YOUNGSTOWN STATE UNIVERSITY

Template for Strategic Investment Funding Proposals, FY 2018

Proposals must be submitted to the YSU Budget Office, no later than February 1, 2018

Section I: Proposal name and contact information

Title / name of proposal:	Center for Cognitive Computing and Emerging Analytics (3CEA)
Contact person name and title:	Dr. Coskun Bayrak, Chairperson and Professor
E-mail address:	cbayrak@ysu.edu
Phone number:	330.941.3120

Section II: Approvals of the appropriate College Dean and/or Division Officer

To certify that the proposal is aligned with the strategic objectives of the department, college or division, signature approvals are required by the appropriate Department Chair or Director, College Dean, and/or area division officer, i.e., Provost, Vice President, Associate VP.

Signature of Dept. Chair or Director	
Name (printed/typed):	Dr. Coskun Bayrak
Title:	Chairperson and Professor
Date:	1/28/2018
Signature of Dean (if applicable):	Wim Steelant
Name (printed/typed):	Win Steelant
Title:	Dean of STEM
Date:	1/28/2018
Signature of Division Officer:	
Name (printed/typed):	Martin Abraham
Title:	Provost
Date:	1-31-18

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Section II: Description of the proposal and its alignment with the YSU 2020 Strategic Plan

Please summarize the proposal and specify how it aligns with the YSU 2020 Strategic Plan.

In response to the YSU's Strategic Investment Funding request, while considering the four cornerstones (student success- research-accountability and sustainability-regional engagement) outlined in the YSU 2020 strategic plan, we are proposing the development of GPU Cloud for Integrated Sciences and Emerging Analytics (CISEA), which will promote BigData related research (including 3D modeling, virtual reality, animation, and simulation) and education (in the form of active learning), and a Wall System to promote achievements and successes obtained by faculty and students in open source tools development, in scholarly activities involvements, and in completing the formal training. It will also serve as a model environment for interdisciplinary collaboration between engineers, scientist, and physicians. Without a research, the training and coordination center, which will help to bring the best practices together, the necessary collaborations and contributions in the field will remain marginal. The envisioned center complemented with a Wall System (3rd floor Meshel hall) on campus will create a state of the art infrastructure with high visibility for the researchers in the State of Ohio.

Section III: Shared governance and stakeholder engagement

Was the proposal developed collaboratively and with input from all stakeholders? Please describe the process used to develop your proposal.

The proposal is drafted based on the initiatives already established. Prior to this invitation, faculty members in CSIS and Creative Arts have generated an agenda to develop a joint program called Animation and Gaming. A preliminary proposal is in progress. Similarly CSIS faculty and Health professions faculty has already drafted the joint Health Informatics Master program proposal. All of these commitments are to increase the enrollment and bring in better visibility. However, without the proper infrastructure none of these programs will be completed. Therefore, CISEA, an active learning center composed of Virtual reality and Virtual Classrooms, is the necessity for the success of these programs in training students. CISEA will not only be a unique learning environment in the state of Ohio but also a center to support interdisciplinary research across the state and country. Therefore, the proposal is an collective effort of the faculty members from multiple departments accross the campus. These departments and involved faculty members are:
Computer Science and Information Systems: Bayrak-PI, Sullins, Sharif, Arslanyilmaz, Yu, Kramer, Zhang, Schueller
Mechanical Engineering: Kevin Disotell
Arts: Greg Moring, Joy Christiansen Erb
Health Professions: Joseph Lyons, Joseph Mistovich
Some of the areas are: Fluid Dynamics (Validation using large data sets, Analysis of large experimental data sets, Remote visualization); Computer-Aided Design Visualization (Real-time visualization and animation, Large component/assembly libraries); Bioinformatics/Health Informatics/Biomedical Engineering (3-D Modeling, Visualization and Animation, Enhanced Support Libraries, Data Analysis); CGPU based Cloud Computing (Deep Learning, Data Mining)

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Section IV: Return on Investment

If applicable, describe how the proposal may generate new revenue to support related expenses or other strategic initiatives. If there are benefits other than revenue-generation, whether tangible or otherwise, you may also describe those.

Due to the increasing demand of a skilled technology workforce, the proposed infrastructure will provide an immediate enhancement of research and professional training. As a result, the studies conducted in the center will also be incorporated into classroom contexts at the University. The research enabled by this infrastructure is anticipated to reach a large number of experts and researchers in the field via local, regional, national, and/or international meetings. The proposed collaborative computing center served by this infrastructure will also be closely tied to the education of the broader regional community served by the University and students in K-12. The strategic location of this infrastructure along the main campus gateway will facilitate access and outreach to adjacent entrepreneurial hubs, such as the Mahoning Valley Innovation and Commercialization Center on campus. In addition, local museums that help form the cultural fabric of the community can benefit from modules that engage school children in immersive environments enabled by GPU infrastructure.

Section V: Proposed funding amount requested

(NOTE: Available strategic investment funds are one-time dollars left over from the prior fiscal year. Consequently, proposals requiring multi-year funding will require additional consideration.)

Single year funding request:	$ 539,503.00		
Multi-year funding request (if applicable):	$	No. of years:	

Section VI: Space utilization and/or modification

If applicable, describe any special and/or additional building or space requirements that would be needed to pursue your proposal.

The success and achievements obtined int he center should be shared, distrubuted, and publicized to gain the right visibility. Therefore, the active learning environment needs to go beyond the classroom and/or research lab's boundaries. This can only be achieved by a continous broadcasting. For this we propose to add a Wall System (4X4) to be made functional on the internal wall of Meshaell Hall.

Section VII: Personnel costs / additions

If applicable, explain any additional costs associated with the need to add staffing and/or faculty resources required to pursue your proposal.

The CISEA and Wall System does not need any additional staffing/faculty. The existing faculty is capable of managing the both parts.

Section VIII: Enterprise risk management

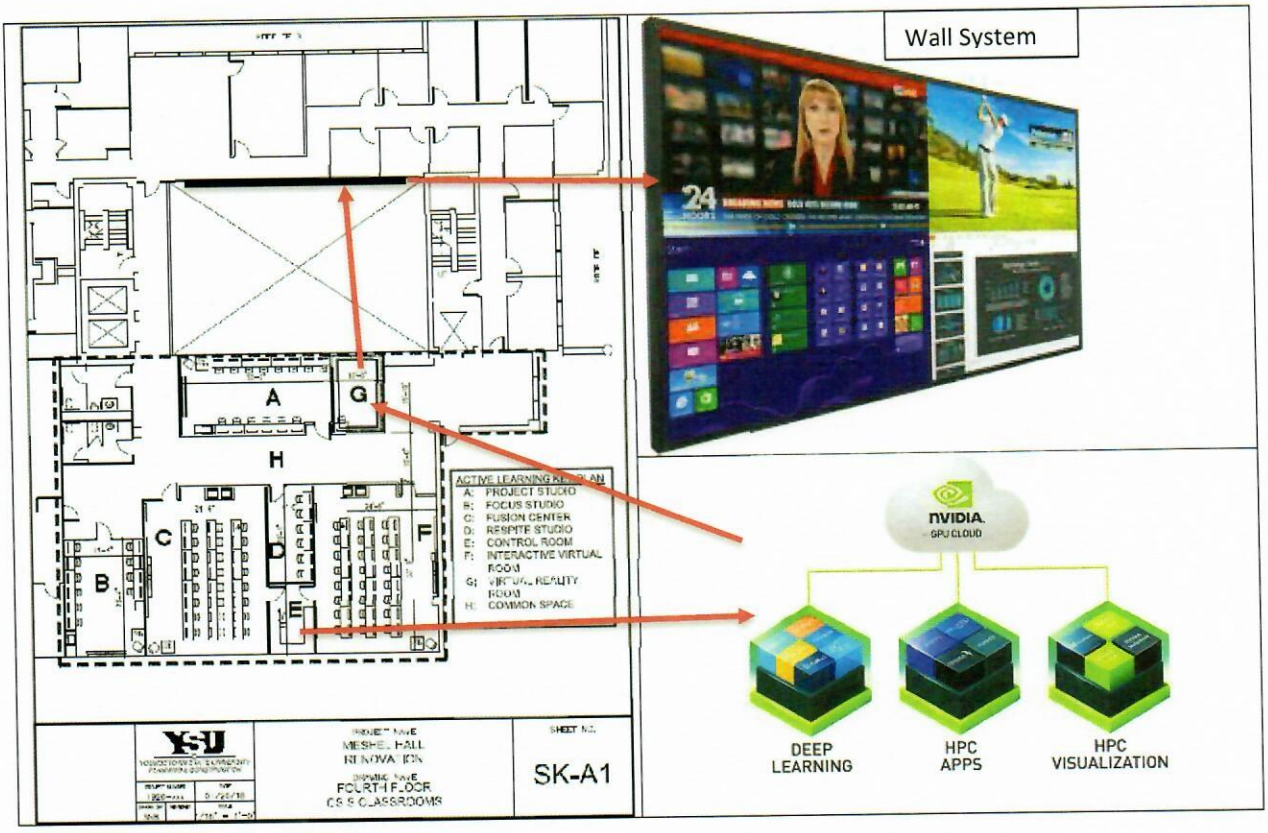
If applicable, describe the risk mitigated by your proposal, or the risk elevated if your proposal is not funded.

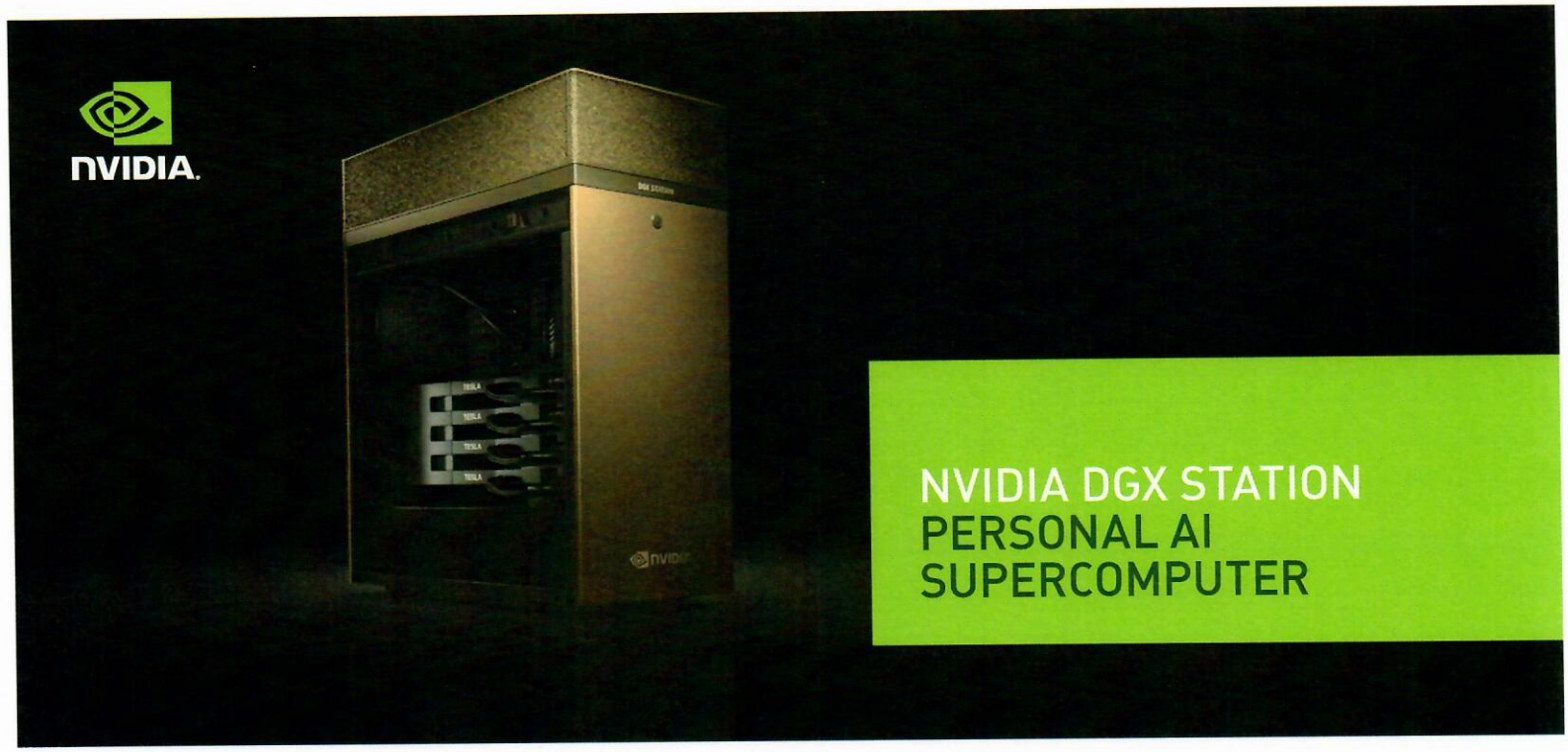
In case of no funding, the joint program (Animation and Gaming and Health informatics) will not have the infrastructure needed to train the students in active learning environment. Active learnin is to have student learn not only the theoretical part but also the practical side while working on real projects brought in with real clients.

if not funded, it will also impact the research interest of nine faculty members in three department, not to mention the other faculty members who would want to use it once established.

Budget: Strategic Investment Proposal Budget				
Project Title:	**GPU Based Virtual Reality Wall System**			
		Year 1	**Year 2**	**TOTAL**
Senior Personnel	**Annual Salary**			
Coskun Bayrak, PI	0	$ -	$ -	$ -
Kevin Disotell, Co-PI	0	$ -	$ -	$ -
Bonita Sharif, Co-PI	0	$ -	$ -	$ -
Feng Yu	0	$ -	$ -	$ -
SubTotal		**$ -**	**$ -**	**$ -**
Other Personnel				
		$0.00	$0.00	$ -
		$0.00	$0.00	$ -
		$0.00	$0.00	$ -
		$0.00	$0.00	$ -
		$0.00	$0.00	$ -
		$0.00	$0.00	$ -
SubTotal		**$0.00**	**$0.00**	**$0.00**
Fringes		$ -	$ -	$ -
SubTotal		**$ -**	**$ -**	**$ -**
Equipment				
NVIDIA® DGX™ Station (4 units)		$ 199,600.00	$ -	$ 199,600.00
Wall System		$ 338,176.70	$ -	$ 338,176.70
			$ -	
		$ -	$ -	$ -
SubTotal		**$ 537,776.70**	**$ -**	**$ 537,776.70**
Travel				
Domestic+International				$ -
SubTotal		**$ -**	**$ -**	**$ -**
Participant Support Costs				
Stipends				$ -
SubTotal		**$ -**	**$ -**	**$ -**
Other Direct Costs				
1. Materials and Supplies		$ -		$ -
3. Consultant Services		$ -	$ -	$ -
4. Computer Services		$ -	$ -	$ -
6. Other - Shipping Cost		*1,726.30*	$ -	$ 1,726.30
SubTotal		**$ 1,726.30**	**$ -**	**$ 1,726.30**
Total Direct Costs		**$ 1,726.30**	**$ -**	**$ 539,503.00**
IDC at 53.00%			**$ -**	**$ -**
Total Project Cost		**$ 539,503.00**	**$ -**	**$ 539,503.00**

The Active Learning Environment Containing CINEA and Wall System





NVIDIA DGX STATION PERSONAL AI SUPERCOMPUTER

The Personal Supercomputer for Leading-Edge AI Development

Your data science team depends on computing performance to gain insights, and innovate faster through the power of deep learning and data analytics. Until now, AI supercomputing was confined to the data center, limiting the experimentation needed to develop and test deep neural networks prior to training at scale. Now there's a solution, offering the power to experiment with deep learning while bringing AI supercomputing performance within arm's reach.

Groundbreaking AI, at Your Desk

Now you can get the computing capacity of 400 CPU's, in a workstation that conveniently fits under your desk, drawing less than 1/20th the power. NVIDIA® DGX Station™ delivers incredible deep learning and analytics performance, designed for the office and whisper quiet with only 1/10th the noise of other workstations. Data scientists and AI researchers can instantly boost their productivity with a workstation that includes access to optimized deep learning software and runs popular analytics software.

Get Started in Deep Learning, Faster

DGX Station breaks through the limitations of building your own deep learning platform. You could spend a month or longer, procuring, integrating, and testing hardware and software. Then additional expertise and effort are needed to optimize frameworks, libraries, and drivers. That's valuable time and money spent on systems integration and software engineering that could be spent training and experimenting.

NVIDIA DGX Station is designed to kickstart your AI initiative, with a streamlined plug-in and power-up experience that can have you training deep neural networks in just one day.

SYSTEM SPECIFICATIONS

GPUs	**4X Tesla V100**
TFLOPS (GPU FP16)	**500**
GPU Memory	**64 GB total system**
NVIDIA Tensor Cores	**2,560**
NVIDIA CUDA® Cores	**20,480**
CPU	**Intel Xeon E5-2698 v4 2.2 GHz (20-Core)**
System Memory	**256 GB LRDIMM DDR4**
Storage	**Data: 3X 1.92 TB SSD RAID 0** **OS: 1X 1.92 TB SSD**
Network	**Dual 10GBASE-T (RJ45)**
Display	**3X DisplayPort, 4K resolution**
Additional Ports	**2x eSATA, 2x USB 3.1, 4x USB 3.0**
Acoustics	**< 35 dB**
System Weight	**88 lbs / 40 kg**
System Dimensions	**518 D x 256 W x 639 H (mm)**
Maximum Power Requirements	**1,500 W**
Operating Temperature Range	**10–30 °C**
Software	**Ubuntu Desktop Linux OS** **DGX Recommended GPU Driver** **CUDA Toolkit**

Productivity That Takes You from Desk to Data Center

Deep learning platforms require software engineering expertise to keep today's frameworks optimized for maximum performance, with time spent waiting on stable versions of open source software. This means hundreds of thousands of dollars in lost productivity, dwarfing the initial hardware cost.

NVIDIA DGX Station includes the same software stack found in all DGX solutions. This innovative, integrated system includes access to popular deep learning frameworks, updated monthly, each optimized by NVIDIA engineers for maximized performance. It also includes access to NVIDIA DIGITS™ deep learning training application, third-party accelerated solutions, the the NVIDIA Deep Learning SDK (e.g. cuDNN, cuBLAS, NCCL), CUDA® Toolkit, and NVIDIA drivers.

Built on container technology powered by NVIDIA Docker, this unified deep learning software stack simplifies workflow, saving you days in re-compilation time when you need to scale your work and deploy your models in the data center or cloud. The same workload running on DGX Station can be effortlessly migrated to a DGX-1 or the cloud, without modification.

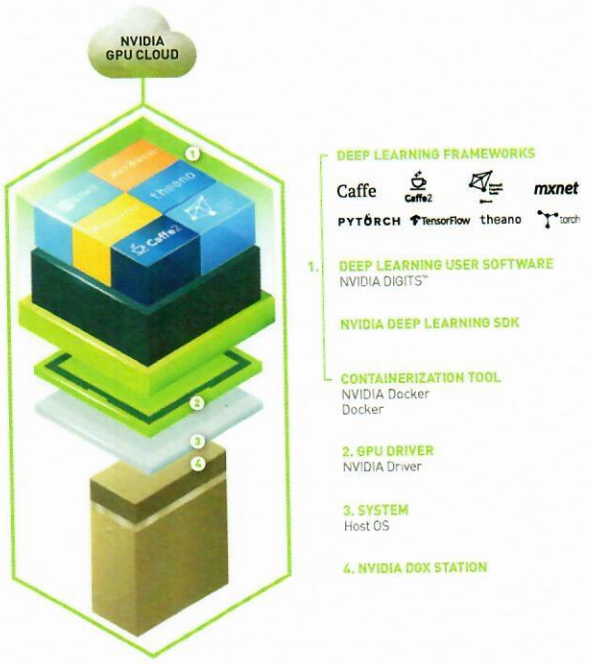
Supercomputing Performance, at Your Desk

DGX Station brings the incredible performance of an AI supercomputer in a workstation form factor that takes advantage of innovative engineering and a water-cooled system that runs whisper-quiet.

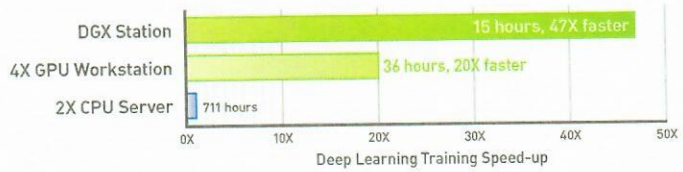
The NVIDIA DGX Station packs 500 TeraFLOPS of performance, with the first and only workstation built on four NVIDIA Tesla® V100 accelerators, including innovations like next generation NVLink™ and new Tensor Core architecture. This ground-breaking solution offers:

- 47X the performance for deep learning training, compared with CPU-based servers
- 100X in speed-up on large data set analysis, compared with a 20 node Spark server cluster
- 5X increase in bandwidth compared to PCIe with NVIDIA NVLink technology
- maximized versatility with deep learning training and over 30,000 images/second inferencing

NVIDIA DGX Station Software Stack



NVIDIA DGX Station Delivers 47X Faster Training



DGX Station performance projected based on DGX-1 (with Tesla V100) Workload: ResNet50, 90 epochs to solution | CPU Server: Dual Xeon E5-2699 v4, 2.6GHz. Projections subject to change.

Investment Protection

With DGX Station, you get enterprise grade support with access to NVIDIA deep learning expertise, a library of expert training, software upgrades and updates, and priority resolution of your critical issues—all in one place.

For more information, visit **www.nvidia.com/dgx-station**

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