Jacob Je-Chian Lin

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EDUCATION

UNIVERSITY OF ILLIOIS, URBANA-CHAMPAIGN (UIUC)

Ph.D. in Civil and Environmental Engineering   August 2020
  Dissertation Title: "Visual and Virtual Production Management
                System for Proactive Project Controls on
                Construction Projects"
  Dissertation Advisor: Prof. Mani Golparvar-Fard
M.S. in Computer Science   May 2018
  Dissertation Title: "The Design of Human-Information Interfaces
                for Visual Production Management in
                Construction"
  Dissertation Advisor: Prof. Wai-Tat Fu (Computer Science)
                Prof. Mani Golparvar-Fard (Civil Eng.)

NATIONAL TAIWAN UNIVERSITY

M.S. in Civil and Environmental Engineering   July 2013
B.S. in Civil and Environmental Engineering   July 2010

RESEARCH EXPERIENCES

Research Assistant   Aug. 2014 - present
 Advisor: Dr. Mani Golparvar-Fard, UIUC

- Conducted and led research on predictive visual data analytics using Computer Vision and Machine Learning techniques for improving *performance monitoring*, *risk analysis* and *project controls*.
- Developed construction performance metrics that measure risk around work breakdown structure locations, asses reliability of weekly work plan and master schedule and support root cause assessment on plan failure in task and project level.
- Developed a deep learning architecture to detect and classify state of work-in-progress using fused Structure-from-Motion geometrical features together with directional and radial appearance features.
- Developed and implemented a Visual Production Management System (jointly present 4D reality and planned models) for *project controls* and its synergy with lean construction to improve communication, coordination and planning.
- Conducted and led research on automation of 4D BIM using Natural Language Processing and Cloud-Based Computing to develop an end-to-end solution that analyzed schedule tasks and broke down BIM models to automated mapping corresponding elements.
- Conducted and led research on the user interface and experience design of visualizing risk and performance with workflow coordination using visual tools to minimize the resistance of introducing new technologies in construction.

- Conducted research on automated indoor progress monitoring utilizing ground robots to map indoor construction sites in real time using an integrated platform with LiDAR, Kinect and 360 camera.
- Developed an automated visual data collection framework using UAVs to support a complete/accurate point cloud reconstruction.

Visiting Scholar   Aug. 2012 – Jul 2013

Advisor: Dr. Ken-Yu Lin, University of Washington

- Conducted research on a user-centered construction safety inspection tool to improve day-to-day practices and management for safety hazard prevention.
- Developed and evaluated an iPad application for auditing safety violations in construction sites.
- Developed and maintained a fall protection training game developed in Unity 3D for non-English speaking and illiterate construction workers with OSHA.

Research Assistant   Aug. 2008– Jul 2012

Advisor: Dr. Shih-Chung Kang, National Taiwan University

- Conducted and led research on optimization of construction equipment logistics using Motion Planning in Robotics for improving site layout planning and construction equipment management.
- Conducted and led research on using game engines to simulate a composite hazard walkthrough system for enhancing disaster mitigation awareness and developed a game system in Unity 3D.
- Conducted research on simulation of tandem and triple crane lifts using Motion Planning in Robotics for improving planning and preventing safety issues and developed the crane simulation system using Microsoft XNA
- Conducted research on 4D BIM simulation for heavy civil infrastructure project with CTCI corp.

INDUSTRY EXPERIENCES

Lead VDC+Lean Manager   Aug. 2017 - present

Reconstruct Inc., Champaign Research Park, IL

- Developed the workflow to fully integrate the Reconstruct system into traditional project control methods by streamlining the process of progress reporting, delay analysis, potential risk management and schedule updates.
- Developed the risk management system to answer: (1) Will all ongoing activities finish on time? (2) Will all upcoming activities start on time? And (3) What are the at-risk locations for delay?
- Provide VDC related support for 10+ over hundred million projects including: (1) reviewing quality of BIM, reality models for Reconstruct integration; (2) developing 4D BIM for constructability analysis; (3) analyzing long/short term schedule deviation and delay root-causes and (4) evaluating progress data for schedule prediction.

Lead Visualization Manager   Aug. 2015 - Jul. 2017

Reconstruct Inc., Champaign Research Park, IL

- Developed the web-based viewer prototype that visualizes point clouds and BIMs in a timeline with a schedule and analyzes the reliability of the Weekly Work Plan in a color-coded model.
- Led the development of 4D BIM, schedule updates, planning and visualization, progress tracking app, productivity data analytics, long/short term plans alignment and report generation
- Established national guidelines for drone safety on construction sites for multiple

Safety Inspector Intern   Feb. 2013 – Jul. 2013

SD Deacon, Seattle, WA

- Responsible for safety inspections for 10+ projects and conducted weekly site walks to audit safety violations.
- Introduced new technologies to enhance the efficiency of the safety inspection process.

Substitute Military Officer   Aug. 2013 – Aug. 2014

Water Resource Agency, Taipei, Taiwan

- Responsible for flood monitoring and notifying potential at-risk areas during heavy rain and typhoon alerts.
- Was part of the national disaster response team during typhoon alerts.
- Translated scientific papers and articles to help develop government policies related to water resources.

TEACHING EXPERIENCES

Teaching Assistant   Jan. 2018 – May. 2018

CS 465 User Interface Design, Department of Computer Science, UIUC

- Lectured "Wireframing" session
- Guided students to finish their final project of designing a product user interface and user experience

Teaching Assistant   Aug. 2018 – Dec. 2018
                                                                 Jan. 2019 – May 2019

CEE 320 Construction Engineering and Management, Department of Civil and Environmental Engineering, UIUC

- Lectured "Preliminary Estimating" and "Project Financing I" sessions
- Designed and graded assignments and quizzes

Teaching Assistant   Jan. 2016 – May 2016

CEE 598 Building Information Modeling (graduate-level), Department of Civil and Environmental Engineering, UIUC

- Taught multiple hands-on sessions on Autodesk Revit, Navisworks and Synchro
- Guided students to finish their request for bidding projects in a Virtual Design and Construction aspect

Teaching Assistant   Jan. 2015 – May 2015

CEE 598 Visual Sensing for Civil Infrastructure Engineering and Management (graduate-level), Department of Civil and Environmental Engineering, UIUC

- Introduced state-of-the-art research resources to students for their projects.
- Helped students with programming for assignments and projects.

- Taught multiple MATLAB sessions and introduction to object recognition.

Tutor   Aug. 2006 – Aug. 2007

 Private, Taipei, Taiwan

- Taught Physics and Math to high school students

AWARDS/HONORS

Winners of World Economic Forum - Future of Construction Ideas Competition, *World Economic Forum*	Feb., 2017
2016 CMAA Chicago Chapter Scholarship, *Construction Management Association of America.*	May, 2016
2016 William E. O'Neil Research Award, *W.E. O'Neil Construction.*	Aug., 2016
Best Paper Award*, 2015 ASCE International Workshop on Computing in Civil Engineering*.	Jun., 2015
University of Illinois Civil and Environmental Engineering Fellowship, *UIUC Department of Civil and Environmental Engineering*	Aug., 2014
Inducted Member*, Tau Beta Pi the Engineering Honor Society*	Dec., 2014
Honored Member, *Phi Tau Phi Scholastic Honor Society of Republic of China.*	Jun., 2013
Award of Engineering Technology, *China Engineering Consultants Inc.*	Jun., 2011
Award of Innovation Competition, *National Taiwan University*	Jun., 2011
Award of Student Engineering Paper Competition, *Chinese Institute of Engineers*	Jun., 2010

OFFICIAL REVIEW SERVICES

Reviewer, *ASCE Journal of Construction Engineering and Management*	Feb. 2018 - present
Reviewer, *Elsevier Automation in Construction*	Nov. 2018 - present
Reviewer, *ASCE Journal of Computing in Civil Engineering*	Oct. 2014 – present
Reviewer, *2016 Construction Research Congress*, May 31-Jun.2 2016, San Juan, Puerto Rico.	2015

PUBLICATIONS

Refereed Academic Journals Published and Under Review

5   **Lin, J.J.**, and Golparvar-Fard, M. (under review: submitted in Dec, 2019) "A Visual and Virtual Production Management System For Proactive Project Controls," *Journal of Construction Engineering and Management*.

4   Ham, Y., Han, K., **Lin, J.J.**, and Golparvar-Fard, M. (2015) "Visual Monitoring of Civil Infrastructure Systems via Camera-Equipped Unmanned Aerial Vehicles (UAVs): A Review of Related Works," *Springer Journal of Visualization in Engineering*.

3   **Lin, J.J-C.**, Hung, W. H. and Kang, S.C. (2014) "Motion Planning and Coordination of Mobile Construction Machinery," *Journal of Computing in Civil Engineering*.

2   Lin, K.Y., Tsai, M. H., Gatti, U.C., **Lin, J.J-C.**, Lee, C.H. and Kang, S.C. (2014) "Developing an Information and Communication Technology Tool to Improve Safety Inspections: A User-Centered Approach," *Automation in Construction*.

1   **Lin, J.J-C.**, Yang, C.E., Hung, W. H. and Kang, S.C. (2013) "Accessibility Evaluation System for Site Layout Planning - A Tractor Trailer Example," *Springer Journal of Visualization in Engineering*.

Refereed Academic Journals in Preparation

4   **Lin, J.J.**, and Golparvar-Fard, M. (to be submitted by Feb. 15, 2020 – draft completed). "Predictive Schedule Analytics for Proactive Construction Project Control," *Journal of Computing in Civil Engineering*

3   **Lin, J.J.**, and Golparvar-Fard, M. (in preparation). "Training Deep Networks for Material and Geometry Recognition with Synthetic Data: BIM-Driven Monitoring of Construction Progress Via Site Images," *Automation in Construction*

3   **Lin, J.J.**, Ibrahim, A. and Golparvar-Fard, M. (in preparation). "Robotic Visual Data Collection, 3D Analysis, and Automated Report Generation for Bridge Inspection," *Journal of Computing in Civil Engineering,*

1   Liu, K., **Lin, J.J.**, Wang, Y., Chen, J., Tang, P., El-Gohary, N., Golparvar-Fard, M. Berges, M., Zhang, J. Cai, H. (in preparation). "Big Data Analytics in the Construction Industry: Opportunities and Challenges", *Journal of Computing in Civil Engineering,*

Refereed Conference Proceedings (*International Collaboration)

13   **Lin, J.J**. Lee, J. and Golparvar-Fard, M. (2019). Exploring the Potential of Image-based 3D Geometry and Appearance Reasoning for Automated Construction Progress Monitoring, *The 2019 ASCE International Conference on Computing in Civil Engineering*, Atlanta, U.S., June 17-19, 2019.

12   **Lin J.J.**, Golparvar-Fard M. (2018) Visual Data and Predictive Analytics for Proactive Project Controls on Construction Sites, *EG-ICE 2018: 25th International Workshop on Intelligent Computing in Engineering*, Lausanne, Switzerland, June 10-13, 2018.

11   **Lin, J.J**. and Golparvar-Fard, M. (2017). Proactive Construction Project Controls via Predictive Visual Data Analytics, *IWCCE 2017: The International Workshop on Computing in Civil Engineering*, Seattle, U.S., June 25-27, 2017.

10   **Lin, J.J.**, and Golparvar-Fard, M. (2017). "Proactive Project Controls Driven by Ambient As-Built and Plan Visual Data," *International Conference on Civil and Building Engineering Informatics (ICCBEI 2017)*, Taipei, Taiwan, April 22-24.

9   **Lin, J**. and Golparvar-Fard, M., (2016). Web-based 4D Integrated Project Models for Tracking Work-In-Progress and Information Communication on Construction Sites, *2016 Construction Research Congress*, San Juan, Puerto Rico, May 31 - Jun. 2, 2016

8   **Lin, J.J**., Han, K. and Golparvar-Fard, M. (2015). A Framework for Model-driven Collection of Big Visual Data using UAVs for Automated Construction Progress Monitoring, *IWCCE 2015: The International Workshop on Computing in Civil Engineering*, Austin, U.S., June 21-23. **DSA Best Paper Award**

7   Han, K., **Lin, J.J.**, and Golparvar-Fard, M. (2015) "A Formalism for Utilization of Autonomous Vision-Based Systems and Integrated Project Models for Construction

Progress Monitoring," *2015 Conference on Autonomous and Robotic Construction of Infrastructure*, Ames, IA, 119-133, June 2-3.

6   **Lin, J.J.**, Han, K., Fukuchi, Y., Eda, M. and Golparvar-Fard, M. (2015). "Model-Based Monitoring Of Work-In-Progress Via Images Taken by Camera-Equipped UAVs And BIM," *International Conference on Civil and Building Engineering Informatics (ICCBEI 2015)*, Tokyo, Japan, April 22-24. **Keynote – Sponsored by Autodesk**

5   **Lin, J.C.**, Hung, W. H. and Kang, S.C. (2012). "An accessibility evaluation and planning system for dynamic construction site," *Proceedings of 14th International Conference on Computing in Civil and Building Engineering (ICCCBE) Conference*, Moscow, Russia. June 27-29.

4   **Lin, J.C.**, Hung, W. H. and Kang, S.C. (2011). "A Walkthrough of Large Scale Composite Hazard," *Proceedings of 11th International Conference on Construction Applications of Virtual Reality (CONVR) Conference*, Weimar, Germany. November 4-5.

3   Yang, C.E., **Lin, J.C.**, Hung, W. H. and Kang, S.C. (2010). "Accessibility Evaluation System for Site Layout Planning," *Proceedings of 10th International Conference on Construction Applications of Virtual Reality (CONVR) Conference*, Sendai, Japan. November 4-5.

2   **Lin, J.C.**, Hung, W. H. and Kang, S.C. (2012). "Motion Planning for Mobile Construction Machine," *Proceedings of The 16th Symposium on Construction Engineering and Management*, Taichung, Taiwan. July 6

Book Chapters

2   **Lin, J.J.**, Golparvar-Fard, M. (2020). "Computer Vision and BIM-Driven Data Analytics for Monitoring Construction and Operation in the Built Environment" In Sawhney, A., Riley, M., Irizarry, J., (Ed.), *Construction 4.0: An Innovation Platform for the Built Environment*. Abingdon, United Kingdom: Routledge.

1   **Lin, J.J.**, Golparvar-Fard, M. (2020). "Construction Progress Monitoring Using Cyber Physical System" In Nazila, R., and Anumba, C., (Ed.), *Cyber-Physical System in Construction.*.

Patents

1   Golparvar-Fard, M., Hoiem, D., **Lin, J. J.**, Han, K., Degol, J. (2019). "Computation of point clouds and joint display of point clouds and building information models with project schedules for monitoring construction progress, productivity, and risk for delays", U. S. Patent and Trademark Office (US20190325089A1)

PRESENTATIONS (* Conference, ~ Industry, ^ International)

23~   *Project Demo,* Progress Update Strategies using Visual Production Management System, Clayco Corp., Saint Louis, Oct. 10, 2018

22   *Guest Lecture*, Project Financing I. CEE320 Construction Engineering and Management. UIUC. Feb. 15, 2018

21   *Guest Lecture*, Preliminary Estimating & Project Approval. CEE320 Construction Engineering and Management. UIUC. Feb. 1, 2018

20~ *Project Demo,* Automated Indoor Progress Monitoring Using Ground Robots with Visual Production Management System. Oracle Construction Innovation Lab, Deerfield, Aug. 22, 2018

19* *Conference Presentation*, Visual Data and Predictive Analytics for Proactive Project Controls on Construction Sites. Proc., *25th Workshop on Intelligent Computing in Engineering,* Lausanne, Switzerland, Lausanne, Switzerland, June 10th – 13th 2018

18 *Guest Lecture*, Wireframing tools. CS465 User Interface Design. UIUC. Mar. 5, 2018

17* *Conference Presentation*, Proactive Construction Project Controls via Predictive Visual Data Analytics, Proc., *ASCE Int'l Workshop on Computing in Civil Engineering*, Seattle, U.S., Jun. 25-27, 2017

16* *Conference Presentation*, "Proactive Project Controls Driven by Ambient As-Built and Plan Visual Data," Proc., *International Conference on Civil and Building Engineering Informatics (ICCBEI 2017)*, Taipei, Taiwan, Apr. 22-24, 2016

15* *Conference Presentation*, Web-based 4D Integrated Project Models for Tracking Work-In-Progress and Information Communication on Construction Sites, Proc., *2016 Construction Research Congress*, San Juan, Puerto Rico, May 31 - Jun. 2, 2016

14 *Guest Lecture*, Hands-on #7 : Reality Capture. CEE598 Building Information Modelling. UIUC. Apr. 14, 2016

13 *Guest Lecture*, Hands-on #6 : BIM for Cost Estimation. CEE598 Building Information Modelling. UIUC. Apr. 5, 2016

12 *Guest Lecture*, Hands-on #5: Simulating and Visualizing 4D BIM. CEE598 Building Information Modelling. UIUC. Mar. 17, 2016

11 *Guest Lecture*, Hands-on #4: Simulating and Visualizing 4D BIM. CEE598 Building Information Modelling. UIUC. Mar. 18, 2016

10 *Guest Lecture*, Hands-on #3: Generating 4D BIM. CEE598 Building Information Modelling. UIUC. Mar 10, 2016

9 *Guest Lecture*, Hands-on #2: Clash Detection. CEE598 Building Information Modelling. UIUC. Mar. 1, 2016

8 *Guest Lecture*, Hands-on #1 : 3D Modeling. CEE598 Building Information Modelling. UIUC. Feb. 2, 2016

7^ *Research Presentation*, Model-driven Big Visual Data Collection using UAVs for Automated Construction Progress Monitoring, National Taiwan University, Taipei, Taiwan, July 17, 2015

6* *Conference Presentation*, A Framework for Model-driven Collection of Big Visual Data using UAVs for Automated Construction Progress Monitoring, Proc. *ASCE The Int'l Workshop on Computing in Civil Engineering*, Austin, U.S., June 21-23. 2015

5* *Conference Presentation*, An accessibility evaluation and planning system for dynamic construction site, *Proc. 14th International Conference on Computing in Civil and Building Engineering (ICCCBE) Conference*, Moscow, Russia. June 27-29.

4* *Conference Presentation*, A Walkthrough of Large Scale Composite Hazard, *Proc. 11th International Conference on Construction Applications of Virtual Reality (CONVR) Conference*, Weimar, Germany. November 4-5

3* *Conference Presentation*, Accessibility Evaluation System for Site Layout Planning," *Proc. 10th International Conference on Construction Applications of Virtual Reality (CONVR) Conference*, Sendai, Japan. November 4-5.

Jacob Je-Chian Lin

2* *Conference Presentation*, Motion Planning for Mobile Construction Machine," *Proc. The 16th Symposium on Construction Engineering and Management*, Taichung, Taiwan. July 6

1* *Conference Presentation*, Accessibility Evaluation System for the Logistics of A Tractor-trailer, *Proc. 14th Symposium on Construction Engineering and Management*, Taipei, Taiwan. July 6