Students are invited to submit their project abstracts in areas related to the advancement of technologiy and applications related to the following focus areas:

1. Cloud Computing
2. Big Data
3. High Performance Computing (HPC)
4. Internet of Things (IoT)
5. Artificial intelligence (AI)
6. Virtual and Augmented Reality (VAR)
7. Secure Systems

The following is a non-exhaustive list of example project areas that fit within one or more of the focus areas of the Envision the Future Competition this year:

1. Cloud Computing

Cloud Technology:

- Cloud Management
- Hybrid cloud infrastructure
- Secure file management in the cloud
- Efficient methodologies for developing cloud applications
- Multi cloud integration
- Performance monitoring, tuning, and reporting
- Metering and billing in commercial public clouds

Cloud Applications:

- Web-based cloud applications
- Cloud-based information systems
- Real-time cloud applications
- Social media cloud applications
- Mobile apps using cloud computing platforms

2. Big Data

Big Data Algorithms, Technology, and Methodology:

- Data management tools
- Storage and warehousing
- Securing big data systems
- Big data analytics
- Deep learning
- Pattern mining
- Search engines
- Graphical models for massive data sets
- Big data programming tools and techniques

- Data exploration and visualization
- Predictive modeling

Big Data Applications:

- Scientific modeling (e.g., genomics, weather prediction, nano-science, etc)
- Pharmaceuticals and drug design
- Environmental studies
- Mobile Apps using big data back-end platforms
- Data mining applications
- Web-based big data applications (e.g., healthcare, education, judiciary, e-government)
- Big data for Internet of Things
- Cryptocurrency and distributed ledger applications

3. High Performance Computing

Technology for HPC Systems

- Threading
- Partitioning (Data and Computation)
- Sequence Mapping
- Performance evaluation and prediction
- Load balancing
- Fault Tolerance and error recovery
- HPC Programming and Optimization Techniques
- Process Allocation
- Energy efficient HPC systems
- HPC in cloud environments

HPC Applications:

- Scientific applications (e.g., physics, computational chemistry, cellular biology)
- Modeling and simulation of nano-scale systems
- Real-time HPC applications (e.g., weather and seismic activity tracking, public security)
- Image processing
- Distributed ledger and blockchain applications

4. Internet of Things

Technology for IoT Systems

- Robotics
- Autonomous Vehicle Technology
- Scaling in large IoT systems
- Reliability of mission critical systems

- Fault management and recovery
- Ensuring privacy and security in IoT systems
- Communications protocols
- IoT software compliance

IoT Applications:

- Smart homes applications and devices
- Manufacturing and industrial systems
- Logistics and shipping services
- Applications in the retail industry (e.g., inventory management, shopping experience)
- Smart cities applications
- Public safety applications (e.g., security, fire, flooding, structural damage detection, etc.)
- IoT in intelligent transportation systems
- Digital health applications and devices
- Connected cars
- Applications in agriculture (e.g., soil monitoring, pest control, water management, climate control, etc.)

5. Artificial Intelligence

Technology for AI Systems

- Modeling human cognition
- Deep learning
- Pattern recognition in noisy environments
- Algorithms and tools for neural networks development and evolution

AI Applications

- Object recognition applications (2D and 3D)
- Sound and voice recognition
- Pattern matching (e.g., medical imaging and diagnostics, remote sensing)
- Interactive entertainment and gaming
- Social media applications (e.g., understanding trends, mood, impact, etc.)
- AI in healthcare (e.g., diagnosis, prognosis, risk prediction, etc.)
- Smart home devices and applications
- Self-driving cars
- Applications of natural language understanding (e.g., text mining, Q&A, etc.)
- Building and programming interactive robots

6. Virtual and Augmented Reality

Technology for VAR Systems

- Rendering and visualization techniques
- Mapping and integration of virtual objects onto real environments
- Sensors, trackers, and actuators for consumer devices
- Force simulation
- Body motion capture for VAR games
- Olfactory simulation
- Autocalibration of AR systems
- Safety and risk reduction (e.g., confusion, physical harm, etc.)
- Health aspects of VAR devices (e.g., hearing, vision, contact, cognition, etc.)

VAR Applications

- Professional training (medical, industrial tools, sports, etc.)
- Education (e.g., teaching languages, history, science, etc.)
- Advanced Avatars: human conversation, mood sensing, empathy, memorization, etc.
- Multi-user interactive VR or AR games
- Chatbots as customer service or sales agents
- AR in navigation devices
- Enhanced perception for patients and people with disabilities
- Multimedia arts

7. Secure Systems

Technology for Secure Systems

- Encryption techniques and algorithms
- Architectures for securing systems and networks
- Privacy protection mechanisms and architectures
- Secure communications protocols and architectures
- Secure data bases
- Secure embedded systems
- Tamper resistant software
- Forensics techniques

Secure Systems and Security Applications

- Ensuring privacy protection and information security in large interconnected applications (eGovernment, healthcare, eCommerce, supply chains, etc.)
- Fraud prediction and detection in the financial industry (banking transactions, insurance claims, stock market manipulation, cryptocurrency, etc.)
- Support systems for police and emergency services
- Securing critical national infrastructures (electric grids, communications, traffic management, etc.)

- Securing public facilities (airports, ports, roads, transportation, shopping centers, sports arenas, hospitals, educational institutions, etc.)
- Securing industrial enterprises (automated tools, robotics, process control systems, inventory and warehousing, occupational health and safety, etc.)
- Enhancing privacy and security in emerging home applications (smart homes, eCommerce, connected home entertainment, etc.)