

**Customer**

"The Planet of Attractions", Ltd. designs and manufactures high-technology park attractions.

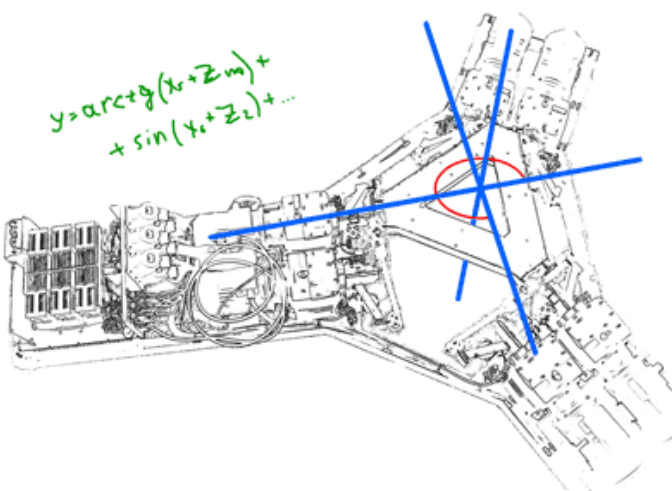
**Objective**

The objective is to develop 4D-Cinema platform controlling software basing on the motor controller board. The attraction is designed for eight people and is mounted on a platform that moves in six coordinate planes. On the whole, the system is based on application of three technologies: simulator technology, 2D/3D digital cinema and virtual reality systems.



The following special effects are added to 3D stereo image according to the plot: chair vibration, abrupt falls, rises and turns. The whole system agrees with motor controller, which, as a result, creates unique feelings and participation effect. The process of film watching is accompanied by the sound of a powerful loudspeaker system.

Platform controlling software must:



- calculate space coordinates of platform location depending on the image on the screen;
- calculate motor controlling actions taking into account inertia and platform characteristic;
- interact with PC via digital interfaces;
- process data from location sensors of executing mechanisms;
- form low-frequency sound signal for creating vibration.

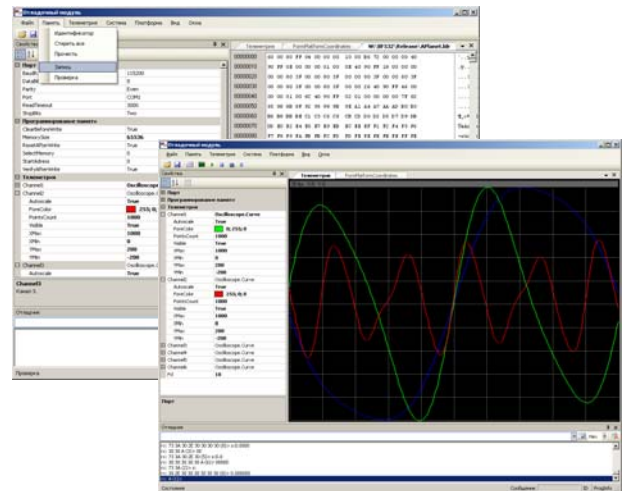


## Solution

The basis of platform controlling software is the algorithm for calculating motor rotation angles depending on platform's space location. This algorithm includes a great number of complex trigonometric calculations with floating point, which imposes strict requirements to processor performance. The usage of BlackFin BF532 allowed implementing all necessary calculations in time intervals acceptable for device's work without any problems.

By using geometrical calculations controller's software sets acceleration/deceleration trajectories for each motor. Movement calculation algorithms were optimized for integer-valued calculations, as the core of controlling DSP is integer-valued.

PC software allows displaying data from motor location sensors in a graphical form, comparing real platform location with controlling motor actions, updating board firmware via easy-to-use graphical shell (it means performing on-board programming without opening controller frame).



## RAPPA-2008

This interactive 4D-cinema was announced at 10<sup>th</sup> International Exhibition "Attractions and Amusements RAPPA—2008", devoted to amusement industry in Russia and held on 9-11 April 2008 in Moscow. You can view video from 4D-cinema presentation here:

<http://www.youtube.com/v/oncZ9qcZBA4>

## Benefits

- Usage of high-performance BlackFin BF532 processor allows applying for calculations complex algorithms for controlling platform with a great number of degrees of freedom;
- The solution, based on application of a ready controller board, allowed significantly decreasing both project completion period and development costs.

Development tools	VisualDSP, MVS
Technologies	NAND Flash, RS232, RS485, USB2.0, DSP
Programming languages	C, C++, ASM
Project management tools	dotProject, MSProject, CVS
Labor input	65 man-days
Project completion period	3 months