STAVOR
A transition from desktop to new mobile platforms

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Software environments have changed a lot in the last few years, since the release of the first **smartphones**. From the typical Windows-Unix market, where languages like Java emerged as multi-platform solutions, new very different systems have appeared leaving the term multi-platform obsolete. To refer to an application that can run in different systems and platforms (Desktop, mobile, web...) we use the term Cross-platform.
CS Systèmes d'Information is the main developer of the free application **STAVOR (Spacecraft Three-dimensional Attitude Visualization with Orekit).**
This Mobile application aims to visualize the attitude and spacecraft-centered indicators, as well as the orbit, of a simulated spacecraft in a simple three-dimensional environment. It allows to use the **OREKIT Space Flight Dynamics Library** as a **space mission simulator** wrapping it in a touch-ready UI with some 3D and 2D visualization modules to represent the simulation results.
STAVOR allows you to learn and teach about space mechanics in new-generation devices, mobile and tactile: You can simulate simple space missions or enhance your space mission simulations with more intuitive and complete results thanks to the visualizations of this application

OREKIT as a multi-platform simulator

Orekit is an **Open-Source Flight Dynamics library** coded in **Java**, to benefit of its multi-platform capabilities. Since this language is still largely used for space applications, the operational use of the library in a near future is not at risk. On the other hand, its utilization in new environments like **mobile applications** is restrained. Many different solutions have been tested to integrate the library in such environments.
The main problems of these new platforms and devices are the heterogeneity of hardware and frameworks: very different screen sizes and resolutions, storage capacity, new GPU architectures with not fully implemented standards, battery consumption, multiple switching connections, variable signal, application and device life cycle...
The library is already able to run in Android, due to the fact that it embeds a Java virtual machine, similar to the one in Desktop environments. For the integration into other devices like Apple smartphones and tablets, mobile devices based on web browsers and others, two approaches were considered: convert the code or binary of the library to a language recognized by each device, or convert it to a Web language and use it. Many source codes and binary converters have been used without success due to the data interface of Orekit. Such a solution needs many modifications in the library code to perform the conversion.
A solution that mandates to maintain different versions of the code and binaries was not desired, and the conversion to JavaScript requires the modification of all the data interface of Orekit, so this was saved as a possible solution in the future.
The last possible solution is to connect remotely Orekit, which demands a server and a fast internet connection, not very common in mobile devices.

Technology Choice for STAVOR

We have decided to use WebGL for the rendering in order to port this application to several platforms.
WebGL is a JavaScript API for rendering interactive 3D computer graphics and 2D graphics within any compatible web browser without the use of plug-ins. The only native part is the UI which can be developed using the same language than the targeted platform.

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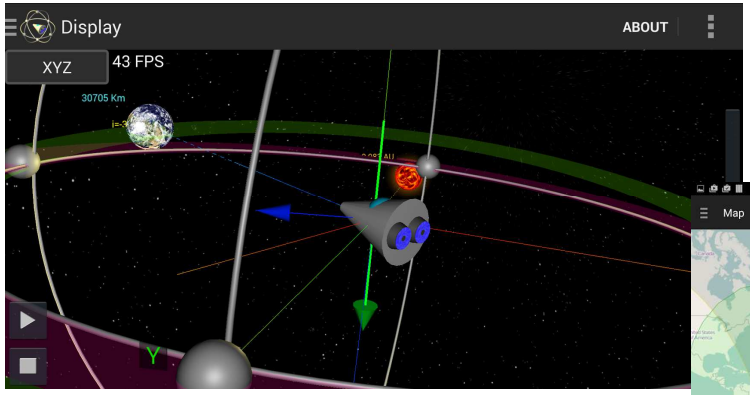
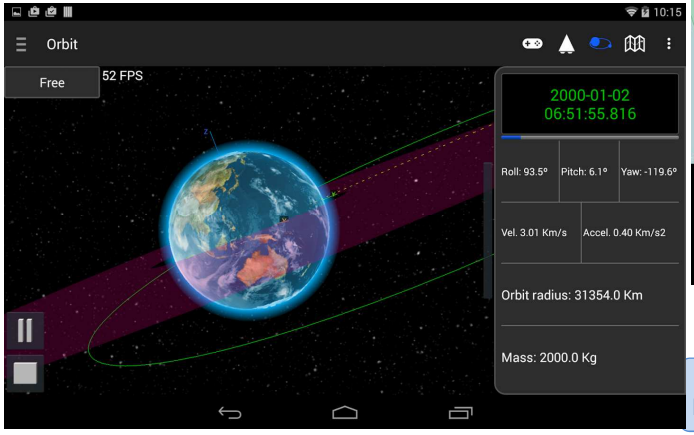
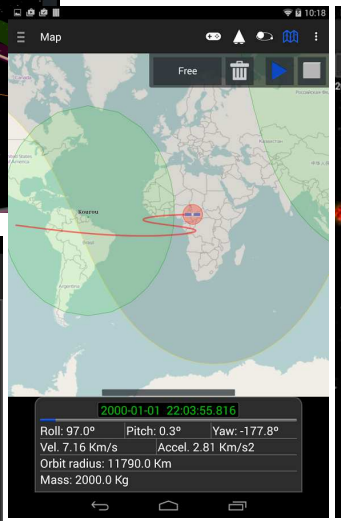
STAVOR

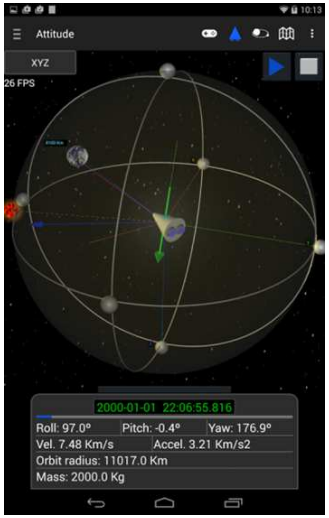
The space simulators usually separate the analytic information and the three-dimensional representation. This allows giving precise information but it creates difficulties to interpret quickly its meaning: where is the force going? Am I traveling towards the Earth? Am I pointing in the right direction?....

- The visualization produced by this application serves as a complementary simulation visualization that combines a simple 3-D representation of the spacecraft with elements like vectors, angle arcs and reference axis that will give a fast preliminary idea of the magnitude and direction of the parameters
- An optional panel of displays complements this information with accurate values
- The information provided is spacecraft-centered, and therefore very intuitive.









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