ESR1: Siyuan Chen

University College Dublin

Reduction of uncertainty through regularized, automated road infrastructure inspection, using unmanned aerial vehicles
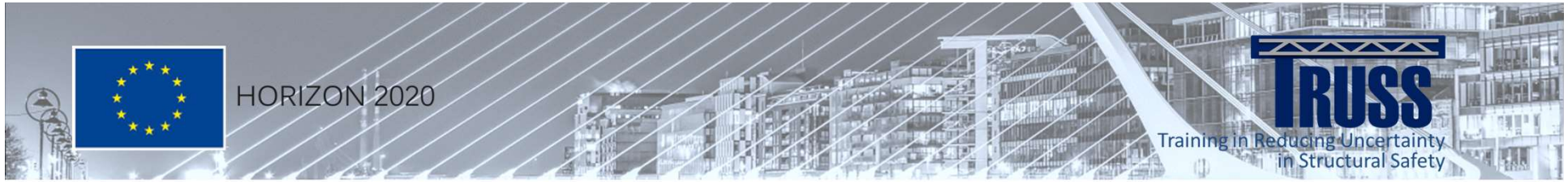
Research

- UAV Design & Construction

- Data Collection & 3d Point Cloud Reconstruction

- Data Evaluation

- Noise Reduction

- Damage Detection

Research (UAV Design and Construction)

UAV Construction

- FPV video system
- 3 axis camera gimbal
- 1080p/16Mp action camera
- 30 minutes flight time
- 3 kg payload
- Dual GPS & compass system

Publication: Chen, S., Laefer, D.F. & Mangina, E., 2016. State of Technology Review of Civilian UAVs. *Recent Patents on Engineering*, 10 (3) 201, pp.160–174.
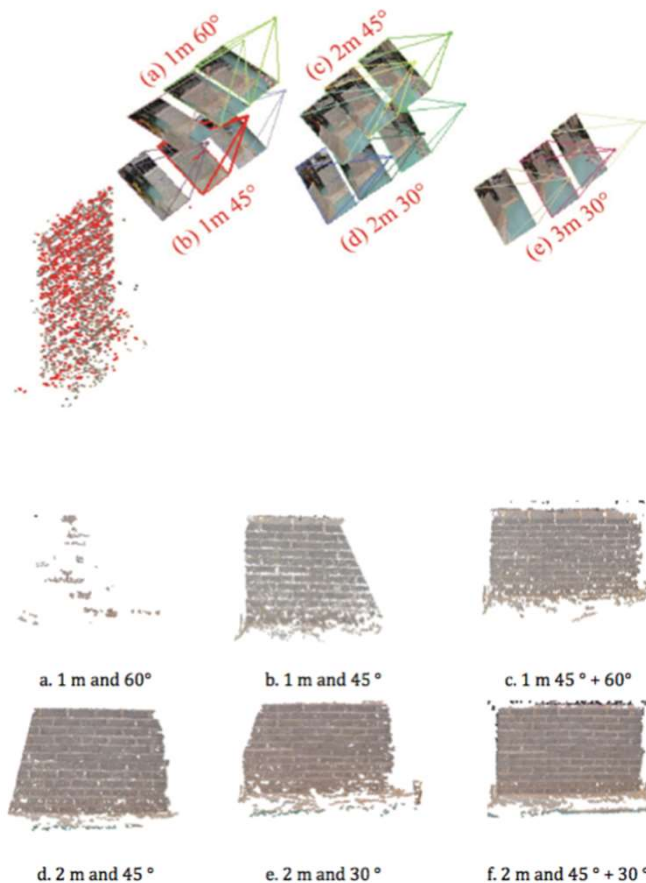
Research (Data Collection & 3D Reconstruction)

Point cloud sets from different angles

Survey Target	Time
Boyne viaduct bridge	2016-7, 2017-5
Christ Church Cathedral	2016-7
St Patrick's Cathedral	2016-7
Wicklow Bridges	2017-5, 2018-3, 2018-8
Wicklow Roads	2017-4, 2017-5, 2018-8

Publication: Chen, S., Laefer, D.F., Byrne, J., Natanzi, A., 2017. The effect of angles and distance on image-based , three-dimensional re-constructions. *ESREL2017*. Portorož, Slovenia
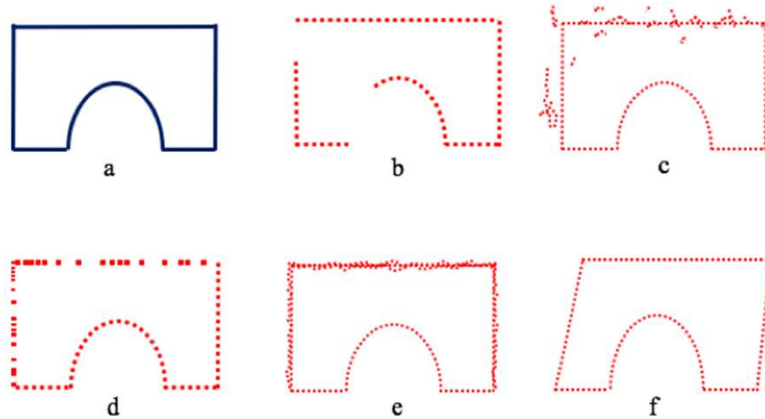
Research (Data Evaluation)
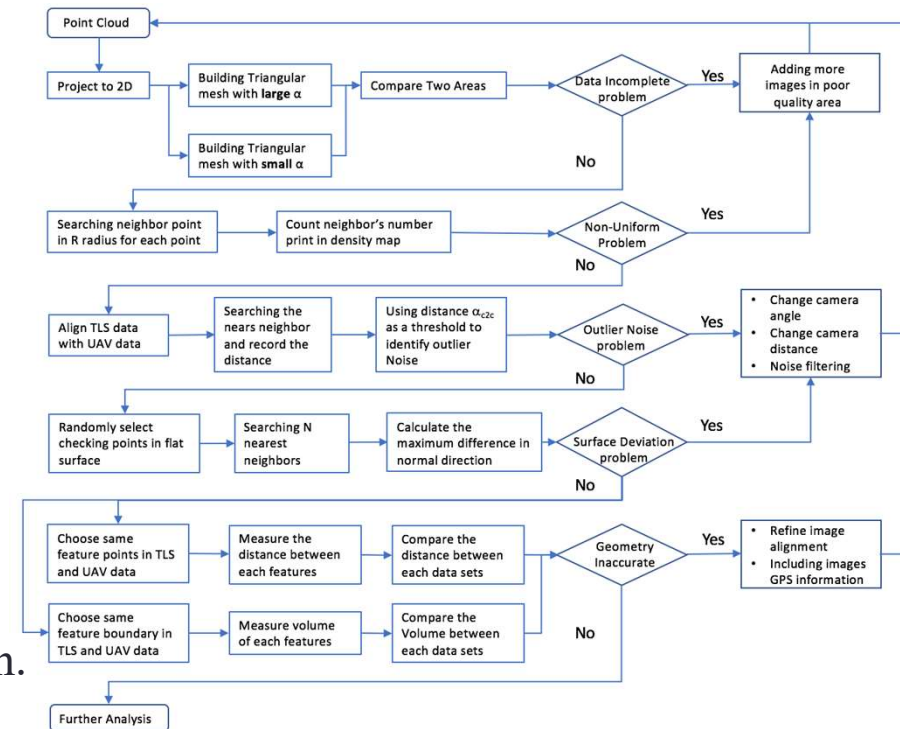

Point cloud defects.
a.   Real structure; b. Incomplete data;
c. Outlier noise d. Non-uniform density;
e. Surface deviation; f. Geometry deformation.

Research (Noise Reduction)

Research (Damage Detection)
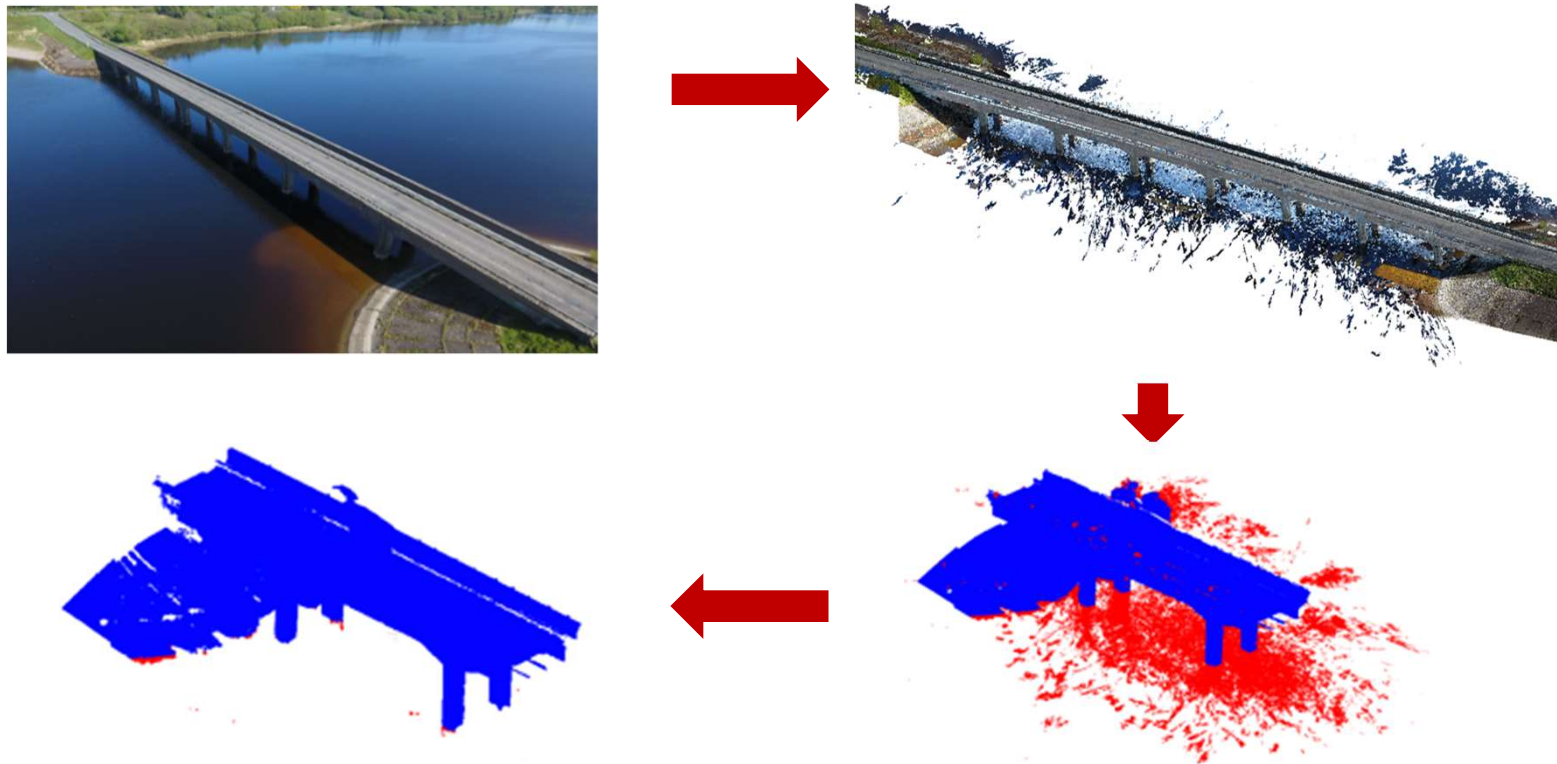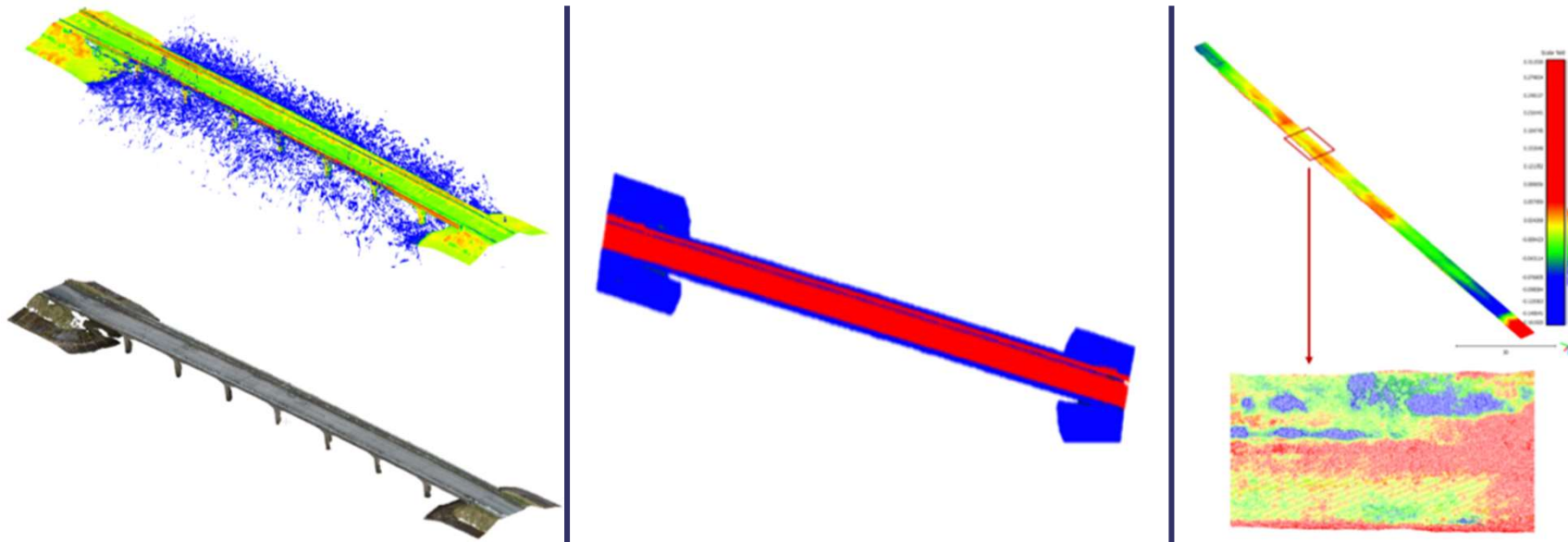
Publication:

Chen, S., Truong-Hong, L, Laefer, D.F., Mangina, E., 2018. Automated Bridge Deck Evaluation through UAV Derived Point Cloud
, CERI 2018, Dublin (Accepted)

Truong-Hong, L., Chen, S., Cao, V., Laefer, D.F., 2018. Automatic Bridge Deck Crack Detection Using Low-cost Uav-based Images, COST ACTION TU1406, Barcelona (Accepted)

Training

Type of Activity	Start date	End date	Title of course/conference/activity and location	No. hours
▽				
Course (>1 day)	01/09/15	10/11/15	Keeping Current with Research, UCD, Dublin, Ireland	20
Workshop	01/10/15	01/10/15	Technology Day, Korec, Maynooth, Ireland	5
Workshop	05/10/15	05/10/15	Drone Developer Workshop, 3DRobotics, Atlantic Bridge, Irish Development Agency, Startup Ireland, and the Linux Foundation's Dronecode Project, Dublin, Ireland	4
Workshop	08/10/15	08/10/15	Drone Developer Flight Day, 3DRobotics, Atlantic Bridge, Irish Development Agency, Startup Ireland, and the Linux Foundation's Dronecode Project, Dublin, Ireland	8
Course (>1 day)	17/10/15	18/10/15	UAV Licence Training, RPAS Training International, Weston Executive Airport Dublin, Ireland	14
Seminar (<=1 day)	19/11/15	19/11/15	Computational Imaging, Maynooth University, Maynooth, Ireland	7
Course (>1 day)	17/12/15	17/01/16	Heartsaver (AED) Training, UCD, Dublin, Ireland	4
Tutorial/Supervision/Demonstration	08/02/16	25/04/16	Tutorial Mechanics of Solids (CVEN20010), UCD, Dublin, Ireland	36
Seminar (<=1 day)	11/02/16	11/02/16	Defining Your Digital Project's Goals and Objectives, UCD, Dublin, Ireland	5
Seminar (<=1 day)	25/02/16	25/02/16	Visualising Environmental Data Using ArcGIS, UCD, Dublin, Ireland	2
Workshop	01/04/16	04/04/16	Drone Expo Ireland, IAA, UAAI, Dublin, Ireland	10
Seminar (<=1 day)	06/04/16	06/04/16	Making a Map with Google Mapping Products, UCD, Dublin, Ireland	2
Secondment (long stay >= 3 months)	20/04/16	31/07/16	Secondment started in Arup, Dublin, Ireland	
Workshop	24/06/17	25/06/17	Workshop in Lloyd's Register, London UK	10
Workshop	20/07/17	20/07/17	Career Planning for Researchers, UCD, Ireland	5
Workshop	22/09/17	22/09/17	SFI Research Careers Forum, Dublin, Ireland	8
Workshop	31/10/17	05/11/17	VSMM 2017, UCD, Ireland	8
Workshop	16/11/17	16/11/17	UCD Discovery Workshop: the Atlantic Bridge POP fund	5
Course (>1 day)	11/062018	15/06/18	Project Management Training	40

Dissemination

Type of activity	Start date	End date	Title of the Publication	Authors	Location, journal or conference (full reference)	Brief description of activity
Journal publication	01/10/15	29/02/16	State of Technology Review of Civilian UAVs	Chen, S., Laefer, D. and Mangina, E.	Recent Patents on Engineering, 10(3): 160 - 174, 2016	Published
Conference publication	04/11/16	16/02/17	The effect of angles and distance on image-based, three-dimensional reconstructions	Siyuan Chen, Debra F. Laefer, Jonathan Byrne and Atteyeh S. Natanzi	European Safety and Reliability Conference ESREL 2017	Published
Journal publication	08/01/16	09/07/18	UAV Bridge Inspection through Evaluated 3D Reconstructions	Chen, S, Laefer, D.F., Mangina, E., Zolanvari, I., Byrne, J.	Journal of Bridge Engineering	Accepted
Conference publication	01/02/18	16/05/18	Outlier detection of point clouds generating from low cost UAVs for bridge inspection	Chen, S., Truong-Hong, O'Keeffe, E., L, Laefer, D.F., Mangina, E.	IALCCE 2018, Ghent, Belgium, October 2018	Accepted
Conference publication	09/02/18	03/08/18	Automated Bridge Deck Evaluation thr	Chen, S., Truong-Hong, L, Laefer, D.F., Mangina, E.,	CERI 2018, Dublin, Ireland, Auguest 2018	Accepted
Conference publication	05/07/18	05/08/18	Automatic Bridge Deck Crack Detectio	Truong-Hong, L., Chen, S., Cao, V., Laefer, D.F.	COST ACTION TU1406, Barcelona, Spain, September 2018	Accepted

Outreach

Type of Activity	Start date	End date	Title of course/conference/activity and location	No. hours
Outreach(open day, talks)	19/04/16	31/07/16	Presentation at Arup, Dublin, Ireland	2
Outreach(open day, talks)	07/09/16	07/09/16	Orientation Presentation School of Civil Engineering, UCD, Dublin, Ireland	2
Outreach(open day, talks)	29/09/16	29/10/16	Drone workshop, UCD, Dublin, Ireland	4
Outreach(open day, talks)	22/11/16	22/11/16	UCD computer science open day, School of Science , UCD, Dublin, Ireland	2
Outreach(open day, talks)	13/11/17	13/11/17	Science Week in Willow Park Junior School, Ireland	5
Outreach (open day, talks)	06/04/18	06/04/18	Intel-UCD drone show	4
Outreach (open day, talks)	13/05/16	13/05/16	Presentation at Arup about UAV application	2
Outreach (open day, talks)	10/11/15	10/11/15	Science Week in Willow Park Junior School, Ireland	5