

Dr. Yu Chen

RESEARCH ASSOCIATE ABOUT

- Binghamton University, Associate Professor
- Ph.D. 2006, University of Southern California (USC)
- Dates of Fellowship: 5/23/2022 - 8/12/2022
- Advisors: Dr. Alexander Aved,
Dr. Erika Ardiles-Cruz
- Contact Information: ychen@binghamton.edu

SUMMER RESEARCH DESCRIPTION

- Motivation: In our earlier work, we proposed a Blockchain Enhanced Video input Authentication (BEVA) scheme as an edge service to secure smart surveillance systems, which aims at enabling real-time detection of adversarial cameras using environmental fingerprints. Electrical Network Frequency (ENF) signals play the key role in the fight. It is foreseeable that attackers will create false ENF fingerprints leveraging advanced AI/ML once they are aware of the defense technology like BEVA. If ENF signals could be convincingly falsified in video or audio, i.e. artificially added or modified in the media, the defenders could lose the battle.
- Objective: In the Summer 2022, the goal is to validate the robustness of ENF signals as environmental fingerprints for secure edge surveillance as this project will explore deeper insights on the feasibility and potentiality of misusing ENF signals.

Research interests: Trust, Security and Privacy in Computer Networks, including Edge-Fog-Cloud Computing, Internet of Things (IoT), Lightweight Machine Learning (ML) Algorithms, Blockchain in IoTs, and their applications in smart and connected environments.

James Xiaojang Du

RESEARCH ASSOCIATE ABOUT

- Stevens Institute of Technology, Professor
- Ph.D. 2003, University of Maryland
- Dates of Fellowship: 5/09/2022 - 7/08/2022
- Advisor: Dr. Paul Ratazzi
- Contact Information: dxj@ieee.org

SUMMER RESEARCH DESCRIPTION

- Motivation: The U.S. Air Force is adopting and deploying military Internet of Things (IoT) devices and systems, for various Air Force missions. Due to various vulnerabilities, attackers could issue malicious cyber commands to (remotely over networks) or have physical controls on AF IoT devices and systems.
- Objective: Designing Novel and Effective Security Schemes to Prevent Malicious Cyber Commands and Physical Controls to Air Force IoT Devices and Systems

Research interests:

- * Internet of Things (IoT) Security, Cyber Physical Systems (CPS) Security, Wireless Network Security
- * Artificial Intelligence (AI) Security, Machine Learning Security
- * Wireless Networks, Computer Networks
- * Computer Systems, Decision Making, Communications

Helen Durand

RESEARCH ASSOCIATE ABOUT

- Wayne State University, Assistant Professor
- Ph.D. 2017, University of California, Los Angeles
- Dates of Fellowship: 5/30/2022 - 8/12/2022
- Advisor: Dr. Paul Alsing
- Contact Information:
helen.durand@wayne.edu

SUMMER RESEARCH DESCRIPTION

- Motivation: Advanced algorithms for decision-making and safety analysis can be computationally-intensive
- Example Algorithm: Model predictive control
- Objective: This research project will explore whether quantum computers can be used to reduce the computation time for advanced control and reachability analysis.

Research interests: control design and theory, chemical process design, process systems engineering

Introducing Kip Nieman: Ph.D. student, Wayne State University, expected graduation date: May 2024

PhD thesis work: Simulating control/process interaction with computational fluid dynamics/finite element analysis, control theory for control implemented on quantum computers

RAJ EZEKIEL

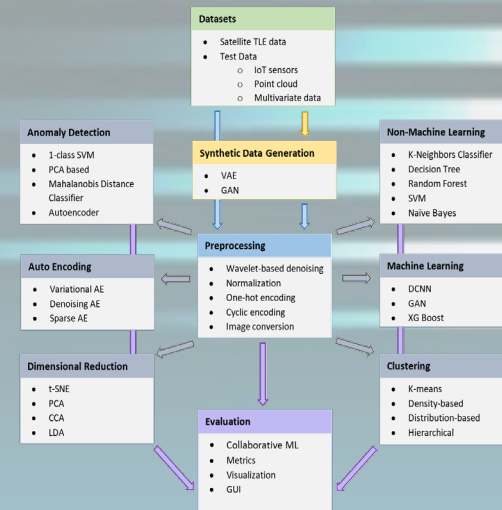
RESEARCH ASSOCIATE ABOUT

- Indiana University of PA (IUP), Professor
- Ph.D. 2000, University of Pittsburgh
- Dates of Fellowship: 5/25/2022 - 8/16/2022
- Advisor: **Ms. Carolyn Sheaff**
- Contact Information: sezekiel@iup.edu 724 490 8052
- **STUDENT: SKY SEMONE**
- **M.S in Applied Mathematics,**
- **Dual B.S. in Math & Physics, CS Minor**
- **Contact Information: jtyt@iup.edu**

SUMMER RESEARCH DESCRIPTION

Topic : Feature-Based Projection of Threats

- **Objective:** Involves the development of a novel architecture for profiling asset behavior, detecting anomalies and deviations from expected behavior, and recommending countermeasures to protect friendly assets using ML



Research interests: AI, Image/Signal Processing, ML, Wavelets, and Cyber Security

Christopher Gerry

RESEARCH ASSOCIATE ABOUT

- Lehman College, City University of New York Professor of Physics
- Ph.D. 1979, SUNY-Albany
- Dates of Fellowship dates: 6/6/22-8/19/22
- Advisor: Dr. Paul Alsing
- Contact Information:
christopher.gerry@lehman.cuny.edu


SUMMER RESEARCH DESCRIPTION

- Motivation: The work is in the use of nonclassical states of light, especially entangled states of light, for the purpose of weak signal detection.
- Objective: The objective of this summer's work is to find conditions under which light entering a beam splitter emerges in maximally entangled states.

Research interests: Theoretical quantum optics, quantum metrology, the use of group theoretical methods in quantum optics.

Edwin Hach

RESEARCH ASSOCIATE ABOUT

- Rochester Institute of Technology, Associate Professor of Physics
- Ph.D. 2000, University of Arkansas 
- Dates of Fellowship: 5/31/2022 - 8/19/2022
- Advisor: Dr. Paul M. Alsing
- Contact Information: eehsps@rit.edu, 2120 Carlson Hall, 85 Lomb Memorial Drive, Rochester, NY 14623

SUMMER RESEARCH DESCRIPTION

- Motivation: by taking advantage of the scalability of silicon nanophotonics and the measurement induced nonlinearities available via relatively simple projective measurements, we can design deployable circuits for important applications in quantum information science.
- Objective: to design and analyze scalable quantum photonic circuits for use in quantum state engineering. Specifically, among other things this summer we want to resolve the details of the physical couplings in general two-dimensional arrays of Micro-Ring Resonators (MRRs)

Research interests: Theoretical Quantum Optics (broadly); quantum photonics for applications in quantum information processing, sensing, and metrology (more specifically)

Non-work pursuits: Swim, Bike, Run (all in a row, i.e. triathlon); guitar, chicken wings, sports (watching or playing**)*

**does not include “guitar hero” ... only interested in actually playing an actual guitar*

***does not include cricket or NASCAR*

Xudong He

RESEARCH ASSOCIATE ABOUT

- Florida International University, Professor
- Ph.D. 1989, Virginia Tech
- Dates of Fellowship: 5/9/2022 - 7/1/2022
- Advisor: Dr. Steve Drager
- Contact Information: hex@cs.fiu.edu,
<https://users.cs.fiu.edu/~hex/>

SUMMER RESEARCH DESCRIPTION

- Motivation: Cyber physical systems have complex continuous and discrete dynamic behaviors, and become more complicated with machine learning components
- Objective: This project aims to provide a formal analysis methodology for assuring the dependability of cyber physical systems with machine learning components

Research interests: software engineering, formal methods, Petri nets, software testing, cyber physical systems

Chin-Tser Huang

RESEARCH ASSOCIATE ABOUT

- University of South Carolina, Professor of Computer Science and Engineering
- Ph.D. 2003, The University of Texas at Austin
- Dates of Fellowship: 5/31/2022 - 8/5/2022
- Advisor: Dr. Laurent Njilla
- Contact Information: huangct@cse.sc.edu, <https://cse.sc.edu/~huangct>

SUMMER RESEARCH DESCRIPTION

- Motivation: when blockchain is applied in decision-making applications, the consensus mechanism requires the decision to be deterministic, which will ignore different recommendations made by agents and may put the computing system at risk.
- Objective: we make use of the smart marker approach to develop a model of probabilistic blockchain which enables branches that allow differing agents to explore further according to their own configuration.
 - We aim to develop a framework for modeling the decision on when to branch and when to merge
 - We aim to develop a set of local and global validation protocols to ensure that consensus can be reached for the acceptance of the converged results

Research interests: network security, network protocol design and verification, malware detection and mitigation, blockchain and consensus protocol, cloud and edge computing, game theoretical modeling of cybersecurity problems

Personal interests: running marathons, travel, cooking

Qiang Ji

RESEARCH ASSOCIATE ABOUT

- Rensselaer Polytechnic Institute , Professor
- Ph.D. 1998, University of Washington
- Dates of Fellowship: 5/30/2022 - 8/19/2022
- Advisors: Drs. Alex Aved, Erika Ardiles, and Collen Rolle
- Contact Information: jiq@rpi.edu , <https://www.ecse.rpi.edu/~qji>

SUMMER RESEARCH DESCRIPTION

- **Project** : A Multi-camera Vision System for Automatic Human Event Analysis and Recognition
- **Motivation**:
 - Automatic video-based human event analysis and recognition is important for many military functions including intelligence collection, reconnaissance, and military facility protection.
 - Existing vision systems focus on simple human actions, typically from a single view, often in 2D, deterministic, purely data driven, and require significant data annotations.
- **Objective**: develop a 3D model-based and physics-augmented probabilistic multi-view vision system to recognize complex human events and to detect abnormal human actions.

Research interests: 1) Computer vision for nonverbal (facial and body) human behavior analysis , recognition, and applications; 2) probabilistic graphical models for learning and inferring structured and causal relations; and 3) probabilistic deep learning , including Bayesian deep learning and deep probabilistic models, for data uncertainty modeling and for quantifying prediction uncertainty.

Hao Jiang

RESEARCH ASSOCIATE ABOUT

- San Francisco State University, Professor
- Ph.D. 2000, University at California San Diego (UCSD)
- Dates of Fellowship: 5/31/2022 – 8/5/2022
- Advisor: Thiem, Clare
- Contact Information: jianghao@sfsu.edu

SUMMER RESEARCH DESCRIPTION

- Motivation: Memristor crossbar array technology has been developed to build energy-efficient dot-product engine. The memristor's output currents, which represent the results of the analog computing, have very large dynamic range.
- Objective: Develop low-power circuit to normalize the output current and reduce its dynamic range.
- Collaborators: Helen Li (Duke Univ.) Qiangfei Xia (U. of Mass at Amherst), and Joshua Yang (U. of Southern California)

Research interests:

High-speed low-power analog and mixed signal integrated circuit design for high performance computing and other applications.

Qingtang (Quinton) Jiang

RESEARCH ASSOCIATE ABOUT

- University of Missouri- St. Louis, Professor
- Ph.D. 1992, Peking University
- Dates of Fellowship: 5/9/2022 – 7/29/2022
- Advisor: Dr. Erin Tripp
- Contact Information: iangq@umsl.edu,
<http://www.math.umsl.edu/~jiang/>

SUMMER RESEARCH DESCRIPTION

- Motivation: Classification of Signals/images
- Objective: Develop signal component decomposition and deep learning based methods for signal/image classification, such as normal/faulty bearings, types of vehicles, SAR images.

Research interests: Time-frequency analysis, signal classification, mathematical imaging, deep learning.

Kyumin Lee

RESEARCH ASSOCIATE ABOUT

- Worcester Polytechnic Institute, Associate Professor
- Ph.D. 2013, Texas A&M University
- Dates of Fellowship: 5/5/2022 - 7/13/2022
- Advisor: Dr. Lee Seversky
- Contact Information: kmlee@wpi.edu,
<https://web.cs.wpi.edu/~kmlee/>

SUMMER RESEARCH DESCRIPTION

- Motivation: The Air Force and military units collect various information over time to create intelligence reports. Sometimes, newly collected information and/or received intelligence report may contain fake/incorrect information.
- Objective: Design and develop an intelligent machine learning model, which can automatically determine whether newly collected information contain fake/incorrect information or not, especially, under “limited labeled” data available.

Research interests: information retrieval, natural language processing, social computing, machine learning, and cybersecurity over large-scale networked information systems like the Web and social media. My research focus has both positive and negative dimensions. On one hand, I focus on threats to these systems and design methods to mitigate negative behaviors (e.g., fake news detection and mitigation, fact verification, and hate speech detection); on the other, I look for positive opportunities to mine and analyze these systems for developing next generation algorithms and architectures that can empower decision makers (e.g., recommender system). I also focus on AI for social good (e.g., combating wildlife trafficking).

Sanjay Madria (faculty), Kyle Whitlatch (PhD student)

RESEARCH ASSOCIATE ABOUT

- Missouri S & T, Curators' Distinguished Professor
- Ph.D. 1995, IIT India
- Dates of Fellowship: 5/23/2022 – 8/12/2022
- Advisor: Drs Mark Linderman and Norm Ahmed
- Contact Information: madrias@mst.edu

SUMMER RESEARCH DESCRIPTION

- **Title:** Secure and Dynamic Provisioning of IoTs via Edge Computing and Blockchain
- **Objectives:**
 - Dynamically assign IoTs and edge devices based on user specification (security, QoS, cost)
 - Deliver IoT sensor and compute data securely and efficiently
 - Tolerate and autonomously recover from faults in the architecture.

Research interests: Combat Cloud, Big Data Management and Machine Learning, IoT and Cloud Security, Incentive-based Models and Security, Cloud-assisted Cyber-Physical Security, Secure Sensor Networks

Dr. Kamesh Namuduri

RESEARCH ASSOCIATE ABOUT

- University of North Texas, Professor, Electrical Engineering, University of North Texas
- B.Tech. in Electronics and Communications, Osmania University, Hyderabad, India
- M. Tech. in Computer Science and Engineering, Central University, India
- Ph.D. in Computer Science and Engineering, University of South Florida, Tampa, Florida
- Dates of Fellowship: 6/1/2022 - 8/24/2022
- Advisor: Dr. Amjad Soomro
- Contact Information: kamesh.namuduri@unt.edu

SUMMER RESEARCH DESCRIPTION

- Motivation: To make 5G broadband services truly ubiquitous – everywhere, anytime, and to everyone!
- Objectives: (1) Investigate a three-layer space-air-ground network as a solution to provide such a ubiquitous 5G broadband service. (2) Investigate the challenges through simulations, experiments, measurements and waveform analysis

Graduate Student

- John Lucas Welch, Master's student, Electrical Engineering, University of North Texas
- University of North Texas, Bs. in Electrical Engineering

Research interests: Advanced Air Mobility, Drone to Drone Communication, Aerial Base Stations, Orbital base Stations, and AI in Communications.

Nagarajan Prabakar

RESEARCH ASSOCIATE ABOUT

- Florida International University at Miami, FL, Associate Professor
- Ph.D. 1987, University of Queensland, Brisbane
- Dates of Fellowship: 5/4/2022 - 7/27/2022
- Advisor: Dr. Paul Alsing
- Contact Information: Prabakar@cis.fiu.edu , <https://www.cis.fiu.edu/faculty-staff/prabakar-nagarajan/>

SUMMER RESEARCH DESCRIPTION

- Motivation: Most financial, retail, and commercial transactions depend on database operations on transactional relational database systems. The exponential growth in online commerce, IoT systems, healthcare, etc., has increased the size of relational databases that require substantial processing time.
- Objective: Design quantum algorithms to expedite database operations.
- Participating student: Steven Valle

Research interests: Deep learning, anomaly detection in sequential data, computer vision, and quantum algorithms.

Dr. Michael J. Reale & Mr. Preston Nichols

RESEARCH ASSOCIATES ABOUT

➤ SUNY Polytechnic, Dept. of Computer Science, Utica, NY

➤ Dr. Reale (Faculty)

Position: Department Chair, CS Master's Program Coordinator, and Associate Professor

Highest Degree: Ph.D. in Computer Science, Binghamton University, 2014

➤ Mr. Nichols (Student)

Position: Master's Student in Computer Science

Highest Degree: B.S. in Computer Science (Accelerated B.S./M.S.), SUNY Polytechnic, 2021

➤ *Dates of Fellowship:* 6/6/2022 - 8/3/2022

➤ *Advisor:* Dr. Maria Cornacchia

➤ *Contact Information:*

realemj@sunypoly.edu, nicholpj@sunypoly.edu

SUMMER RESEARCH DESCRIPTION

➤ *Motivation:* Creating synthetic video can enable augmentation of small realistic datasets

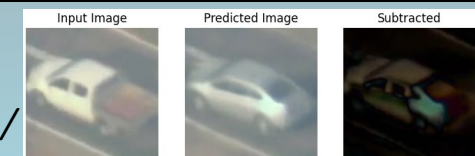
➤ *Previous work:* Leveraged generative adversarial networks (GANs) to transform cars into trucks (and vice versa) in satellite/drone imagery, while also running some preliminary erasure and in-painting experiments. Introduced unique constraints and loss terms, adaptive data augmentation, and preliminary work on context consistency

➤ *Objectives:* 1) enhance the quality of our object generation and in-painting results, 2) improve upon our existing image translation architectures, and 3) adapt our approaches to dynamic data, with particular care to enforce object consistency and reduce artifacts across video frames



Dr. Reale's research interests: automatic multimodal facial activity analysis, retinal image analysis, computer vision, deep / machine learning

Mr. Nichols' research interests: deep / machine learning, natural language processing /



Houbing Herbert Song

RESEARCH ASSOCIATE ABOUT

- Embry-Riddle Aeronautical University, Associate Professor
- Ph.D. 2012, University at Virginia
- Dates of Fellowship: 5/4/2022 - 7/26/2022
- Advisor: Dr. Alvaro Velasquez
- Contact Information:
Houbing.Song@erau.edu, <http://www.songlab.us/>

SUMMER RESEARCH DESCRIPTION

- Motivation: Due to the totally different internal structures of deep neural networks (DNNs) and software programs, there exists a definite gap between deep learning testing and software testing.
- Objective: To develop a coverage-guided differential adversarial machine learning framework to guide deep learning systems to expose incorrect behaviors.

Research interests: Transfer Learning, Reinforcement Learning, Anomaly Detection

K. Subramani

RESEARCH ASSOCIATE ABOUT

- Professor, West Virginia University.
- Ph.D., Computer Science, University of Maryland, College Park, 2000.
- Dates of Fellowship: 5/12/2022 - 8/5/2022.
- Advisor: Dr. Alvaro Velasquez.
- Contact Information: k.subraman@mail.wvu.edu.

SUMMER RESEARCH DESCRIPTION

- d -distance matching problem in bipartite graphs.
- Balanced graph partition.
- Tree Augmentation.
- Verification certificates.
- Simple stochastic games.

Research interests: Computational Logic, Combinatorial Optimization, Theoretical AI and Data Science.

Group members: Sangram Jena (Postdoctoral Associate), Jacob Restanio (Doctoral Student), Cody Klingler (Master's student).

Dmitry Uskov

VISITING RESEARCH FACULTY ABOUT

- Brescia University, prof. of Physics and Mathematics, Tulane University Physics Dep., Research professor.
- PhD. Moscow Inst. of Physics & Technology 1985.
- Dates of Fellowship: May 23 - Aug 12, 2022.
- Dr. Paul Alsing
- Email: dmitry.uskov@brescia.edu

SUMMER RESEARCH DESCRIPTION

- Title: Realization of Quantum Control of Multipartite Entangled States Through Topological and Geometric Protocols.
- The focus of my research is on quantum control of tripartite entanglement, geometric properties of projective spaces of entanglement parameters and generalization of control protocols to non-unitary dynamics including Weak Measurements.
- Collaborators:
Tulane University, New Orleans LA
Oak Ridge National Laboratory, Oak Ridge TN
LSU, Baton Rouge LA

My original field of specialization after PhD in 1985 was theory of atomic collisions in application to X-Ray Lasers, X-Ray Solar Spectroscopy and Astrophysics. In 2001 I have adiabatically immigrated to the US and in 2004 my research interests shifted to Quantum Information Theory when I was working with Jonathan Dowling and Ravi Rau at LSU. In 2010-2015 my work on numerical optimization of quantum optical computation schemes in collaboration with Lev Kaplan from Tulane University and Paul Alsing from AFRL was funded by NSF grant # 1005709. I have academic appointment as assistant professor of physics and mathematics at Brescia University where I am also serving as a director of 2+3 engineering program.

Yonghui Wang

RESEARCH ASSOCIATE ABOUT

- Prairie View A&M University, Assistant Professor
- Ph.D. 2003, Mississippi State University
- Dates of Fellowship: 5/23/2022 - 7/15/2022
- Advisor: Dr. Alfredo Vega Irizarry
- Contact Information: yowang@pvamu.edu, 936-261-9863, P. O. Box 519 MS 2515, Prairie View, TX 77446

SUMMER RESEARCH DESCRIPTION

- Motivation: Research on finding an effective feature extraction method for deepfake detection
- Objective: To research on the current status of deepfake creation as well as detection technologies and to design an effective deepfake detection method.

Research interests: My research interests include image processing, computer vision, data compression, wavelet application, etc.

Jie Wei

RESEARCH ASSOCIATE ABOUT

- Dept. of Computer Science, City College and Graduate Center, The City University of New York, Professor
- Ph.D. 1999, Simon Fraser Univ., Burnaby, BC, Canada
- Dates of Fellowship: 5/23/2022 – 7/15/2022
- Advisor: Dr. Alexander Aved
- Contact Information: jwei@ccny.cuny.edu, <http://www-cs.ccny.cuny.edu/~csjie>

SUMMER RESEARCH DESCRIPTION

- Motivation: The importance of situational assessment and awareness (SAAW) becomes increasingly evident for military operations in today's warfare and humanitarian assistance and disaster response (HADR), such as battlefield awareness, disaster assessment, critical region monitoring, and surveillance control. It is of crucial importance to develop Artificial Intelligence and Machine Learning (AI/ML) methods that are efficient, robust and explainable
- Objective: we will theoretically model four subsystems, namely, Sensor Parameter Model (SPM), Exploratory Data Analysis (EDA), Back-end Deep Learning (BDL) and Front-end Data Classification (FDC) to produce an efficient, robust and explainable AI/ML system.

Research interests: signal processing, image processing, computer vision, machine learning, multi-modal computing, medical computing

Shucheng Yu

RESEARCH ASSOCIATE ABOUT

- Stevens Institute of Technology, Associate Professor
- Ph.D. 2010, Worcester Polytechnic Institute
- Dates of Fellowship: 5/31/2022 - 7/29/2022
- Advisor: Dr. Laurent Njilla
- Contact Information: shucheng.yu@stevens.edu

SUMMER RESEARCH DESCRIPTION

- Motivation: Efficient and robust data dissemination in distributed systems is a challenge when Byzantine failures and attacks are considered. Based on our previous research, this project aims to design a novel data dissemination mechanism including anchor-based information-centric networking, efficient information coding and distributed anchor election.
- Objective: To have a complete design of the proposed mechanism and conduct preliminary simulation.

Research interests: Data and Information Security, Applied Cryptography, Machine Learning Security and Privacy, Wireless Networking and Security

Dakai Zhu

RESEARCH ASSOCIATE ABOUT

- The University at Texas at San Antonio (UTSA), Professor
 - Department of Computer Science
- Ph.D. 2004, University at Pittsburgh
- MS, 1999, Tsinghua University, China
- BS, 1996, Xi'an Jiaotong University, China
- Dates of Fellowship: 5/23/2022 - 7/29/2022
- Advisor: Dr. Steven Drager
- Contact Information: Dakai.Zhu@utsa.edu, <http://www.cs.utsa.edu/~dzhu>

SUMMER RESEARCH DESCRIPTION

- Motivation: **Heterogeneous computing platforms** that integrate different processing units (e.g., multicores and GPUs) with shrinking technology sizes provide more opportunities to support resilient operations of **safety-critical embedded systems**, but also introduce increased complexity considering their various features in performance, security, reliability and energy usage.
- Objective: Investigate and develop **efficient and robust learning techniques** to support resilient operations of safety-critical embedded systems running on heterogeneous computing platforms while considering the intriguing interplay of their requirements in **security, reliability, timeliness, resource and energy efficiency**.

Research interests: Real-Time Embedded Systems, Parallel and Distributed Systems, Mixed-Criticality Systems, Low-Power and Energy-Efficient Computing, Fault-Tolerance and Dependable Computing, Cloud Computing Performance Modeling and Prediction, Internet of Things (IoTs), and AI/ML based anomaly detection; Scheduling theory, modeling and algorithm design for better performance, energy efficiency and system dependability.