R&CS RadarSites - DirectX11 Version

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Overview

The original purpose of this app was to test CSI radar tracker configurations. it has since grown to add the ability to test radar to link 16 correlation and to provide scenarios for operator training.

The operator is presented with a fully pan and zoomable map which provides a georeferenced background over which radar sites and simulated aircraft can be placed,

The app is designed such that it requires a minimum amount of user interaction to get basic scenarios running. Scenarios can be elaborated if required, but sensible defaults are provided for most cases.

The app comes with several preconfigured radar sites that match the current situation at 3and 4 Wing.

By default the app remembers most of the settings of the previous session. Thus it is easy to get started:

Launch the app

The map will appear centred on wherever it was located the last time it was run. for example it may start up centered over Bagotville.

If the radar control window is not on screen use display it by menu/Radar/Radar Control. This dialog will show a list of preconfigured radar sites each with a start/stop button as well as a checkbox to make. Mini radar view appear and a checkbox to bring up the radar details panel.

Click the start button for TPS-77 Lac Castor.this will cause that radar to start. By default inactive radars are not fully displyed on the map. Active radars are shown with range rings for their primary and secondary radars. Aside: there re several options for how to show radar range rings.

The radar is now running and is sending Asterix radar messages on the preconfigured multicast IP and port.

Create a sim aircraft

Double click on the map at the location where you want to create n aircraft. A small menu will appear showing some options. Click create track. This will cause a create track dialog box to appear. All you need to do is click save. Everything else is optional. Clicking save will create a simulated aircraft flying a straight course at 250 knots, heading 45T at 12000 feet.

That’s all you need to do for basic operation. CSI (or any other asterix based radar procsssor) will be able to receive and process these radar messages as if they came from the actual radar.

You can now add more radars, add more simulated aircraft tracks, or modify aircraft functions.

Aircraft Control

You can control an aircraft manually using keyboard or mouse, or by selecting a flight profile.

Flight profiles include orbiting a point, flying a racetrack, flying a serpentine path, flying to a point, following a flight path that you can create, following another aircraft, flying as a wingman to another aircraft, or flying straight and level (rhumb line or great circle).

Manual control:

Click on the track, at the pop up menu select CTRL. this will bring up a small window. use the mouse to select a new speed, heading or altitude. If slew to is checked then the aircraft will move to the new heading, altitude, and speed at the rates indicated in the associated edit fields. If slew to is not selected then changes will be immediate (which isn't very realistic).

Flight profiles

Click on the track and select control

This will bring up the control window for that track.

It is divided 8 to sections

Dynamics

These controls are immediate changes to speed, heading, altitude

Capabilities

These items control the capabilities of the track. If the track has no set then asterix messages provided by radars will not include any SSR info such as the squawk code.

Flight profiles

This section provides several flight profiles

- Rhumb line: track will fly at a constant heading altitude and speed. Tracks that follow a rhumb line will eventually spiral into the pole
- Great circle, track will fly a course of shortest distance between two points
- Orbit. Track will fly a circle around a fixed point on the earth, radius is:
- Racetrack track will fly a racetrack with the first long leg being whatever the heading as at time of committing to the racetrack.
- Serpentine similar to racetrack but at the end of a leg the track will turn opposite of a racetrack
- Go to when selected the user must select a point on the earth that the tr ack will fly to. When it gets to that point it will fly past it then maneuver back to it. This produces some interesting patterns that depend o the tracks speed

- Route. When selected a combo box is available through which the user can select one of the available routes. This will cause the route to be displayed o the map (if it wasn't already). The can then select a starting waypoint which by default is the first one. Whe committed the track will fly to the selected waypoint then towards the next waypoint until the end of the route is reached. Whe the end is reached, the track will return towards the first waypoint, even if it originally started at another waypoint.
- Follow track when selected the user must choose another existing track. Whe. Omitted the track will the. Adjust its heading and speed to follow, not intercpet, that track.
- Wingman abreast when selected the user must select another existing track that this track will the try to fly as wingman. The lead track will show a red circle to the right of itself. The wingman track will maneuver to reach and maintain that location. This is rudimentary but works .

Unlike dynamics and capabilities, flight profile changes are not immediate so the user must click commit before the track will start to execute the flight profile.

The app provides a track list window which when enabled will show a table of all tracks in the track list. The table provides buttons to delete, find or edit tracks.

Radar settings

Radars have many site and operational settings. site settings are related to the location do network configuration for a site. Operational settings are related to caapbilite such a# whether the radar has mode 5, whether its SSR is working, whether it is can measure target altitude etc. any combination. Of thes3 settings is possible which is useful for testing. However actual radars used in dnd have specific settings. The radar settings allows the user to tailor settings or to select a radar type. Selecting a radar type just sets all of the individual capabilities, like 3d and Doppler, to match what a specific real radar provides. The actual radars simualted by this app are the TPS-77, TPS-70 (obsolete), MRR, and Nav Canada ATC radars.

To change any of these settings click on the radar on the map or use the radar control window to bring up the individual radar control window. Similar to the track edit window, the radar edit window is organized into sections:

Monitor Radar

Each radar can have its lock picture displayed in a mini PPI view. Display the PPI view the same way as the edit view: click on the radar o the map and select mini, or use the radar control window to select the mini view for that radar. You can change the size of the PPI view and.....

Map objects (tracks, radars) that have dialog boxes can be difficult to associate with their dialogs. This app has locate line function that will draw a line between the dialog box and the map object to which it refers. By default these lines only appear when the mouse is over the dialog box. However they can be made persistent on a map object by map object basis. Each dialog has a check box to enable a persistent locate line.

ADSB

The app also includes an feature wherein it can connect to an ADSB receiver. By default the app will treat all ADSB tracks as valid radar tracks. Thus any ADSB tracks that are in range of a radar will be detected by that radar and forwarded as asterix messages.

The app provides a separate track list for ADSB tracks. By default all tracks are forwarded to the sim/radar module. However this can be changed on g the ADSB track list window. There is a check box to forward all ADSB tracks to the sim/radar module. If this is not checked the individual ADSB tracks can be forwarded to the sim radar module using the checkbox on the ADSB tracks line I the table.

There is another. Heckbox that controls display of ADSB tracks. They can be always disolayed, no5 displayed or only displayed if not forwarded to radar sim module. If you forward to sim and display then you will get dual track symbols on the map.

Route creation.

Use the menu to select routes. This will display. Window showing the current list of routes and whether to display or edit them. To create a new route, select create new route. This will present a new window through which waypoints can be added and modified. Waypoints have a lag,Lon as well as altitude and optional name.

POI

The app provides the capability to annotate the map with points of interest. There are 4 types

Point this is a single lat, long. The user provides a name, a colour nd sellects an icon from a list of predefined icons.

- Circle, the user selects a point, colour, name and radius.
- Polyline, the user selects a name, c9lour and list of positions. This is useful for showing boundari3s such as feba
- Polygon, the user selects a name, colour and list of positions similar to the poly line. However I this case the last and first points will be joined and the polygon filled with a second user defined colour.

POIs are graphical, there is currently no way for tracks or radars to interact with POIs. Thus they are primarily I ntended to provide useful annotations to the map for visual use.

L16 module

The app includes an optional link16 module. The link 16 module is really a JREAP module. Whe enabled, the app will emulate having a link16 terminal in Ottawa. It will send out a j2.5 message every 12 seconds. Tracks will behave as follows:

If a track has link16 , meaning the has link16. Heckbox is checked, the the track will send a j2.2 message every 12 seconds. If the track does not have link16 the app will send. J3.5 message every 12 seconds. The STN for these tracks will be the STN assigned to the app.

Link 16 configuration options are available through the menu, link16, xx item.

Elevation

The app include an optional module for loading and displaying Terrain elevation based on global DTED0 data. Whe enabled the applicatio will load bout 5000 dted one degree by one degree tiles. This is done in the background and you can see a loading dted the dted loaded toast messages at startup.

Whe DTED is loaded the time and position; overlay will show the elevation at the current location of the mouse pointer.

You can see a colour map of the loaded dted by selecting menu, show elevation overlay. This display shows all of the one by one dted cells overlaid on the map. Although the overlay shows one degre by one degre rectangle, dted data is provided as post elevation data, thus the elevation number shown in the centre of the dted tile (only appears when zoomed in) is the elevation at the centre of the rectangle.

The user can click on the map the select create los Line in the popup menu. This will cause three things to occur:

An elevation window will open, an LOS will appear on the map that starts where the map was clicked and ends, more or less, where the mouse pointer is,and a finer grid will appear for the one degree by one degree dted tile enclosing the selected point. The elevation windows whirl show two elevation lines, the green one shows the elevation profile for a flat earth, the red line shows the elevation profile for the actual earth. It shows elevation dropping off with distance based on the curvature of the earth (4/3 Earth model). You type the T key to swap the start and end points of the los line.

You can cancel or save the los line.

Cancelling the Los line will close the elevation window and maybe stop showing the detailed grid.

Map overlays

Status overlay

Map go to buttons

Scale bar

Mouse pointe4

MGRS

Utility functions

- Geo tool
- App options
- Debug
- Tile manager
- About
- Help