Flights in my Hands

Strip'TIC

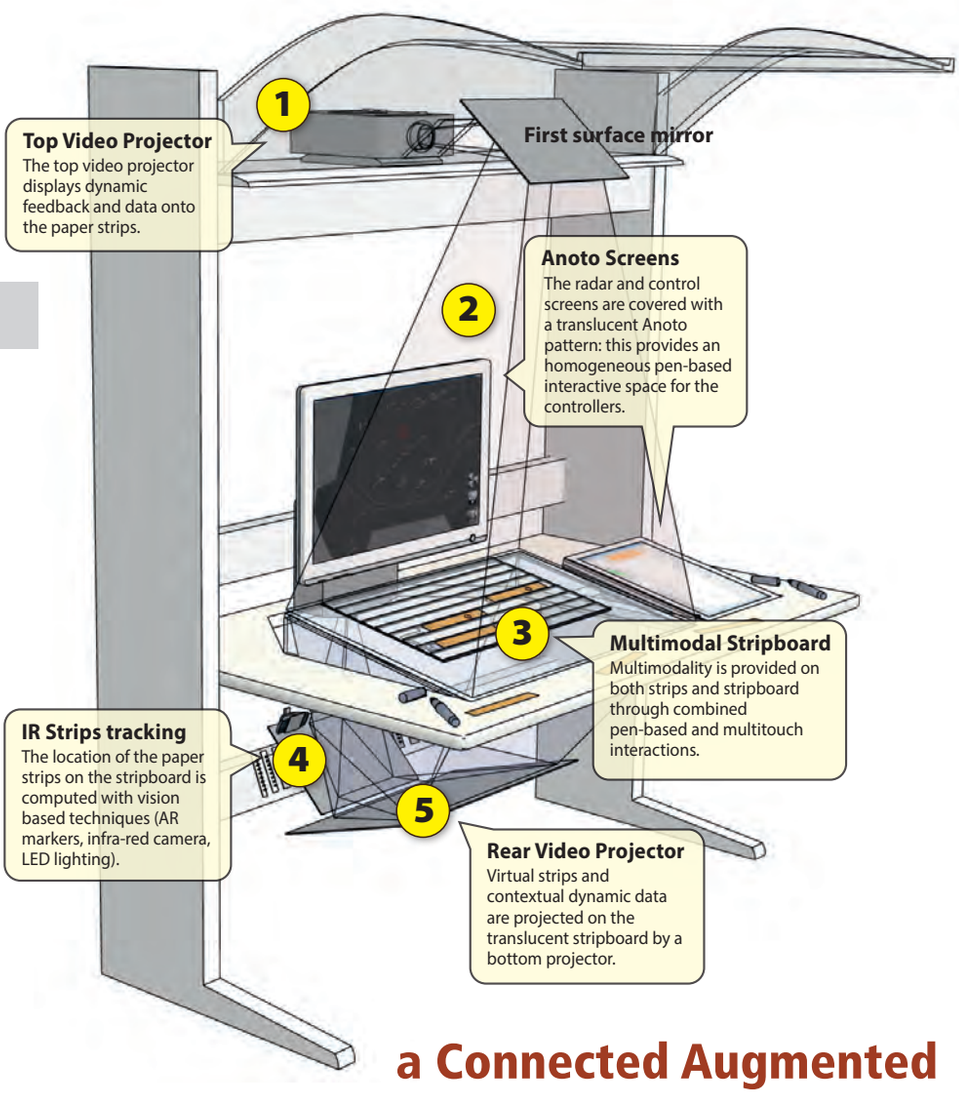
***Strip'TIC**, Stripping Tangible Interface for Controllers, is a research collaboration between ENAC and DSNA/DTI (French Civil Aviation). This innovative prototype mixes the best of two technologies: paper and electronic strips. Based on upcoming technologies (digital pen, augmented reality, multitouch), the environment that is offered to the controllers through this system is both **coherent** (through linked radar and stripboard views, synchronized virtual and physical strips), **robust** (paper is failsafe) and **easy to use** (familiar interactions with paper enable direct manipulation of computational data).*

Design Process

To design Strip'TIC, we analysed the controller activity has been analyzed using ethnographic and participatory design methods (6 observation sessions in real context, 3 observation sessions of training controllers, 4 interview sessions, 5 brainstormings and prototyping sessions and 4 design walkthrough sessions).

During prototyping workshops, controllers were able to build paper and video mockups, in order to provide us with their own view on what an appropriate support of their work could be and on the way the user should be able to interact with the system. We ran design walkthrough sessions during which where the controllers tried the prototype by running scenarios such as ungrouping, conflict detection, stack management, etc.

The Strip'TIC design team is composed of 1 controller and 4 HCI designers and researchers (visualization, tangible and paper-based interaction, graphic design).



a Connected Augmented Tangible and Collaborative system

ENAC Research

dgac direction de la Technique et de l'Innovation
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DSNA

Strip'TIC *a Connected Augmented Tangible and Collaborative System*

A coherent and connected space

In Strip'TIC, controller actions such as strip moves and pen input are instantaneously known from the system (even outside the stripboard, pen input still works).

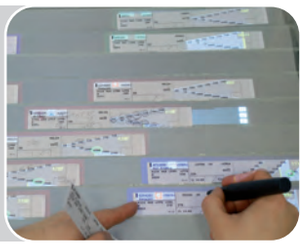
The radar and stripboard views are linked: the controller can select an aircraft or a beacon from either the paper strips or the radar screen. The virtual and paper strips are synchronized: strokes written onto the paper, such as clearances or level selections, are displayed onto the virtual strips; conversely, pen input on virtual strips is will be top projected onto the paper strips. Finally, the system projects up-to-date information onto the paper strips.

Augmented data through projection

Dynamic information that augment the paper strips range from real-time information (aircraft altitude, clearance status), contextual information (logo, wake turbulences, distance to beacons) to computational assistance.

This encompasses stack management, that is supported through expected approach time calculation and stack level assignment support, traffic sequences management and conflict detection: for instance, the controller can select a beacon by pointing with the digital pen on the radar screen or the strip; the system will then automatically highlight this beacon on every paper strip with a top projection.

Tangible strips for safety and efficiency



Physical paper is robust (paper never breaks), efficient (physical strips are easy to manipulate, shift, group or grasp) and flexible:

Free-hand writings and drawings convey important information (warning signs, potential problems underlined, emergency indications, etc.), that are aimed to other controllers, even if the system doesn't need to interpret them.

Physical arrangments of strips on the stripboard help the controller to handle complex tasks through cognitive externalization.

Communication for collaboration & awareness

Controllers communicate and maintain awareness through paper strips moves and gestures in physical space.

Global traffic management state may be inferred from strips and stripboard physical state: it is thus available for monitoring (e.g by a chief controller with an external tablet).

Paper strips may be virtually extended in order to supplement and facilitate oral communication between sectors.

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