2 MILLION PIXEL EXPERIMENT
MAPPING A 1080p VIDEO SOURCE INTO 3D SPACE IN REALTIME

DESCRIPTION OF CONCEPT

2 MILLION PIXEL EXPERIMENT has been created as a piece of computational art using visual computing technologies. Developed as a software application this experiment maps a full HD video source (1920 x 1080 @ 30 fps) into 3D space. Each video frame is processed in real-time by a CUDA kernel. Every pixel in a frame is scaled in the Z-axis by its luminance value and given its original color from the video source.

IMPLEMENTATION DETAILS

CUDA KERNAL

```
// CODE EXCERPT for launching the CUDA KERNAL
// to achieve the vertex mapping according to a video frame

void ISampleGrabberCB.BufferCB(double SampleTime, IntPtr pBuffer, int BufferLen) {
    // CODE EXCERPT for the frame grabber event at a new frame
    void cudabuffer.UpdateBytes(byteinput, BufferLen);
}
```

CUDA KERNEL

```
for(unsigned int i=0; i<3; i++)
    float rgb[3] = {0.0f, 0.0f, 0.0f};

float v = (((float)y / hf)-0.5f)*2.0f;
float u = (((float)x / wf)-0.5f)*2.0f*aspect;
float aspect = wf/hf;
unsigned int s = 8;
unsigned int h = __float2uint_rd(PARAMS[2]);
unsigned int w = __float2uint_rd(PARAMS[1]);
unsigned int y = blockIdx.y*blockDim.y + threadIdx.y;
unsigned int x = blockIdx.x*blockDim.x + threadIdx.x;

// CODE EXCERPT for launching the CUDA KERNAL to update vertices
// Copy parameters and the bytes of the last video frame to device

CUDA KERNAL

```

POSSIBLE PURPOSES

By mapping a video source into 3D space, each pixel can be displayed highly differentiated. This approach could be utilized for checking video quality on lower pixel level like on a realtime video waveform monitor. For digital content creation this experiment may provide new possibilities for particle-based visual effects that allow to dissolve a video source into a highly dynamic 3D point cloud.

CONTACT INFORMATION

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NOUMENTALIA is a digital arts company that offers innovative IT services, rapid software development with focus on visual computing technologies, sophisticated IT consulting as well as fine art content creation.