

Department of Intellectual Information Technology and Systems

Laboratory: complex 3D intellectual industrial plans and cycle

Moscow Institute of Physics and Technology

State University

*P. Sheetekela*

*Ph.D MIPT(SU), Moscow*

*Tel: +79152287497, E-mail:sheetekela81@gmail.com*

### GPGPU APPROACH ON SCALING AND NAVIGATION WHEN CREATING, MODELLING VISUALIZATION OF 3D OBJECTS IN CAD/E/M SYSTEMS

Most 3D CAD/E/M visualization systems use the power of the central processing units (CPU) to process geometric data, but the up to date requirements to high speed, real-time and realistic 3D environments, high picture resolutions had forced CPU to process big data, in less time, with efficiency and less energy consuming. But the use of CPUs only cannot solve such task to achieve real-time, this approach requires robust data processing units that are fast, powerful enough for rapid and rendering of smooth transition of FPS in a 3D virtual scene.

The use of modern graphic processing units, the technologies of massively parallel computing, algorithms and special tools to visualize 3D-geometry for rasterization and rendering of 3D virtual environments is had reached much so far and shows no end in finding compact way to visualize complex 3D virtual scenes for better data understanding, and time consuming, the use cheap effective hardware.

In our approach to conquer the challenges of visualization in 3D systems we use the trending efficiency of CUDA technology that offered a maximum up to x43 on:

- rendering
- shading calculation
- optimization calculation
- neural network Backpropagation method to detect collision

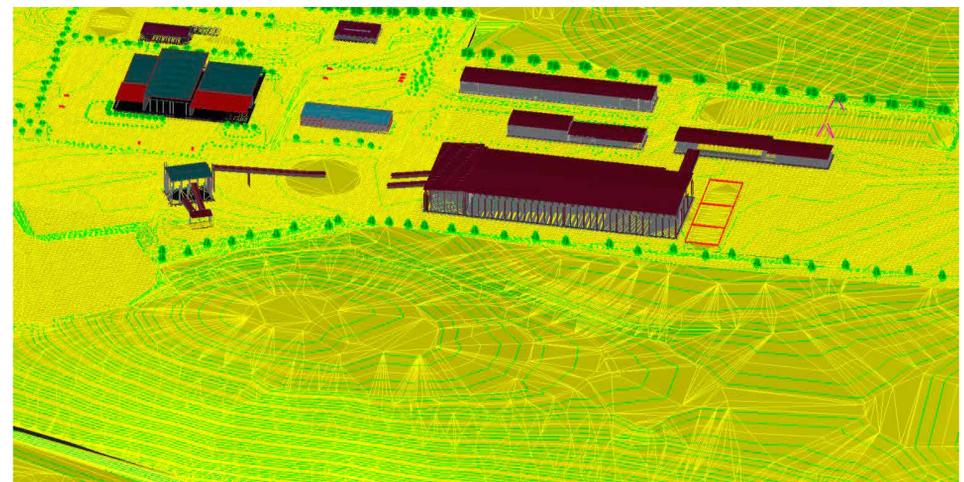
The results showcased our work and approaches on CAD systems of scaling and navigation in creating, projecting and modeling of detailed 3D objects and their visualization in complex virtual environment in real-time.

CPU maximum core can go up 12

GPU maximum core can reach up to



Efficient of GPGPU parallel computing technology



Hardware:

CPU Xeon E5-2630

GeForce QUADRO 4000

Mine site rendering at a speed of 800FPS with more than 10 million triangles. All the triangulation is done in real-time to save memory.

Our visualization systems took the maximum use of GPUs to enhance its usability on speed and efficient calculation by using improved techniques available in visualization technology of 3D objects with optimized tasks solving and easy maintenance.

Further work: Development intellectual 2D to 3D virtual objects and use of sensor data to create 3D virtual environment in real-time, this will remarks possible ways for future robotics navigation in unknown areas and realistic visual data.