

VAMSI SAI KALASAPUDI, Ph.D.

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Dedicated instructor with experience in teaching civil engineering/construction management courses and research specialization in construction data analytics and structural health monitoring. Expertise in computer vision and 3D imaging of various infrastructure facilities. Previous research/consulting experiences and research interests include working knowledge of:

- Construction Automation & Mobile Applications
- Virtual & Augmented Reality in BIM
- Spatiotemporal 2D/3D Imaging Data Analysis
- Adaptive Quality Assessment & Control (QA/QC)
- Machine Learning and Predictive Analysis
- Sensor-based Structure Health Monitoring

EDUCATION

Doctor of Philosophy in Civil, Environmental, and Sustainable Engineering (Specialization in Construction Engineering) (May 2017), Arizona State University

Committee: Pingbo Tang (Chair), Keith Hjelmstad, Oswald Chong

Dissertation: Automatic Change-based Diagnosis of Structures using Spatiotemporal Data and Model

The dissertation focuses on developing algorithm for automating visual data (photos, videos, and laser scanner point cloud data) collection, processing, and interpretation for effective construction/infrastructure change management of large civil infrastructure facilities such as bridges, buildings, water tanks, etc. to rapidly identify correlations among various spatial changes occurring on structures. Such correlations that are automatically visualized by the algorithms can help engineers in detecting defective parts based on anomalous change patterns (e.g., settlements of the foundation would happen together with a series of deformations of bridge elements).

Masters of Construction Engineering (In Passing), Arizona State University

Bachelor of Technology, Civil Engineering (May 2013), National Institute of Technology, Durgapur, India

PROFESSIONAL APPOINTMENTS

- **Visiting Instructor**, Moss School of Construction, Florida International University, Miami, U.S.A. (August 2017 – Present)
- **Academic Advisor and Co-founder**, Avvir, New York, U.S.A. (August 2017 – May 2018)
- **Research Associate**, School of Sustainable Engineering and Built Environment, Arizona State University, Tempe, U.S.A. (May 2017 – August 2017)
- **Graduate Research Associate**, School of Sustainable Engineering and Built Environment, Arizona State University, Tempe, U.S.A. (January 2014 – May 2017)
- **Graduate Teaching Assistant**, School of Sustainable Engineering and Built Environment, Arizona State University, Tempe, U.S.A. (January 2015 – December 2016)
- **Research Assistant**, Ocean Engineering Department, Indian Institute of Technology, Madras. (December 2010 – Jul 2012)

PUBLICATIONS

Journals (Published)

- **V.S. Kalasapudi**, P. Tang, Y. Turkan, Computationally efficient change analysis of piece-wise cylindrical building elements for proactive project control, *Automation in Construction*. (2017) 0–1. doi: 10.1016/j.autcon.2017.04.001.
- Zhang, C., **V.S. Kalasapudi**, & Tang, P. (2016). Rapid data quality oriented laser scan planning for dynamic construction environments. *Advanced Engineering Informatics*, 30(2), 218–232. doi:10.1016/j.aei.2016.03.004
- **V.S. Kalasapudi**, P. Tang, W. Xiong, Ying Shi, (2018) A Multi-Level 3D Data Registration Approach for Supporting Reliable Spatial Change Classification of Single-Pier Bridges. *Advanced Engineering Informatics*. (2018). doi:10.1016/j.aei.2018.06.010

Journals (In Review)

- **V.S. Kalasapudi**, P. Tang, Chen. J., Reducing the Search Space of Structural Condition through Qualitative Spatial Change Reasoning based on 3D Imagery Data. (2017)

Conference Publications (Published)

- **V.S. Kalasapudi**, P. Tang, A Robust Registration Algorithm for Automatic and Reliable Geometric Change Detection of Bridges using 3D Laser Scanning Data, in: 11th International Bridge & Structure Management Conference, 2017: pp. 1–2.
- **V.S. Kalasapudi**, Y. Turkan, P. Tang, Toward Automated Spatial Change Analysis of MEP Components Using 3D Point Clouds and As-Designed BIM Models, in: 2014 2nd International Conference on 3D Vision, IEEE, 2014: pp. 145–152. doi:10.1109/3DV.2014.105.
- **V.S. Kalasapudi**, & Tang, P. Automated Spatial Change Detection and Control of Curvilinear Building Components Using 3D Laser Scanning Data. In *Construction Industry Institute (CII) Annual Conference 2015*, Boston, MA.
- **V.S. Kalasapudi**, P. Tang, C. Zhang, J. Diosdado, R. Ganapathy, Adaptive 3D Imaging and Tolerance Analysis of Prefabricated Components for Accelerated Construction, *Proceeding of the 3rd International Conference on Sustainable, Design, Engineering, and Construction (ICSDEC 2014)*. (2014) (in press).
- **V.S. Kalasapudi**, P. Tang, Du. J, Automatic Correlated Vibration Pattern Analysis for Rapid Remote Assessment of Civil Infrastructures, in: *Proceedings of the 2016 Construction Research Congress – Old and New Construction Technologies Convene in a Historic Setting*, 2016: pp. 1–10. doi:10.1061/9780784479827.083.

- **V.S. Kalasapudi**, P. Tang, Condition Diagnostics of Steel Water Tanks Using Correlated Visual Pattern, in: 5th International Construction Specialty Conference, ICSC15 – The Canadian Society for Civil Engineering’s 5th International/11th Construction Specialty Conference, 2015. doi:10.14288/1.0076341.
- **V.S. Kalasapudi**, P. Tang, Automated Tolerance Analysis of Curvilinear Components Using 3D Point Clouds for Adaptive Construction Quality Control, in: Computing in Civil Engineering 2015, American Society of Civil Engineers, Reston, VA, 2015: pp. 57–65. doi:10.1061/9780784479247.008.
- **V.S. Kalasapudi**, R.Durga Prasad, K.Ganesh Babu, C.lakshman Rao, “Evaluation Of The In Service Thermal Cycling Effects On The Fast Breeder Reactor Containment Concretes,” *Transactions*, SMiRT-22, San Francisco, California, USA - August 18-23, 2013.
- **V.S. Kalasapudi**, R.Durga Prasad, K.Ganesh Babu, C.lakshman Rao, “Effects of Thermal Cycling on the Mechanical Properties of Concrete,” Indian Conference on Applied Mechanics (INCAM) 2013 IIT Madras, 4 – 6 July 2013.
- Shi. Y, Xiong. W, **V.S. Kalasapudi**; Geng. C, Zhang. C, Tang. P., “Automated Change Diagnosis of Single-Column-Pier Bridges Based on 3D Imagery Data.” *Computing in Civil Engineering* 2017,91-98
- J. Chen, **V.S. Kalasapudi**, P. Tang, W. Xiong, Characterizing Point Cloud Data Quality for Reliable Spatial Change-based Maintenance Planning of Civil Infrastructures

Conference Publications (In Progress)

- S. Subedi, **V.S. Kalasapudi.**, N. Pradhananga, Spatial Change Tracking of Structural Elements of a Girder Bridge under Construction Using 3D Point Cloud

Magazine Publications

- Tang, P., **V.S. Kalasapudi.**, Zhang, C., (2016) “ASU Researchers Bridging Gaps in Infrastructural Maintenance.” State Press, Published on 09-05-2016
- Tang, P., **V.S. Kalasapudi.** (2015) “Automatic Diagnosis of Civil Infrastructures using Correlated Visual Changes in LiDAR Data.” *LiDAR Magazine*, Vol. 5 No. 6.
- Tang, P., Zhang, C., and **V.S. Kalasapudi.** (2015) “Real-Time LiDAR Data Collection Planning Method.” *LiDAR Magazine*, Vol. 5 No.7.

PATENT

Tang, Pingbo., & **Kalasapudi, Vamsi Sai.**, "Systems and Methods for **Automated Spatial Change Detection** and Control of Buildings and Construction Sites using **Three-Dimensional Laser Scanning Data**," U.S. Patent No. 62/327,930, April 26, 2016. Status: *Under Review*

Highlights

- Spatial relationships between building objects assist reliable change detection.
- Neighborhood searching has limitations when analyzing changes of packed pipes.
- A relational-graph-based approach can augment neighborhood searching.
- The hybrid approach can achieve both computational efficiency and precision.

RESEARCH PRESENTATIONS

- A Robust Registration Algorithm for Automatic and Reliable Geometric Change Detection of Bridges using 3D Laser Scanning Data, in: 11th International Bridge & Structure Management Conference, 2017
- “Automated Spatial Change Detection and Control of Curvilinear Building Components Using 3D Laser Scanning Data”. In Construction Industry Institute (CII) Annual Conference 2015, Boston, MA.
- “Automated Tolerance Analysis of Curvilinear Components Using 3D Point Clouds for Adaptive Construction Quality Control.” 2015 ASCE Workshop of Computing in Civil Engineering, June 21-23, 2015, Austin, TX, USA.
- “A Structural Model Simplification and Imagery Reduction Framework for Real-time Scour Length Monitoring of Bridges.” International Conference on Sustainable Design, Engineering, and Construction, Tempe, AZ, USA, 18 – 20 May 2016.
- “Condition Diagnostics of Steel Water Tanks Using Correlated Visual Pattern,” in: 5th International Construction Specialty Conference, ICSC15 – The Canadian Society for Civil Engineering’s 5th International/11th Construction Specialty Conference, 2015.

PROPOSAL WRITING

- “NSF I-Corps Customer Discovery Grant: To develop Scientific and Engineering Discoveries into Technologies” PI: Vamsi Sai Kalasapudi, Pingbo Tang; *Status: Awarded \$2000.*
- “Real-time Video-driven Structural Systems Identification for Scour Damage Monitoring,” PI: Pingbo Tang; *Status: Submitted*

PROFESSIONAL ACTIVITIES AND SERVICES

- Student Organizer: [ICSDEC 2016](#)
- Peer Reviewer for several journals (Elsevier (Auto CON), ASCE (JCEM, JCCE), Wiley (CACAIIE))
- Member: IWCCE 2017 Poster Evaluation Committee

TEACHING EXPERIENCE

Courses Taught:

Two graduate courses and four undergraduate courses since joining FIU. (Description of Unit Rating Scale: 1-5 where 5 is the best)

Course Prefix, Number, Title	Term/Year	No. of Students	Student Evaluation
BCN 1013 Principles of Construction Management	Fall 2018	60	4.66
BCN 4612 Construction Cost Estimating II	Fall 2018	35	4.55

BCN 3727 Construction Site Work and Equipment	Summer 2018	36	4.64
BCN 4612 Construction Cost Estimating II	Spring 2018	15	3.88
BCN 3611 Construction Cost Estimating I	Spring 2018	42	3.83
BCN 5772 Management of Construction Organizations	Fall 2017	25	4.24
BCN 5783 Construction Information Systems	Fall 2017/2018	21	4.15

Faculty

Florida International University,

August 2017 – Present

Teaching and developing course material for graduate and undergraduate courses that includes:

- Teaching **Construction Cost Estimating I & II** as a part of fundamental construction management practices for understanding the basic principles of estimating construction projects
- Teaching **Building Information Modeling** as a part of Virtual Design & Construction of an educational building
- Teaching **Principles of Construction Management, Management of Construction Organizations** for recognizing the operations and functioning of a construction company

Teaching Assistant

Arizona State University, Course Advisor: Dr. Pingbo Tang

January 2015 – December 2016

Taught and managed an undergraduate course “**Microcomputer Applications for Construction**” for 2+ years which includes:

- Teaching computer applications such as **Excel, Access, Bluebeam, Revit, AutoCAD, Navisworks**, etc.
- Developing several education modules, Taught classes, Course database management, Graded assignments, Held office hours

Instructor (High School Student Outreach Program)

Arizona State University, Course Advisor: Dr. Pingbo Tang

June 2016 to July 2016

Developed, taught and managed the STEM outreach program for high school students on “**Detecting Anomalous Change in Civil Infrastructures**” which includes

- Developing education modules and coordinated with the STEM outreach program manager
- Teaching selected high schools students about importance of STEM programs in day-to-day life scenarios
- Conducting a hands-on interactive learning module that helps students to collect data using 3D laser scanner

Grader, Microcomputer applications for Construction

Arizona State University, Course Advisor: Dr. Pingbo Tang

January 2014 to May 2014

- Graded assignments, Managed Course Materials, Held Office Hours

CURRENTLY ACTIVE RESEARCH PROJECTS

- Spatial Change Tracking of Structural Elements of a Girder Bridge under Construction Using 3D Point Cloud, PI's: Vamsi Sai Kalasapudi, Nipesh Pradhananga
- Rapid Remote Assessments of Structural Vibrations using Correlated Vibration Patterns Captured using High Frequency Video Cameras, PI's: Vamsi Sai Kalasapudi, Nipesh Pradhananga
- Spatiotemporal Network Analysis for Adaptive Tolerance Checking of Prefabricated Building Elements, PI's: Vamsi Sai Kalasapudi, Nipesh Pradhananga

RESEARCH EXPERIENCE

Graduate Research Associate

Arizona State University, Advisor: Dr. Pingbo Tang

January 2014 – August 2017

Coordinated multiple research projects on **Computer Vision** and **LiDAR-data** based construction applications that include:

- **Automation of LiDAR data collection, analysis and interpretation procedures** of spatiotemporal visual data of civil infrastructures such as bridges, water tanks, buildings, and parking structures for infrastructure change management (*NSF CAREER: Risk Monitoring of Civil Infrastructures Using Correlated Change Patterns in Spatiotemporal Data*)
- **Geometric data collection** of civil infrastructure facilities such as buildings, bridges, water tanks using **total station, GPS sensors, and RFID data** tags for conducting detailed geometric QA/QC
- **Forensic analysis** of several highway bridges by integrating and analyzing 2D/3D visual data, metadata from field investigations (Data from **total station and GPS sensors**), and design data
- **Video data-driven** structural component tracking for detecting **vibration patterns** of concrete highway bridges
- Automatic **3D point cloud data reconstruction** for quality assessment of mechanical building components
- Pre/Post processing of **large point cloud data sets** that include registration, **geo-referencing**, and **CAD modeling**
- Annual deformation tracking of structural elements using **Spatiotemporal LiDAR data**
- **Change/Clash detection** between design & as-built models generated using **ClearEdge^{3D} EdgeWise** on MEP components
- **As-built modeling for quality control (QA/QC)** of building systems using **3D laser scanners** and BIM models and 2D/3D geometric data analytics for **data quality assessment**
- Annual **data collection, visualization and pattern analysis** of the deformation of a bridge girder
- Automated **tolerance analysis** of MEP components using 3D point clouds for adaptive **construction quality control**

Research Assistant

Department of Ocean Engineering, IIT Madras

December 2010 – Jul 2012

- **Numerical modeling** for estimating the core compressive strength of reinforced concrete
- Geometric data collection of several concrete samples across Pondicherry region of Tamil Nadu, India
- Analysis of concrete strength using **statistical data analysis**, Creating **data visualization** tools using MATLAB
- **Cyclic wetting and drying** of fast breeder reactor containment concrete and its effect on dynamic shear and Young's modulus
- Effect of silica fume in concrete and methods to improve core compressive strength of reinforced concrete containing silica fume
- **Destructive and nondestructive** testing of reinforced concrete from an under-construction oil refinery in Pondicherry, India

INDUSTRY EXPERIENCE

Co-Founder and Academic Advisor

Avvir

August 2017 – May 2018

Automated Construction Verification Service Company located in New York

- **Co-founder** and academic advisor
- **Head of 3D Laser Scanning operations**
- **Managed a team of 3-4 3D laser scanning data processors** for conducting automated **construction verification**

Highway Maintenance Project using 3D Imaging technology in China

- Construction **quality control** of an arch bridge using **3D Laser Scan data** (Design vs. built)
- Conducted **long-term deformation monitoring** of numerous single-pier bridges located in China and USA.
- **Pre/Post processing of large point cloud data sets** that include registration, geo-referencing, and CAD modeling

Laser Scanning Consultant

DPR Construction, Advisor: Dr. Pingbo Tang

January 2015 - February 2015

Collaboration with the **Virtual Construction Team** at DPR for Accelerated Construction Projects

- CAD modeling from **3D point cloud data and tolerance analysis** of prefabricated building components
- Conducted **automated spatial change detection** between design BIM models and 3D laser scan models

Laser Scanning Consultant

HDR Inc., Advisor: Dr. Pingbo Tang

October 2014 -November 2014

City of Phoenix Steel Tank Program

- Collected **3D laser scan data of two steel water tanks** located in Phoenix, AZ
- Conducted **construction quality assessment** studies using the collected 3D scans and design models of the water tank

RELEVANT COURSES

- Information Technology in Construction, Construction Project Management, Sensing and Modeling in Construction, Construction Productivity
- Structural Damage Evaluation, Stress Analysis, Structural Dynamic, Pre-stressed Concrete
- Graph Theory, Introduction to Statistics using MATLAB
- Introduction to Digital Image Processing

CERTIFICATIONS AND TRAINING

Confined Space Entry Training Certificate from United Academy, October 2014

TECHNICAL SKILLS

- BIM tools: Revit, Navisworks, Tekla BIMsight, Bluebeam, AutoCAD
- LiDAR Data Processing Tools: Faro Scene, ClearEdge^{3D} EdgeWise, Leica Cyclone, Cloud Compare, Autodesk Recap, Bentley Point tools, Realworks, 3ds Max
- Programming Languages: Python, R, SQL
- Computational Tool: MATLAB
- Design and Analysis Software: MIDAS, ABAQUS, Arc GIS/MAP, STAAD. Pro, SAP, ANSYS, MSC NASTRAN

HONORS AND AWARDS

- **Graduate Student Fellowship**, National Science Foundation (January 2015) for Risk Monitoring of Civil Infrastructures Using Correlated Change Patterns in Spatiotemporal Data
- **Customer Discovery Grant** (April 2017), ASU's NSF I-Corps Site Program
- **Outstanding Merit Scholarship** (top 3%) for academic excellence for the year 2005
- **National Math's Olympiad** first position, conducted by Talent Search Institute consecutively for the years 2001, 2002