pro

This application provides an electronic logbook feature which can be used to log and track flights.This application allows pilots to easily check route histories, total times and verify they have met requirements for a

certificate using the application. This application arranges and sorts all flights in simple to utilize tables and graphs which permits reading and extracting information off the application is simple and efficient.

2.3 Cloud ahoy

This App is great for both pilots and Flight Instructors. Cloud ahoy offers full flight tracking including route and inflight data history logging. With this application, a flight instructor can easily look back at a flight or lesson done with a student, and view data such as airspeeds, altitude, flight path, ground track etc.

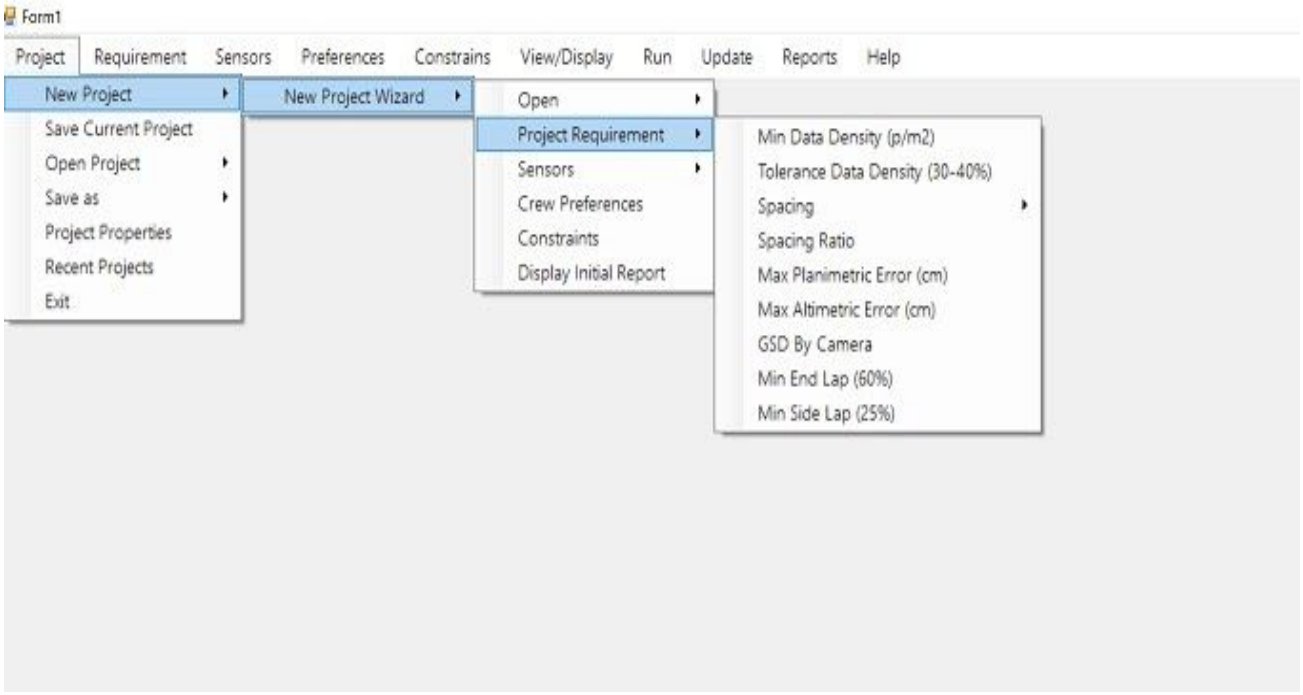
Chapter 3

Implementation

Our main focus is to make a complete application and a setup file with it. We used visual studio 2010 to build this software.We will use visual C++ for the whole project.We used ‘windows form application’ for this project.We implemented all of the features as menus and menuitem. We used ‘toolStrip’ for creating the menu and used ‘toolStripMenuItems’ for creating the menu item.

To create the setup file, we add a ‘setup and deployment’ project to our windows form application.We also attached a license agreement with the setup file .

The software will be installed using the setup file after agreeing to the license agreement.We will allow our users to use the software for free as a trial version for the first 3 days from the time of installation and after that users have to purchase a license to use the software. We will also use some techniques so that user can’t use the trial version more than one time even if he reinstalls the software.



The GUI features of this Project includes:

A)'Project' as menuitem

Under 'Project'

1. New Project
    a. Open
        i. AOI file
        ii. DEM File
        iii. View :Flight Plan
        iv. View :Flight Plan report
    b. Project requirement
        i. Min Data Density (p/m2)
        ii. Tolerance Data Density (30-40%)

iii. Spacing
    1. Along Track (m)
    2. Across Track (m)
iv. Spacing Ratio
v. Max Planimetric Error (cm)
vi. Max Altimetric Error (cm)
vii. GSD by Camera (cm)
viii. Min End Lap (60 %)
ix. Min Side Lap (25%)

c. Sensors
    i. Laser
        1. Select Laser Scanner
            a. Select from List
        2. Customize Laser Scanner
    ii. GPS
        1. Max Base Line Length
        2. Max Planimetric Error
        3. Max Altimetric Error
        4. Max Bank Angle (45 deg
    iii. IMU
        1. Select IMU Sensor
            a. Select From List
        2. Customize IMU Sensor
    iv. Camera
        1. Select camera Sensor
            a. Select From List
        2. Customize camera Sensor
d. Crew Preferences
e. Constraints
f. Display Initial report

2. Save Current Project
3. Open Project
    a. Open Wizard
4. Save as
5. Project Properties
6. Recent Projects
7. Exit

B) ‘Requirement ‘ as menu item

C) ‘Sensors’ as menuitem

Under sensors

1. Laser
    a. Select Laser Scanner
        i. Select from List
    b. Customize Laser Scanner
2. GPS
    a. Max Base Line Length
    b. Max Planimetric Error
    c. Max Altimetric Error
    d. Max Bank Angle (45 deg)
3. IMU
    a. Select IMU Sensor
        i. Select From List
    b. Customize IMU Sensor
4. Camera
    a. Select camera Sensor
        i. Select From List
    b. Customize camera Sensor

D) ‘Preferences’ as menuitem

Under Preferences

1. Aerial Vehicle

a. Select from list
b. Customized

2. Max Flying Height (km/m)
3. Min Flying Height (km/m)
4. Max Air Speed (knots/ kmph)
5. Min Air Speed (knots/ kmph)
6. Max Banking Angle (degrees)
7. Min Banking Angle (degrees)
8. Cushion Period/ Cushion Length
9. Reaction Time: 4 seconds
10. Tolerance (for horizontal sliding)

E) 'Constraints' as menuitem

Under constraints

1. Min flying height

F) 'View/ Display' as menuitem

Under 'View/Display'

1. Flight Plan (Graphics Window)
    a. AOI Display (Tabulated)
        i. Edit AOI Data
    b. DEM Display
    c. Flight Strips Display on DEM
    d. Flight Lines Display in Air
2. Flight Map (Graphics Window)
    a. AOI Display
    b. Flight Strips Display
    c. Flight Lines Display
3. Flight Lines (Tabulated Window)
    a. Flight Line No
    b. Left End Name
    c. Right End Name

d. Left End Coordinates (x,y)
e. Right End Coordinates (x,y)
f. Turning From-To
    i. Edit

4. Details (Open Another Window)
    a. Spacing (Be)
    b. Swath (B)
    c. Overlap (eta)

G) 'Run' as menuitem

H) 'Update' as menuitem

Under 'Update'

1. Re-Design Sessions

I) 'Reports' as menuitem

Under 'Reports'

1. Display Initial Report
2. Display Final Report
3. All Reports in HTML
4. Formats with Print
5. Option

J) 'Help' as menuitem

Under 'Help'

1. Help (HTML)
2. Help (PDF)
3. Active License

Chapter 4

Conclusion and Future work

A basic overview and the front-end GUI structure of ‘a voiced based path planning system for airborne vehicles’ has been given in this report. The software is at an initial stage and is being developed.The future work is to add the algorithms and codes for all the features including the voice recognition , menu-based features.We will also take care that the algorithm used are optimized so that running time becomes as low as possible.As the software is going to be used in real world, necessary testing will also be done.Finally, the software will be deployed.We will also keep track of licensed users of the software.