

## Curriculum Vitae

### I. Personal Details

Title: Univ.Prof. Dipl.-Ing. Dr.techn.  
Name: Werner Lienhart  
Nationality: Austria

### II. Education

2001-2006                    **PhD in Engineering Geodesy**  
Graz University of Technology, Austria  
Thesis Title: Analysis of Inhomogeneous Structural Monitoring Data  
Degree with *First Class Honours*

1998-2001                    **Master in Geodesy**  
1994-1997                    Graz University of Technology, Austria  
Thesis Title: Applications of Lumped Coefficients Approach for  
Selected Problems in Satellite Gravity Gradiometry  
Degree with *First Class Honours*

1997-1998                    **BEng (Hons) in Engineering Surveying (Final Year)**  
Nottingham Trent University, United Kingdom  
Student Exchange within ERASMUS Program  
Thesis Title: Determination of the Local Horizon with Digital Image  
Processing  
Degree with *First Class Honours*

### III. Work Experience

- Since 01.10.2011      **University Professor and Head of the Institute** of Engineering Geodesy and Measurement Systems, Graz University of Technology, Austria
- Since 06.2022      **Co-founder and partner** of ACI Monitoring GmbH, Graz, Austria
- 01.01.-31.08.2011    **Product Manager Innovation**, TPS Program, Business Area Geomatics, Leica Geosystems AG, Heerbrugg, Switzerland
- 2009-2010      **Senior Application Engineer**, Business Area Geomatics, Leica Geosystems AG, Heerbrugg, Switzerland
- 2006-2009      **Application Engineer**, Business Area Geomatics, Leica Geosystems AG, Heerbrugg, Switzerland
- 2001-2006      **University Assistant**, Graz University of Technology, Institute of Engineering Geodesy and Measurement Systems (Prof. Fritz K. Brunner), Austria
- 2000-2001      **Research Assistant**, Graz University of Technology, Institute of Engineering Geodesy and Measurement Systems (Prof. Fritz K. Brunner), Austria
- 1999-2000      **Project Staff Member**, Austrian Academy of Sciences, Space Research Institute (Prof. H. Sünkel)

### IV. Patents

- [PA9]    Kwapisz M, Vorwagner A, **Lienhart W**, Monsberger C, Winkler M (2022) *Method for Detecting the Maximum Expansion of Cracks in an Object*, EP3894796 (B1): 23 pages
- [PA8]    **Lienhart W**, Monsberger C, Friessnig M (2018) *Apparatus and Method for Additive Manufacturing*, EP3511155 (A1): 16 pages
- [PA7]    **Lienhart W**, Galler R (2014) *Tübbingelement mit Dehnungsmessung*, AT516158 (B1): 53 pages
- [PA6]    **Lienhart W** (2011) *Measuring device and method for filtered presentation of object information*, EP2570768 (A1): 20 pages
- [PA5]    Metzler B, Sieber S, **Lienhart W**, Zogg H-M (2011) *Measuring Device that can be operated without Contact and Control Method for such a Measuring Device*, WO2013014084 (A1): 51 pages
- [PA4]    **Lienhart W**, Nindl D, Kotzur N (2011) *Robotic Surveying Instrument and Method for the Automated Autocollimation of a Telescope of a Surveying Instrument Comprising an Autocollimation Target*, WO2012072811 (A1): 63 pages
- [PA3]    Zogg H-M, **Lienhart W**, Nindl D, Kotzur N (2010) *Geodetic Survey System having a Camera integrated in a Remote Control Unit*, WO2012034813 (A1): 65 pages
- [PA2]    Nindl D, Zogg H-M, **Lienhart W**, Kotzur N (2010) *Target Point Recognition Method and Surveying Instrument*, EP2405237 (A1): 11 pages
- [PA1]    **Lienhart W**, Nindl D, Zogg H-M, Kotzur N (2010) *Surveying Instrument*, WO2011141547 (A1): 27 pages

## V. Publications

- [P181] **Lienhart W**, Monsberger C, Fleckl-Ernst J, Moritz B (2025) *Sensorik und Langzeitmonitoring im Tunnelbau*. Betonkalender 2025. Tunnelbau Betonbauqualität (BBQ) Ernst & Sohn GmbH Rotherstraße 21, 10245 Berlin: 393 - 413
- [P180] **Lienhart W** (2024) Erfassung von Hangbewegungen und Steinschlägen mit geodätischen und faseroptischen Sensoren. Proc. 2. Steinschlagsymposium, Schladming Austria: 61-68
- [P179] **Lienhart W**, Strasser L, Hagmüller M, Ainhirn F, Bolzer A, Hötendorfer G, Wischenbarth G, Kainz A, Maier K, Samhaber N, Schicketmüller C (2024) *Development and validation of a third party intrusion detection software based on DAS measurement data*. Elektrotech. Inftech. 141, 692–700 (2024). <https://doi.org/10.1007/s00502-024-01284-z>
- [P178] Miah M, **Lienhart W** (2024) *Measured displacement data analysis and modelling for structural health monitoring*. Proc. 7<sup>th</sup> International Conference on Smart Monitoring Assessment and Rehabilitation of Civil Structures (SMAR 2024), Procedia Structural Integrity, Volume 64, 2024: 476-483 <https://doi.org/10.1016/j.prostr.2024.09.288>
- [P177] Guo JY, **Lienhart W**, Sun MY, Zhang CC, Zhuo C, Jiang HT, Shi B (2024) *The water vapor distribution profile in dry soil layer during evaporating with high spatial resolution monitored by distributed fibre-optic sensing technology*. Géotechnique. <https://doi.org/10.1680/jgeot.24.01127>
- [P176] Miah S, **Lienhart W** (2024) *Offline and Online Performance Contrast of Optimal Control*. Proc. 9th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2024), 11 p. <http://dx.doi.org/10.23967/eccomas.2024.004>
- [P175] Boros V, Vorwagner A, Prammer D, **Lienhart W** (2024) *Application of Embedded Distributed Fiber Optic Sensors on a Highway Bridge as a Support for Bridge Inspections*. Proc. 14th Central European Congress on Concrete Engineering: 268-276
- [P174] Strasser L, **Lienhart W** (2024) *Distributed fiber optic sensing during static and dynamic bridge loading*. Proc. 12th International Conference on Bridge Maintenance, Safety and Management (IABMAS 2024), Copenhagen, Denmark, 24-28 June 2024. 8 p. <http://dx.doi.org/10.1201/9781003483755-133>
- [P173] Moser T, **Lienhart W**, Schill F (2024) *Static and dynamic monitoring of bridges with contactless techniques*. Proc. 12th International Conference on Bridge Maintenance, Safety and Management (IABMAS 2024), Copenhagen, Denmark, 24-28 June 2024. 9 p. <http://dx.doi.org/10.1201/9781003483755-35>
- [P172] Miah M, **Lienhart W** (2024) *Performance Comparison of Derivative-Free Optimization Methods*. Proc. International Structural Engineering and Construction, 11(2), 2024 Developing Materials and Structures for Sustainable Engineering, ISEC Press, 6 p. [www.doi.org/10.14455/ISEC.2024.11\(2\).STR-13](http://www.doi.org/10.14455/ISEC.2024.11(2).STR-13)
- [P171] Miah M, **Lienhart W** (2024) *Effect of sensors locations and magnitudes of dynamic loads on dynamical properties in structural health monitoring*. Procedia Structural Integrity, Volume 54, 2024: 3-10 <https://doi.org/10.1016/j.prostr.2024.01.049>
- [P170] Raventós J, Beth M, Clegg M, Garin H, Golser J, **Lienhart W**, Pezzetti G (2024) *Development of international standards for geotechnical instrumentation under ISO—an update* in New Challenges in Rock Mechanics and Rock Engineering, CRC Press, 181-186, 2024
- [P169] Lachinger S, Unterweger H, Lackner G, Maicz D, Reimoser T, **Lienhart W**, Mack T, Forstlechner F (2024) *Destructive Testing of the Pinkabach Railway Bridge – Large*

- scale Testing of Sensor Systems for Fatigue Crack Monitoring and System*. Proc. 11th European Workshop on Structural Health Monitoring (EWSHM 2024), June 10-13, 2024, Potsdam, Germany, 9 p. <https://doi.org/10.58286/29869>
- [P168] Schönberger C, **Lienhart W** (2024) *Drive-by Structural Monitoring using GNSS measurements at alpine bridges*. Proc. 11. European Workshop on Structural Health Monitoring (EWSHM 2024), June 10-13, 2024, Potsdam, Germany, 8 p. Proc. 11.th European Workshop on Structural Health Monitoring (EWSHM 2024). <https://doi.org/10.58286/29845>
- [P167] **Lienhart W**, Moser T, Strasser L (2024) *Large scale monitoring of a highway bridge with remote sensing and distributed fiber optic techniques during load tests*. Proc. 11. European Workshop on Structural Health Monitoring (EWSHM 2024), June 10-13, 2024, Potsdam, Germany, 8 p. <https://doi.org/10.58286/29678>
- [P166] Bauer P, Schönberger C, **Lienhart W** (2024) *Interactive planning of GNSS monitoring applications with virtual reality*. Survey Review. 56. 317 – 322 <https://doi.org/10.1080/00396265.2024.2345450>
- [P165] Miah, M.S., Lienhart, W. (2024). Performance Comparison of Different Vibration Control Strategies. In: Ungureanu, V., Bragança, L., Baniotopoulos, C., Abdalla, K.M. (eds) 4th International Conference "Coordinating Engineering for Sustainability and Resilience" & Midterm Conference of CircularB "Implementation of Circular Economy in the Built Environment". CESARE 2024. Lecture Notes in Civil Engineering, vol 489. Springer, Cham. pp. 126-134 [https://doi.org/10.1007/978-3-031-57800-7\\_11](https://doi.org/10.1007/978-3-031-57800-7_11)
- [P164] Kalenjuk S, **Lienhart W** (2024) *Drive-by infrastructure monitoring: a workflow for rigorous deformation analysis of mobile laser scanning data*. Structural Health Monitoring. 23(1): <https://doi.org/10.1177/14759217231168997>
- [P163] Strasser L, Dumitru V, **Lienhart W** (2023) *Detection of seismic waves with Distributed Acoustic Sensing*. Conrad Observatory Journal Nr. 7. p. 16
- [P162] Bauer P, **Lienhart W** (2023) *Augmentation approaches for geodetic permanent monitoring systems in dynamic urban environments*. Survey Review. pp. 1-9, <https://doi.org/10.1080/00396265.2023.2293555>
- [P161] Wuestefeld A, Spica ZJ, Aderhold K, Huang H-H, Ma K-F, Lai VH, Miller M, Urmantseva L, Zapf D, Bowden DC, Edme P, Kiers T, Rinaldi AP, Tuinstra K, Jestin C, Diaz-Meza S; Jousset P, Wollin C, Ugalde A, Barajas SR, Gaité B, Currenti G, Prestifilippo M, Araki E, Tonegawa T, de Ridder S, Nowacki A, Lindner F, Schoenball M, Wetter C, Zhu H-H, Baird AF, Rørstadbotnen RA, Ajo-Franklin J, Ma Y, Abbott RE, Hodgkinson KM, Porritt RW, Stanciu C, Podrasky A, Hill D, Biondi B, Yuan S, Luo B, Nikitin S, Morten JP, Dumitru VA; **Lienhart W**, Cunningham E, Wang H (2023) *The Global DAS Month of February 2023*. Seismological Research Letters (2023): <https://doi.org/10.1785/0220230180>
- [P160] Monsberger CM, Buchmayer F, **Lienhart W** (2023) *Distributed Fiber Optic Monitoring Systems in Tunneling: Implementation from research into practice*. In: Proceedings of the ISRM 15<sup>th</sup> International Congress on Rock Mechanics and Rock Engineering & 72<sup>nd</sup> Geomechanics Colloquium – Challenges in Rock Mechanics and Rock Engineering, Schubert, W. & Kluckner, A. (eds), Salzburg, Austria, October 9-14, 2023. Austrian Society for Geomechanics: Salzburg. pp. 1501-1506
- [P159] Moritz B, Fleckl-Ernst Johannes, **Lienhart W**, Golser J, Pilgerstorfer T (2023) *Long-term monitoring of Austrian railway tunnels – A next step forward*. In: Proceedings of the ISRM 15<sup>th</sup> International Congress on Rock Mechanics and Rock Engineering & 72<sup>nd</sup> Geomechanics Colloquium – Challenges in Rock Mechanics and Rock Engineering, Schubert, W. & Kluckner, A. (eds), Salzburg, Austria, October 9-14, 2023. Austrian Society for Geomechanics: Salzburg. pp. 1478-1483
- [P158] Strasser L, **Lienhart W**, Winkler M (2023) *Static and Dynamic Bridge Monitoring with Distributed Fiber Optic Sensing*. Proceedings of the 14<sup>th</sup> International Workshop on

- Structural Health Monitoring 2023 (IWSHM): Designing SHM for Sustainability, Maintainability and Reliability, DEStech Publications, Inc: 1745–1752: <https://www.doi.org/10.12783/shm2023/36932>
- [P157] Miah S, **Lienhart W** (2023) *Structural Performance Monitoring Employing Linear Observer*. Proceedings of the 14<sup>th</sup> International Workshop on Structural Health Monitoring 2023 (IWSHM): Designing SHM for Sustainability, Maintainability and Reliability, DEStech Publications, Inc: 897–904: <https://www.doi.org/10.12783/shm2023/36827>
- [P156] **Lienhart W**, Schill F, Moser T (2023) *Dynamic Bridge Monitoring with Remote Sensing Techniques*. Proceedings of the 14<sup>th</sup> International Workshop on Structural Health Monitoring 2023 (IWSHM): Designing SHM for Sustainability, Maintainability and Reliability, DEStech Publications, Inc: 140–147: <https://doi.org/10.12783/shm2023/36736>
- [P155] **Lienhart W**, Strasser L, Dumitru V (2023) *Distributed Vibration Monitoring of Bridges with Fiber Optic Sensing Systems*. In: Limongelli, M.P., Giordano, P.F., Quqa, S., Gentile, C., Cigada, A. (eds) *Experimental Vibration Analysis for Civil Engineering Structures*. EVACES 2023. Lecture Notes in Civil Engineering, vol 433. Springer, Cham. [https://doi.org/10.1007/978-3-031-39117-0\\_67](https://doi.org/10.1007/978-3-031-39117-0_67)
- [P154] Schönberger C, **Lienhart W**, Kaden, B (2023) *Static and Dynamic Structural Monitoring of Civil Infrastructure Objects with GNSS*. Proceedings of the 10th International Conference on Smart Structures and Materials (SMART): 777-788 <https://doi.org/10.7712/150123.9831.450643>
- [P153] Miah M, **Lienhart W** (2023) *Dynamic response mitigation adopting multi-damping technology strategy*. Proceedings of the 10th International Conference on Smart Structures and Materials (SMART): 757-765
- [P152] Kalenjuk S, **Lienhart W** (2023) *Unlocking the full potential of mobile laser scanning for infrastructure monitoring*. GIM International, 4+5 (37): 32-35
- [P151] Jousset P, Wuestefeld A, Krawczyk C, Baird A, Currenti G, Landrø M, Nowacki A, Spica Z, Barajas SR, Lindner F, Konca ÖA, Edme P, Lai VH, Treshchikov V, Urmantseva L, Morten JP, **Lienhart W**, Lipovsky BP, Schoenball M, Ma KF and the “DAS-month” team (2023) *Global Distributed Fibre Optic Sensing recordings of the February 2023 Turkey earthquake sequence*. EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023, EGU23-17618, <https://doi.org/10.5194/egusphere-egu23-17618>
- [P150] Kalenjuk S, **Lienhart W**, Antony C, Klass C (2023) *Zustandsüberwachung im Vorbeifahren: Monitoring von Bestandsbauwerken mithilfe von mobilem Laserscanning*, Proc. 37<sup>th</sup> Christian Veder Kolloquium ‘Zustandserhebung, Bewertung und Sanierung von gealterten bzw. schadhafte geotechnischen Konstruktionen’ (Vol. 16), TU Graz
- [P149] Bauer P, **Lienhart W** (2023) *Experiences from the Creation of a Virtual Tour through a Stalactite Cave with VR Gear*. Proc. 43<sup>rd</sup> Wissenschaftlich-Technische Jahrestagung der DGPF in München – Publikationen der DGPF, Band 31, 2023: 368-380: <https://doi.org/10.24407/KXP:1841166472>
- [P148] Krüger M, Pongratz H, **Lienhart W**, Müllleder T, Binder F, Willeke J, (2023) *Interoperable, platform independent structural health monitoring with long-term availability*. Proc. EUROSTRUCT, <https://doi.org/10.1002/cepa.2055>
- [P147] Bauer P, **Lienhart W** (2023) *3D concept creation of permanent geodetic monitoring installations and the a priori assessment of systematic effects using Virtual Reality*. Journal of Applied Geodesy 17(1): 1–13: <https://doi.org/10.1515/jag-2022-0020>
- [P146] Strasser L, **Lienhart W** (2023) *Detektion von Naturereignissen mit verteilt akustischer Sensorik*, Proc. 22. Internationale Geodätische Woche Obergurgl 2023: 46-54

- [P145] Wieser A, Balangé L, Bauer B, Gehrmann T, Hartmann J, Holst C, Jost B, Kuhlmann H, **Lienhart W**, Maboudi M, Mawas K, Médic T, Paffenholz JA, Pollinger F, Rafeld E, Schill F, Schwieger V (2023) Proc. Terrestrisches Laserscanning 2022 (TLS 2022). DVW-Schriftenreihe, Band 104/2022, Wißner Verlag: 23-38
- [P144] Miah SM, **Lienhart W** (2022) *Deflection condition monitoring of a steel bridge via remote sensing techniques*. Current Perspectives and New Directions in Mechanics, Modelling and Design of Structural Systems, CRC Press: 637-638: <https://doi.org/10.1201/9781003348450-300>
- [P143] Bauer P, **Lienhart W** (2022) *Visualization and interpretation of structural health monitoring data in a 3D environment using virtual reality*. Proc. 11<sup>th</sup> International Conference on Structural Health Monitoring of Intelligent Infrastructure (SHMII-11), Montreal: 4 p
- [P142] Kalenjuk S, **Lienhart W** (2022) *Modeling mobile laser scanning data for deformation monitoring of transportation infrastructure*. Proc. 11<sup>th</sup> International Conference on Structural Health Monitoring of Intelligent Infrastructure (SHMII-11), Montreal: 4 p
- [P141] Monsberger CM, **Lienhart W** (2022) *Long-term structural integrity monitoring of inner tunnel linings using distributed fiber optic sensing*. Proc. 11<sup>th</sup> International Conference on Structural Health Monitoring of Intelligent Infrastructure (SHMII-11), Montreal: 4 p
- [P140] **Lienhart W**, Monsberger CM, Buchmayer F (2022) *How to Make a Self-sensing House with Distributed Fiber Optic Sensing*. Proc. European Workshop on Structural Health Monitoring EWSHM 2022 - Volume 3, Rizzo P, Milazzo A (Eds.), Lecture Notes in Civil Engineering (LNCE), Volume 270, Springer Nature Switzerland: 718–726: [https://doi.org/10.1007/978-3-031-07322-9\\_72](https://doi.org/10.1007/978-3-031-07322-9_72)
- [P139] Miah MS, **Lienhart W** (2022) *Data-Based Prognosis and Monitoring of Civil Infrastructures*. Proc. European Workshop on Structural Health Monitoring EWSHM 2022 - Volume 2, Rizzo P, Milazzo A (Eds.), Lecture Notes in Civil Engineering (LNCE), Volume 254, Springer Nature Switzerland: 1007–1017: [https://doi.org/10.1007/978-3-031-07258-1\\_101](https://doi.org/10.1007/978-3-031-07258-1_101)
- [P138] Monsberger CM, Bauer P, Buchmayer F, **Lienhart W** (2022) *Large-scale distributed fiber optic sensing network for short and long-term integrity monitoring of tunnel linings*. Journal of Civil Structural Health Monitoring, (2022) 12, 1317–1327: <https://doi.org/10.1007/s13349-022-00560-w>
- [P137] Schönberger C, Lienhart W, Moser T (2022). *Dynamic monitoring of civil infrastructures with geodetic sensors*. In Proceedings 5th Joint International Symposium on Deformation Monitoring JISDM 2022 (pp. 537-543) <https://doi.org/10.4995/JISDM2022.2022.16057>
- [P136] Zambanini C, Kieffer DS, Woschitz H, **Lienhart W** (2022) *Hybrid InSARTrac for remote geostructure monitoring*. Proc. Proceedings of the Geo-Congress, March 20-23, 2022, Charlotte, North Carolina
- [P135] **Lienhart W**, Bauer P (2022) *Vermessung 4.0: Lichtwellenleiter als Sensoren und Virtual Reality als geodätisches Arbeitsmittel*. BDVI Forum 2.22: 16-25
- [P134] Kalenjuk S, **Lienhart W** (2022) *A Method for Efficient Quality Control and Enhancement of Mobile Laser Scanning Data*. Remote Sens. 2022, 14(4), 857; <https://doi.org/10.3390/rs14040857>
- [P133] **Lienhart W**, Monsberger CM, Buchmayer F (2021) *Distributed Fibre Optic Sensing to Detect, Localize, Identify and Quantify Deformation Events*. AVN, 128 (2021) 5: 248-255
- [P132] Vorwagner A, Kwapisz M, **Lienhart W**, Winkler M, Monsberger C, Prammer D (2021) *Verteilte Rissbreitenmessung im Betonbau mittels faseroptischer Sensorik – Neue*

*Anwendung von verteilten faseroptischen Messsystemen. Beton- und Stahlbetonbau* 116 (2021), Heft 10, 727-740: <https://doi.org/10.1002/best.202100060>

- [P131] Monsberger CM, **Lienhart W** (2021) *Distributed Fiber Optic Shape Sensing of Concrete Structures*. *Sensors* 2021, 21, 6098: <https://doi.org/10.3390/s21186098>
- [P130] Monsberger CM, **Lienhart W** (2021) *Distributed fiber optic shape sensing along shotcrete tunnel linings: Methodology, field applications, and monitoring results*. *Journal of Civil Structural Health Monitoring*, (2021) 11, 337–350: <https://doi.org/10.1007/s13349-020-00455-8>
- [P129] Zambanini C, Kieffer DS, **Lienhart W**, Woschitz H (2021) *InSARTrac: a novel approach for remote acquisition of 3D slope displacement vectors*. *IOP Conf. Ser.: Earth Environ. Sci.* 833 012148
- [P128] Monsberger CM, Buchmayer F, **Lienhart W** (2021) *Autonomous integrity monitoring of shotcrete tunnel linings using distributed fiber optic sensing*. *Proceedings of 10<sup>th</sup> International Conference on Structural Health Monitoring of Intelligent Infrastructure (SHMII-10) - Best paper Award*
- [P127] Schönberger C, **Lienhart W** (2021) *Long-term monitoring using GNSS: Lessons learned and experiences from 20 years of operation*. *Proceedings of 8<sup>th</sup> Workshop on Civil Structural Health Monitoring (CSHM-8): Ageing Structures and Infrastructures in Hazardous Environment*
- [P126] Kalenjuk S, **Lienhart W**, Rebhan M (2021) *Processing of mobile laser scanning data for large-scale deformation monitoring of anchored retaining structures along highways*. *Comput Aided Civ Inf.* 2021: 1-17: <https://doi.org/10.1111/mice.12656>
- [P125] Vorwagner A, Kwapisz M, **Lienhart W**, Winkler M, Grunicke U H (2021) *Rissweitenmessung mittels nachträglich angebrachten, verteilten faseroptischen Messsystemen*. *Proc. 11. Symposium experimentelle Untersuchungen von Baukonstruktionen, Schriftenreihe Konstruktiver Ingenieurbau Dresden, Heft 55: 78-86*
- [P124] Bauer P, **Lienhart W**, Jost S (2021) *Accuracy Investigation of the Pose Determination of a VR System*. *Sensors* 2021, 21(5), 1622: <https://doi.org/10.3390/s21051622>
- [P123] Bauer P, **Lienhart W** (2021) *VR-gestützte Planung von geodätischen Netzmessungen*, *Proc. 21. Internationale Geodätische Woche Obergurgl 2021: 1–12*
- [P122] Bauer P, **Lienhart W**, Jost S (2021) *Genauigkeitsuntersuchung eines VR-Systems zur 3D-Koordinatenbestimmungsgccuracy*. *AVN*, 128 (2021) 1: 3-12
- [P121] Moritz B, Heissenberger R, Schachinger T, **Lienhart W** (2021) *Long-term monitoring of railway tunnels*. *Geomechanics and Tunnelling*; 14 (2021): 35–46: <https://doi.org/10.1002/geot.202000049>
- [P120] Grunicke U H, **Lienhart W**, Vorwagner A (2021) *Long-term monitoring of visually not inspectable tunnel linings*. *Geomechanics and Tunnelling*; 14 (2021): 19–32: <https://doi.org/10.1002/geot.202000051>
- [P119] Buchmayer F, Monsberger CM, **Lienhart W** (2021) *Advantages of tunnel monitoring using distributed fibre optic sensing*. *J. Appl. Geodesy* 2021; 15(1): 1–12: <https://doi.org/10.1515/jag-2019-0065>
- [P118] **Lienhart W**, Buchmayer F, Klug F, Monsberger CM (2020) *Distributed fibre-optic sensing applications at the Semmering Base Tunnel, Austria*. *Proceedings of the Institution of Civil Engineers: https://doi.org/10.1680/jsmic.20.00006*
- [P117] Roberts GW, Hancock CM, **Lienhart W**, Klug F, Zuzek N, de Ligt H (2020) *Displacement and frequency response measurements of a ship using GPS and fibre optic-based sensors*. *Applied Geomatics: https://doi.org/10.1007/s12518-020-00338-z*

- [P116] Monsberger C, **Lienhart W**, Hayden, M (2020) *Distributed fiber optic sensing along driven ductile piles: Design, sensor installation and monitoring benefits*. Journal of Civil Structural Health Monitoring (2020) 10: 627–637: <https://doi.org/10.1007/s13349-020-00406-3>
- [P115] Vorwagner A, Kwapisz M, Prammer D, **Lienhart W**, Monsberger C, Winkler M, Grunicke U (2020) *Neue Möglichkeiten zur Rissweitenbestimmung an bestehenden Betonkonstruktionen mittels verteilter optischer Fasermessungen*. Proc.: 4. Brückenkolloquium, Technische Akademie Esslingen, Germany: 323-329
- [P114] Bauer P, Jost S, **Lienhart W** (2020) *Beurteilung der Eignung eines VR-Systems als 3D Koordinatenmesssystem*. Proc.: Ingenieurvermessung 20, Beiträge zum 19. Internationalen Ingenieurvermessungskurs München, 2020, Wunderlich, T. (Hrsg.). Wichmann Verlag: 15-28
- [P113] Schönberger C, **Lienhart W**, Lang E, Stary U (2020) *Erfahrungen aus 20 Jahre GPS Monitoring der Massenbewegung Gradenbach*. Proc.: Geomonitoring 2020: 149-162: <https://doi.org/10.15488/9347>
- [P112] Wagner L, Kluckner A, Monsberger C, Wolf P, Prall, Schubert W, **Lienhart W** (2019) *Direct and Distributed Strain Measurements Inside a Shotcrete Lining: Concept and Realisation*, Rock Mech Rock Eng (2019): [10.1007/s00603-019-01923-4](https://doi.org/10.1007/s00603-019-01923-4)
- [P111] Monsberger C, **Lienhart W**, Kluckner A, Schubert W (2019) *In-situ assessment of distributed strain and curvature characteristics in shotcrete tunnel linings based on fiber optic strain sensing*, Proc. International Congress of Rock Mechanics (ISRM): 1324–1331
- [P110] Monsberger C, **Lienhart W** (2019) *In-situ Assessment of Curvature and Bending Characteristics Along Geotechnical Structures Using Distributed Fiber Optic Sensors*, Proceedings of the 12<sup>th</sup> International Workshop on Structural Health Monitoring 2019 (IWSHM): Enabling Intelligent Life-cycle Health Management for Industry Internet of Things (IIOT), DEStech Publications, Inc: 1715–1723
- [P109] Monsberger C M, **Lienhart W** (2019) *Design, Testing, and Realization of a Distributed Fiber Optic Monitoring System to Assess Bending Characteristics Along Grouted Anchors*, Journal of Light Wave Technology 37 (2019): 4603–4609: <https://doi.org/10.1109/JLT.2019.2913907>
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- [P4] **Lienhart W**, Brunner FK (2003) *Monitoring of Bridge Deformations using Embedded Fiber Optical Sensors*. In: Stiros St, Pytharouli St (eds): Proc 11<sup>th</sup> International Symposium on Deformation Measurements, Santorini, Greece: 555-561
- [P3] Wieser A, **Lienhart W**, Brunner FK (2003) *Nachbarschaftstreue Transformation zur Berücksichtigung von Spannungen im amtlichen Festpunktfeld*. Österreichische Zeitschrift für Vermessung und Geoinformation 91: 115-122
- [P2] **Lienhart W**, Wieser A, Brunner FK (2003) *Ausreißerdetektion bei der Positionsbestimmung in aktiven GPS Netzen*. AVN 5/2003: 177-182
- [P1] **Lienhart W**, Wieser A, Brunner FK (2002) *Positioning by an Active GPS System: Experimental Investigation of the Attainable Accuracy*. In: Proc FIG XXII Congress, Washington D.C. USA: 12 pages

## VI. Multimedia

- [M3] Bauer P, **Lienhart W** (2022, Dezember 5) *VRsurv*. Video, Graz University of Technology: <https://doi.org/10.3217/chvy0-rnx08>
- [M2] Bauer P, **Lienhart W** (2022, December 5) *Interaction with structural health monitoring data of a tunnel site in a 3D VR environment*. Video, Graz University of Technology. <https://doi.org/10.3217/jsjnp-qsn27>

- [M1] Bauer P, **Lienhart W** (2022, December 5) *VR walk-through of structural health data of a smart family home*. Video, Graz University of Technology. <https://doi.org/10.3217/j43jh-ggx88>

## VII. Presentations

- [T152] 28.11.2024, *Erfassung von Hangbewegungen und Steinschlägen mit geodätischen und faseroptischen Sensoren*, 2. Steinschlagsymposium, Schladming, Austria
- [T151] 21.11.2024, *Erfassung und Interpretation von Brückendehformationen mit geodätischen und faseroptischen Sensoren*, Geodätisches Kolloquium, Universität Stuttgart, Stuttgart, Germany - **invited presentation**
- [T150] 05.11.2024, *KI in der Ingenieurgeodäsie*, Tagung Künstliche Intelligenz in ZT-Berufen, TU Graz, Graz, Austria - **invited presentation**
- [T149] 21.10.2024, *Aktuelle Perimeterschutzmaßnahmen*, Tag der kritischen Infrastruktur, Vienna, Austria - **invited presentation**
- [T148] 05.09.2024, *Lückenlose Überwachung von unterirdischen Versorgungsleitungen mittels verteilter faseroptischer Sensorik*, Workshop Glasfaser als Sensor, Vienna, Austria - **invited presentation**
- [T147] 05.09.2024, *Detektion, Lokalisation und Klassifikation von Ereignissen mittels verteilter faseroptischer Sensorik*, Workshop Glasfaser als Sensor, WKO Wien, Austria - **invited presentation**
- [T146] 12.06.2024, *Monitoring of roads & railways*. 10th International Course on Geotechnical and Structural Monitoring (ICGSM), Golden, USA - **invited presentation**
- [T145] 11.06.2024, *Monitoring static & dynamic geotechnical deformations in a nutshell: data collection, data analyses and data interpretation*. 10th International Course on Geotechnical and Structural Monitoring (ICGSM), Golden, USA - **invited presentation**
- [T144] 05.06.2024, *Civil Infrastructure Monitoring with Fiber Optic Sensing – Opportunities and Limitations*. Mid-year meeting of Fiber Optic Sensing Association (FOSA), Graz, Austria - **keynote presentation**
- [T143] 17.04.2024, *Dynamisches Brückenmonitoring mit geodätischen und faseroptischen Sensoren*. OVG Vortragsreihe, Innsbruck, Austria - **invited presentation**
- [T142] 16.04.2024, *Static and Dynamic Bridge Monitoring with Remote Sensing and Fiber Optic Techniques*, SHM seminar presentation, The Hong Kong Polytechnic University, Hong Kong - **invited presentation**
- [T141] 19.02.2024, *Wieviel ist ein Mikrostrain? – Faseroptische Erfassung von Dehnungen*, Weiterbildungsveranstaltung "Vermessung aktuell", Innsbruck, Austria - **invited presentation**
- [T140] 19.02.2024, *Wie wird ein Präzisionsnivellement präzise und wo liegen die Genauigkeitsgrenzen von Totalstationsmessungen?*, Weiterbildungsveranstaltung "Vermessung aktuell", Innsbruck, Austria - **invited presentation**
- [T139] 12.02.2024, *Dynamic Measurements of Seismic Events and Vibration Monitoring of Structures with Distributed Fiber Optic Sensing*. Civil Structural Health Monitoring Workshop (CSHM-9), Kuwait – **keynote presentation**
- [T138] 30.11.2023, *Bridge Monitoring with Distributed Fiber Optic Sensing - Graz University of Technology*. Public Webinar of Fiber Optic Sensing Association (FOSA) <https://www.youtube.com/watch?v=rtW1mzVfG7U> - **invited presentation**



- [T137] 29.11.2023, *Dynamisches Brückenmonitoring mit geodätischen und faseroptischen Sensoren*. OVG Vortragsreihe, Linz, Austria - **invited presentation**
- [T136] 21.10.2023, *Applications of IoT Sensors and Virtual Reality in SHM Systems*. 12<sup>th</sup> Int. Conf. on Structural Health Monitoring of Intelligent Infrastructure – SHMII-12, Hangzhou, China – **keynote presentation**
- [T135] 12.10.2023, *Long-term monitoring of Austrian railway tunnels – A next step forward*. 15<sup>th</sup> International ISRM Congress 2023, Salzburg, Austria
- [T134] 12.09.2023, *Forschungsprojekt Kontaktkraftmessung zwischen Oberleitung und Stromabnehmer mit FOS*. 2. ÖVG-Forum: Lichtwellenleitersensorik im Eisenbahnwesen, Vienna, Austria - **invited presentation**
- [T133] 12.09.2023, *Verformungsmonitoring von Tragschichten*. 2. ÖVG-Forum: Lichtwellenleitersensorik im Eisenbahnwesen, Vienna, Austria - **invited presentation**
- [T132] 11.09.2023, *Überwachung von Bauwerken kritischer Infrastruktur*. Fachtagung Katastrophenforschung., Montanuniversität Leoben, Austria - **invited presentation**
- [T131] 31.08.2023, *Distributed Vibration Monitoring of Bridges with Fiber Optic Sensing Systems*. 10<sup>th</sup> International Conference of Experimental Vibration Analysis for Civil Engineering Structures (EVACES), Milano, Italy
- [T130] 25.08.2023, *Fiber Optic Sensors*. SFB/TRR 339 – Digital Twin Road, International Summer School, Bergisch Gladbach, Germany – **invited presentation**
- [T129] 28.06.2023, *Monitoring und Nachrechnung von Belastungsversuchen an der Gschnitztalbrücke*. Brückentagung, Vienna, Austria – **invited presentation**
- [T128] 27.05.2023, *Uncertainty assessment of high frequent strain measurements*. Scientific Workshop, Uncertainty and Quality of Multi-Sensor Systems, FIG Working Week 2023, Orlando, USA
- [T127] 10.05.2023, *Glasfaser – Nervensystem der Erde*. Österreichischer Geodätag 2023, Steyr, Austria – **invited presentation**
- [T126] 09.05.2023, *Zustandsmonitoring von Bahnanlagen mittels Lichtwellenleitern*. 24<sup>th</sup> International Convention of the Working Committee on Railway Technology, Salzburg, Austria - **invited presentation**
- [T125] 04.05.2023, *Master Class on Monitoring of Highways and Airstrips*. 9<sup>th</sup> International Course on Geotechnical and Structural Monitoring (ICGSM), Rome, Italy - **invited presentation**
- [T124] 11.04.2023, *Dynamische Deformationsüberwachung von Ingenieurbauwerken mit geodätischen Sensoren*. Tutorial at 20<sup>th</sup> International Engineering Surveying Course, ETH Zurich, Switzerland
- [T123] 20.04.2023, *Bridge Monitoring with Fiber Optic and Remote Sensing Techniques*. EPIC Meeting on Fiber Sensors, Porto, Portugal - **keynote presentation**
- [T122] 10.03.2023, *Statische und dynamische Deformationsmessungen von Brücken mit verteilten faseroptischen Sensoren*. GeoMonitoring 2023, Hannover, Germany - **invited presentation**
- [T121] 08.12.2022, *Virtual Reality for the Planning, Visualisation and Interpretation of Structural Health Monitoring Data*. 13<sup>th</sup> International Symposium on Environmental Geotechnology and Global Sustainable Development, online conference - **keynote presentation**
- [T120] 05.10.2022, *Monitoring mittels Faseroptik*. ASFINAG AS-Tagung 2022, Vienna, Austria - **invited presentation**

- [T119] 13.09.2022, *VRsurv: A virtual planning and educational tool for surveying tasks*. XXVII FIG Congress, Session TS05C, Warsaw, Poland
- [T118] 11.09.2022, *Determination and Mitigation of Uncertainty in Mobile Laser Scanning Point Clouds*. Scientific Workshop on Uncertainty and Quality of Multi-Sensor Systems, Warsaw, Poland - **invited presentation**
- [T117] 09.08.2022, *Long-term Structural Integrity Monitoring of Inner Tunnel Linings using Distributed Fiber Optic Sensing*. 11<sup>th</sup> Int. Conf. on Structural Health Monitoring of Intelligent Infrastructure – SHMII-11, Montreal, Canada
- [T116] 09.08.2022, *Modeling mobile laser scanning data for deformation monitoring of transportation infrastructure*. 11<sup>th</sup> Int. Conf. on Structural Health Monitoring of Intelligent Infrastructure – SHMII-11, Montreal, Canada
- [T115] 08.08.2022, *Visualization and interpretation of structural health monitoring data in a 3D environment using virtual reality*. 11<sup>th</sup> Int. Conf. on Structural Health Monitoring of Intelligent Infrastructure – SHMII-11, Montreal, Canada
- [T114] 05.07.2022, *How to make a self-sensing house with distributed fiber optic sensing*. 10<sup>th</sup> European Workshop on Structural Health Monitoring (EWSHM), Palermo, Italy
- [T113] 28.06.2022, *Advantages of Fiber Optical Sensing in Tunnel Monitoring*. Sistemi Innovativi di Monitoraggio Geotecnico Mediante Sensori in Fibra Ottica, Padova, Italy - **invited presentation**
- [T112] 28.06.2022, *The Importance of Calibration of Fibre Optic Sensing Systems*. Sistemi Innovativi di Monitoraggio Geotecnico Mediante Sensori in Fibra Ottica, Padova, Italy - **invited presentation**
- [T111] 22.06.2022, *The role of IoT sensors and virtual reality in the planning, analysis and visualization of deformation monitoring data*. 5<sup>th</sup> Joint International Symposium on Deformation Measurements (JISDM), Valenica, Spain - **keynote presentation**
- [T110] 09.06.2022, *Challenges and Benefits of Long Term Monitoring of Civil Infrastructure with Distributed Fibre Optic Sensors*. 3<sup>rd</sup> International Conference on Health Monitoring of Civil & Maritime Structures (HeaMES 2022), online conference - **invited presentation**
- [T109] 02.06.2022, *Nutzung von Glasfasern zur Überwachung von Infrastrukturobjekten am Beispiel des Online Monitorings von Pipelines*. 8.anlagen.forum Symposium für Anlagen und Industrietechnik, Voesendorf, Austria - **invited presentation**
- [T108] 20.04.2022, *Distributed fiber optic sensing for geotechnical monitoring*. Webinar Series on Landslide Monitoring for Early Warning Systems - **invited presentation**
- [T107] 04.12.2021, *Dynamic monitoring of infrastructure objects with remote sensing techniques*. 7<sup>th</sup> International Symposium on Opto-electronic Sensor-based Monitoring in Geo-engineering, online conference - **invited presentation**
- [T106] 18.11.2021, *Structural Health Monitoring Made Easy with Fiber Optic Sensing*. Public Webinar of Fiber Optic Sensing Association (FOSA) - **invited presentation**
- [T105] 11.11.2021, *Entwicklungsstand und Vision moderner Tragwerksbeurteilung*. 4. Interlpinne Bautage, Igls, Austria - **invited presentation**
- [T104] 28.09.2021, *Master Class on Total Station*. 7th International Course on Geotechnical and Structural Monitoring (ICGSM), webinar - **invited presentation**
- [T103] 21.09.2021, *Pipesense – Überwachung von Gasleitungen mit faseroptischen Sensoren*. ÖVGW Gas digital Teil III – Innovative Technologien im Gasnetzbetrieb - **invited presentation**

- [T102] 10.09.2021, *Die Bedeutung von Digitalen Zwillingen und Glasfaserkabel in der modernen Bauwerksüberwachung*. DACH Dreiländertagung, Mondsee, Austria - **invited presentation**
- [T101] 17.06.2021, *Monitoring of Large Concrete Structures*. Public Webinar of Fiber Optic Sensing Association (FOSA), <https://www.youtube.com/watch?v=Ren1F8Yku7c>
- [T100] 14.06.2021, *Panel discussion: Geotechnical and Structural Monitoring in Academia*. 7th International Course on Geotechnical and Structural Monitoring (ICGSM), online conference - **invited presentation**
- [T99] 18.05.2021, *Fiber Optics*. Virtual Well Integrity Platform (WIP) Workshop, online conference - **invited presentation**
- [T98] 05.03.2021, *Verteilte faseroptische Sensorik zur Detektion, Lokalisation, Identifikation und Quantifikation von Deformationsereignissen*. GeoMonitoring 2021, online conference - **invited presentation**
- [T97] 09.02.2021, *VR gestützte Planung von geodätischen Netzmessungen*. 21<sup>st</sup> Internationale Geodätische Woche Obergurgl, online conference
- [T96] 02.12.2020, *Fibre Optic Sensing (FOS) in Railways*, Round Table discussion at Rail Live Virtual, online conference - **invited presentation**
- [T95] 26.11.2020, *Temperaturüberwachung von faseroptischen Kommunikationsleitungen der Wiener Netze*, 8. VKÖ-Stadtwerketag 2020, online conference - **invited presentation**
- [T94] 21.10.2020, *Faseroptische Sensorik im Tunnelbau*, ÖVG-Forum Lichtwellenleitersensorik im Eisenbahnwesen, Vienna, Austria - **invited presentation**
- [T93] 16.11.2020, *Alles regt sich, alles bewegt sich - Rutschungs- und Überwachungsmessungen*, Weiterbildungsveranstaltung "Vermessung aktuell", Innsbruck, Austria - **invited presentation**
- [T93] 05.03.2020, *Deformationsmessungen mit Kameras*, Internationalen Ingenieurvermessungskurs, Munich, Germany - **invited presentation**
- [T92] 09.01.2020, *Moderne Bauwerksüberwachung in Zeiten von Big Data und Industrie 4.0*, Geodätisches Kolloquium, Karlsruher Institute of Technology (KIT), Karlsruhe, Germany - **invited presentation**
- [T91] 19.11.2019, *Faseroptisch unterstützte Messmethoden zur Beobachtung von Gebirgsdruck*, VIF FORUM 2019, Vienna, Austria - **invited presentation**
- [T90] 14.10.2019, *Überwachung der Bauwerksicherheit im Kontext aktueller Großbauvorhaben*, Austrian Disaster Research Days 2019, Graz, Austria - **invited presentation**
- [T89] 19.09.2019, *Grobdetektion von Deformationen und Schadstellen von Stützmauern*, Voebu Seminar: FFG SIBS: Sicherheitsbewertung bestehender Stützbauwerke, Vienna, Austria - **invited presentation**
- [T88] 18.09.2019, *Optical surveillance of high pressure pipelines*, Distribution Committee Meeting, International Gas Union (IGU), Prague, Czech Republic - **invited presentation**
- [T87] 28.08.2019, *Assessment of crack patterns along plain concrete tunnel linings using distributed fiber optic sensing*, 5<sup>th</sup> International Conference on Smart Monitoring, Assessment and Rehabilitation of Civil Structures (SMAR), Potsdam, Germany
- [T86] 08.07.2019, *Distributed Fiber Optic Sensing on a Large Tunnel Construction Site: Increased Safety, More Efficient Construction and Basis for Condition-Based*

- Maintenance*, International Conference on Smart Infrastructure and Construction (ICSIC) 2019, Cambridge, UK
- [T85] 28.05.2019, *Master Class: Total Stations*, 6<sup>th</sup> International Course on Geotechnical and Structural Monitoring (IcGSM), Rome, Italy - **invited presentation**
- [T84] 11.02.2019, *Statische und dynamische Überwachung von Infrastrukturbauten mit kommerziellen Videotachymetern*, 20. Internationale Geodätische Woche Obergurgl, Austria
- [T83] 24.01.2019, *Monitoring von Stützmauern*, Burgdorfer Geotechniktag 2019, Burgdorf, Switzerland - **invited presentation**
- [T82] 23.11.2018, *Monitoring von Brückenkonstruktionen mit neuen Methoden*, Kulinarischer Bautreff – Die Bauwirtschaft im Wandel, Franzensfeste, Italy - **invited presentation**
- [T81] 14.11.2018, *High resolution monitoring of retaining walls with distributed fiber optic sensors and mobile mapping systems*, 7<sup>th</sup> Asia-Pacific Workshop on Structural Health Monitoring (APWSHM), Hong Kong
- [T80] 07.11.2018, *Statische und dynamische Bauwerksüberwachung mit linien- und flächenhaften Sensoren*, OVG Vortragsreihe, Vienna, Austria - **invited presentation**
- [T79] 06.06.2018, *Aktueller Status Forschungsprojekt Pipe Sense: Statische und dynamische Überwachung von Gasleitungen mittels faseroptischer Sensoren*, 128. ÖVGW-Jahrestagung, Salzburg, Austria - **invited presentation**
- [T78] 23.05.2018, *Monitoring of Displacement by Total Station, Laser Scanner and GNSS: Guidelines and Lessons Learned*, 5<sup>th</sup> International Course on Geotechnical and Structural Monitoring (IcGSM), Rome, Italy - **invited presentation**
- [T77] 21.05.2018, *Total Stations*, Master Class held at the 5<sup>th</sup> International Course on Geotechnical and Structural Monitoring (IcGSM), Rome, Italy - **invited presentation**
- [T76] 03.05.2018, *Drowning in data: The curse of high resolution structural health monitoring*, Geomatik Seminar, ETH Zurich, Switzerland - **invited presentation**
- [T75] 19.04.2018, *Geotechnisches Monitoring mit geodätischen und faseroptischen Sensoren: Aktuelle Entwicklungen und neue Möglichkeiten mit hochauflösenden Messverfahren*, Geodätisches Kolloquium, HafenCity Universität, Hamburg, Germany - **invited presentation**
- [T74] 15.02.2018, *Zustandsbeurteilung von Ingenieurbauwerken mittels statischem und kinematischem Laserscanning*, DGZfP Fachtagung Bauwerksdiagnose 2018, Berlin, Germany - **invited presentation**
- [T73] 11.01.2018, *Monitoring mit modernen Totalstationen: Kritische Komponenten und neue Möglichkeiten durch optimale Nutzung der integrierten Sensoren*. Geodätisches Kolloquium, Frankfurt University of Applied Sciences, Germany - **invited presentation**
- [T72] 14.12.2017, *Hochauflösende Deformationsmessungen von Ingenieurbauten mit geodätischen und faseroptischen Sensoren*. Geodätisches Kolloquium, RWTH Aachen, Germany - **invited presentation**
- [T71] 08.12.2017, *Efficient and Large Scale Monitoring of Retaining Walls along Highways using a Mobile Mapping System*. 8<sup>th</sup> Int. Conf. on Structural Health Monitoring of Intelligent Infrastructure – SHMII-8, Brisbane, Australia
- [T70] 16.11.2017, *Die Geister, die man rief – Der begrenzte Nutzen von hochfrequenten und hochauflösenden Monitoringdaten*. VoGIS Fachforum 2017, „Alles misst!“, Feldkirch, Austria - **invited presentation**

- [T69] 14.11.2017, *Linien- und flächenhaftes Strukturmonitoring mit geodätischen und geotechnischen Sensoren*. Messen im Bauwesen 2017, Bundesanstalt für Materialforschung und –prüfung (BAM), Berlin, Germany - **invited presentation**
- [T68] 05.11.2017, *New approaches to monitor geotechnical structures using mobile mapping systems, fiber optic sensors and image based techniques*. 6<sup>th</sup> International Forum on Opto-electronic Sensor-based Monitoring in Geo-engineering (OSMG). Nanjing University, China - **invited presentation**
- [T67] 26.09.2017, *Einsatz von kommerziellen Videotachymetern zur statischen und dynamischen Überwachung von Infrastrukturbauten*. Intergeo 2017, Berlin, Germany – **invited presentation**
- [T66] 14.09.2017, *Combined Laser Scanning and Image Based Monitoring of Large Infrastructure Objects*. Int. Workshop on Structural Health Monitoring (IWSHM), Stanford, USA
- [T65] 04.07.2017, *Hochauflösende Deformationsmessungen von Tunneltübbingen mit verteilten faseroptischen Sensoren*. VDI-Fachkonferenz Tunnelbau, Raunheim bei Frankfurt, Germany - **invited presentation**
- [T64] 14.06.2017, *Monitoring of Displacements by Topographic and GNSS Systems: Guidelines and Lessons Learned*. IV International Course on Geotechnical and Structural Monitoring, Rome, Italy - **invited presentation**
- [T63] 25.04.2017, *Richtig Arbeiten mit modernen Totalstationen*. Tutorial at 18<sup>th</sup> International Engineering Surveying Course, TU Graz, Austria
- [T62] 20.04.2017, *Überwachung von Ankerausziehversuchen im Rahmen der Hangsicherung für den Neubau einer Raffinerie*. 32<sup>nd</sup> Christian Veder Kolloquium 'Zugelemente in der Geotechnik', Graz, Austria
- [T61] 27.06.2016, *Condition monitoring of railway tracks and vehicles using fibre optic sensing techniques*. International Conference on Smart Infrastructure and Construction, (ICSIC), Cambridge, UK
- [T60] 31.05.2016, *Rissdetektion und Langzeitüberwachung von Bauteilen, Brücken und Staumauern mit faseroptischen Sensoren*. Geodätisches Kolloquium, Leibniz Universität Hannover, Germany - **invited presentation**
- [T59] 27.05.2016, *Critical Aspects when using Total Stations and Laser Scanners for Geotechnical Monitoring*. Civil Structural Health Monitoring Workshop (CSHM-6), Belfast, UK - **invited presentation**
- [T58] 07.04.2016, *Zufällige und systematische Fehler bei geodätischen Überwachungsmessungen*. ATCOLD-Kolloquium: Sichere Talsperren & Speicherbauwerke, Graz, Austria - **invited presentation**
- [T57] 31.03.2016, *High Frequent Total Station Measurements for the Monitoring of Bridge Vibrations*. Joint International Symposium on Deformation Monitoring (JISDM), Vienna, Austria
- [T56] 03.03.2016, *Überwachung von geotechnischen Objekten und Infrastrukturbauten mit faseroptischen Sensoren*. Geomonitoring 2016, Braunschweig, Germany
- [T55] 24.09.2015, *Überwachungsprojekte mit faseroptischen Sensoren*. Austrian National Committee on Large Dams (ATCOLD) AK Betrieb, Überwachung und Instandhaltung von Stauanlagen, Herbsttagung 2015, Stubachtal, Austria – **invited presentation**
- [T54] 01.09.2015, *State of the Art of Geodetic Bridge Monitoring*. Int. Workshop on Structural Health Monitoring - IWSHM, Stanford, USA

- [T53] 01.07.2015, *Continuous monitoring of a large concrete arch dam using Fibre Bragg Grating sensors*. 7<sup>th</sup> Int. Conf. on Structural Health Monitoring of Intelligent Infrastructure - SHMII, Turin, Italy
- [T52] 19.06.2015, *New concepts for the monitoring of concrete joints movements of water dams in pump-storage operation*. 83<sup>rd</sup> ICOLD Annual Meeting, Stavanger, Norway
- [T51] 05.05.2015 *Fehlereinflüsse bei automatisierten Überwachungsmessungen mit Totalstationen*. 12<sup>th</sup> Österreichischer Geodätentag, Velden, Austria – **invited presentation**
- [T50] 16.04.2015, *Messtechnische Überwachung von bewehrte Erde-Konstruktionen*. ZT-Forum Seminar: Bewehrte-Erde-Konstruktionen - Planung, Ausführung und praktische Fallbeispiele, Graz, Austria
- [T49] 09.02.2015, Erfassung und Analyse der Blockfugenbewegungen einer Staumauer im Pumpspeicherbetrieb. 18<sup>th</sup> Internationale Geodätische Woche Obergurgl, Obergurgl, Austria
- [T48] 21.11.2014, *Langzeitüberwachung von Hangbewegungen mit GNSS und faseroptischen Sensoren*. AHORN 2014 - der Alpenraum und seine Herausforderungen im Bereich Orientierung und Navigation und Informationsaustausch, Graz, Austria
- [T47] 06.11.2014, *Semmering-Basistunnel neu, Bewehrte-Erde-Konstruktionen - Ausführung und Monitoring mit faseroptischen Messsystemen*. Spezialtiefbau im Tunnelbau. Montanuniversität Leoben, Austria
- [T46] 17.10.2014, *Structural Monitoring using Geodetic and Fibre Optic Sensors*. Lecture at The University of Nottingham, Ningbo, China – **invited presentation**
- [T45] 13.10.2014, *High Sensitive Monitoring of Natural and Engineered Slopes*. 5<sup>th</sup> International Forum on Opto-electronic Sensor-based Monitoring in Geo-engineering (OSMG). Nanjing University, China – **invited presentation**
- [T44] 01.07.2014, *Laboratory and field validation of fibre optic strain measurements*. The Cambridge Conference on Fibre Optic Sensing in Civil Infrastructure (CamFOS). University of Cambridge, UK – **invited presentation**
- [T43] 24.04.2014, *Semmering-Basistunnel neu - geotechnisches Monitoring mit faseroptischen Messsystemen beim Bau von Bewehrte-Erde-Stützkonstruktionen in der Deponie Longsgraben*. 29<sup>th</sup> Christian-Veder-Kolloquium "Stützmaßnahmen in der Geotechnik", Graz, Austria
- [T42] 13.03.2014, *Herausforderungen bei der Messung und Auswertung von Deformationen im Inneren von Objekten*. 60 Jahre Geodäsie in Weimar "Geodäsie - Wofür?", Bauhaus-Universität Weimar, Germany – **invited presentation**
- [T41] 15.01.2014, *Richtig Arbeiten mit modernen TPS*. Tutorial at 17th International Engineering Surveying Course, ETH Zurich, Switzerland
- [T40] 14.01.2014, *Faseroptische Überwachung von Blockfugenbewegungen einer Talsperre*. 17<sup>th</sup> International Engineering Surveying Course, ETH Zurich, Switzerland
- [T39] 09.12.2013, *Deformation Monitoring of Flood Prevention Dams using Geodetic and Fibre Optic Measurement Techniques*. 6<sup>th</sup> International Conference on Structural Health Monitoring of Intelligent Infrastructure (SHMII-6), Hong Kong, China
- [T38] 05.12.2013, *Hochauflösende Erfassung und integrierte Auswertung von Deformationen*. Geodetic Colloquium, Braunschweig Technical University, Braunschweig, Germany – **invited presentation**
- [T37] 07.11.2013, *Hangrutschungen, Tunnelbauten und Pumpspeicherkraftwerke – Aktuelle ingenieurgeodätische Herausforderungen in Österreich*. Österreichische Geodätische

- Kommission (ÖGK) – 150 Jahre für den Fortschritt der Geodäsie, Vienna, Austria – **invited presentation**
- [T36] 09.09.2013, *Integrated Analysis of Inhomogeneous Structural Monitoring Data from Internal and External Sensors*. 2<sup>nd</sup> Conference on Smart Monitoring Assessment and Rehabilitation (SMAR), Istanbul, Turkey
- [T35] 14.05.2013, *Deformationsmessungen eines Erddammes mit faseroptischen Sensoren*. 3. Tagung Messtechnik, Vienna, Austria
- [T34] 12.03.2013, *Die Bedeutung von faseroptischen Messsystemen für ingeniergeodätische Überwachungsmessungen*. 2. Darmstädter Ingenieurkongress – Bau und Umwelt, Darmstadt, Germany
- [T33] 22.01.2013, *Dammüberwachung mit geodätischen und faseroptischen Methoden*. Leica Geosystems & rmData Tour 2013, Vienna, Austria – invited presentation
- [T32] 21.11.2012, *Wenn Genauigkeit zählt – Ingenieurgeodätische Überwachung von künstlichen und natürlichen Strukturen*. Antrittsvorlesung, Geo – Colloquium, Austrian Society for Surveying and Geoinformation, Graz, Austria
- [T31] 07.11.2012, *Challenges in the Analysis of Inhomogeneous Structural Monitoring Data*. Civil Structural Health Monitoring Workshop (CSHM-4), Berlin, Germany
- [T30] 19.10.2012, *Faseroptische Messsysteme als Teil moderner geodätischer Sensorik*. Fortbildungsveranstaltung "Vermessung aktuell" zum Thema "Geodätische Messtechnik - Grundlagen, Methoden, Anwendungen", University Innsbruck, Austria – **invited presentation**
- [T29] 09.10.2012, *Neue Technologien zur flächenhaften Messung von Oberflächen und deren Deformationen*. Intergeo 2012, Hannover, Germany – **invited presentation**
- [T28] 26.09.2012, *Analyse von Deformationsmessungen mit kausalen Auswertemodellen*. Interdisziplinäre Messaufgaben im Bauwesen, Bauhaus-Universität Weimar, Germany
- [T27] 25.09.2012, *Integrierte Auswertung von internen und externen Messdaten*. Seminar: Faseroptische Sensoren - Messsysteme mit Zukunft, Bauhaus-Universität Weimar, Germany
- [T26] 24.09.2012, *Übersicht über kommerziell verfügbare faseroptische Messsysteme*. Seminar: Faseroptische Sensoren - Messsysteme mit Zukunft, Bauhaus-Universität Weimar, Germany
- [T25] 24.09.2012, *Kalibrierung und Zuverlässigkeitsbeurteilung von faseroptischen Messsystemen*. Seminar: Faseroptische Sensoren - Messsysteme mit Zukunft, Bauhaus-Universität Weimar, Germany
- [T24] 05.06.2012, *System Investigations of Modern Geodetic Instruments*. Hexagon 2012 Conference, Las Vegas, USA – **invited presentation**
- [T23] 24.05.2012, *Ingenieurgeodätische Herausforderungen bei der Überwachung von Bauwerken und Rutschhängen*. OVG (Austrian Society for Surveying and Geoinformation) Colloquium, University of Innsbruck, Austria – **invited presentation**
- [T22] 03.11.2011, *The Importance of Engineering Geodesy in the Context of Structural Health Monitoring*. Joint International Symposium on Deformation Monitoring, Hong Kong – **keynote speech**
- [T21] 28.10.2011, *EDM-Basismessung mit LSPM-Auswertung*. GKGM Workshop: Hochgenaue Messung langer Strecken, Neubiberg, Germany

- [T20] 24.03.2011, *Die moderne Totalstation – ein komplexes Multisensorsystem*. OVG (Austrian Society for Surveying and Geoinformation) Colloquium, TU Vienna, Austria – **invited presentation**
- [T19] 01.06.2011, *The impact of image assisted surveying and image based documentation on traditional surveying workflows*. AfricaGEO - Developing Geomatics for Africa, Cape Town, South Africa – **keynote speech**
- [T18] 25.11.2010, *Der Einfluss neuer Technologien in Totalstationen auf klassische Vermessungsabläufe*. GEOMATIK-News, Zurich, Switzerland
- [T17] 05.10.2010, *Tachymetrie & GNSS – Bildgestützte Vermessung und Dokumentation*. Intergeo 2010, Cologne, Germany
- [T16] 25.02.2010, *“Vom Feld ins Internet” – ein Beispiel zur Nutzung internetfähiger Mobilkommunikation bei der Messwerterfassung und Visualisierung von Deformationsmessungen*. 16<sup>th</sup> International Engineering Surveying Course, Munich, Germany
- [T15] 11.02.2009, *Interoperability of GLONASS Observations for RTK Positioning Applications*. 15<sup>th</sup> International Geodetic Week, Obergurgl, Austria
- [T14] 13.11.2008, *New approaches to improve rover positions using standardized RTCM network information based on the Master Auxiliary Concept*. EUPOS-GNSS Symposium 2008, Berlin, Germany
- [T13] 30.06.2008, *Applied Laser Physics and Satellite Navigation Technology*. Live demonstration at the 58<sup>th</sup> Nobel Laureate Meeting (Physics). Lindau, Germany – **invited demonstration**
- [T12] 25.04.2008, *A Novel Method of Processing Standardized RTCM Network RTK Information for High-Precision Positioning*. ENC-GNSS 2008, Toulouse, France
- [T11] 08.11.2007, *Aktuelle Entwicklungen in der satellitenbasierten Positionierung (GPS/GLONASS/Galileo ...)*. GEOMATIK-News, Zurich, Switzerland
- [T10] 26.09.2007, *Neue Strategien des RTK-Processing im SAPOS Einsatz mit RTCM3.1 MAC*. Presentation session for SAPOS RTK network providers, Intergeo 2007, Leipzig, Germany – **invited presentation**
- [T9] 26.09.2007, *Aktueller GNSS Status*. Presentation session for SAPOS RTK network providers, Intergeo 2007, Leipzig, Germany – **invited presentation**
- [T8] 20.04.2007, *Integrierte Auswertung von inhomogenen Überwachungsdaten am Beispiel einer monolithischen Brücke*. 15<sup>th</sup> International Engineering Surveying Course, Graz, Austria
- [T7] 05.05.2006, *Auswertung von Überwachungsmessungen mit inhomogenen und hybriden Daten*. 9<sup>th</sup> Austrian Geodetic Day, Krems at the Danube, Austria
- [T6] 08.09.2005, *Critical Issues in Using the SOFO Measurement System for Structural Health Monitoring*. SAMCO (Structural Assessment, Monitoring and Control) Summer Academy 2005, Zell am See, Austria
- [T5] 16.03.2005, *Potentiale und Probleme beim Einsatz des faseroptischen SOFO Messsystems zur ingenieurgeodätischen Überwachung*. Geo – Colloquium, Austrian Society for Surveying and Geoinformation, Graz, Austria – **invited presentation**
- [T4] 22.03.2004, *Temperature Dependence of Gyroscopic Measurements Using the GYROMAT 2000*. Positioning Metrology and Surveying Group (Dr. Michel Mayoud), CERN, Geneva, Switzerland – **invited presentation**



- [T3] 17.03.2004, *Monitoring einer Brücke mit geodätischen Methoden und faseroptischen Sensoren*. 14. International Engineering Surveying Course, ETH Zurich, Switzerland
- [T2] 27.05.2003, *Monitoring of Bridge Deformations using Embedded Fiber Optical Sensors*. 11th International Symp. on Deformation Measurements, Santorini, Greece
- [T1] 24.04.2002, *Positioning by an Active GPS System: Experimental Investigation of the Attainable Accuracy*. FIG XXII Congress, Session TS5.6, Washington, USA

## VIII. Academic Activities

### National and International Bodies

- since 01.01.2023 **President of the *International Society for Structural Health Monitoring of Intelligent Infrastructure (ISHMII)***
- since 01.01.2023 **Chair of Commission 6 - Engineering Surveys of the *International Federation of Surveyors (FIG)* for the period 2023-2026**
- since 01.01.2020 **President of the *Austrian Geodetic Commission (ÖGK)***
- 01.01.2016 -  
31.12.2019 **Vice President of the *Austrian Geodetic Commission (ÖGK)***
- since 01.01.2012 Member of the ***Austrian Geodetic Commission (ÖGK)***
- since 01.01.2020 **Vice – Dean of the Faculty of Mathematics, Physics and Geodesy of *Graz University of Technology (TUG)***
- since 15.12.2020 **Vice President for West Europe of the *International Society of Environmental Geotechnology (ISEG)***
- since 13.06.2013 Council Member of the ***International Society for Structural Health Monitoring of Intelligent Infrastructure (ISHMII)***
- since 01.03.2012 Member of the ***International Society for Structural Health Monitoring of Intelligent Infrastructure (ISHMII)***
- since 01.05.2013 Member of the ***Austrian National Committee on Large Dams (ATCOLD)***
- since 09.04.2013 Austrian Representative of the ***International Organization for Standardization (ISO) TC172/SC6 "Geodetic and surveying instruments"***
- since 12.12.2014 Member of the ***German Geodetic Commission (DGK)***
- since 01.01.2013 Member of the ***German Geotechnical Society (DGGT)***
- since 10.05.2012 Council Member of the ***Austrian Society for Surveying and Geoinformation (OVG)***
- since 27.10.2011 Member of the ***Society for Calibration of Geodetic Devices (SCGD)***

### Journals and Examination

- since 12.02.2016 Member of the **Editorial Board of the *Journal of Applied Geodesy***

since 21.08.2012	Member of the <b>Editorial Board of the Austrian Journal of Surveying and Geoinformation (VGI)</b>
2012 – 2017	Member of the <b>Editorial Board of The Monitor</b> . Associate Editor, responsible for Europe, Middle East and Africa
2012 – 2015	<b>Associate Editor of the Journal of Civil Structural Health Monitoring (JCSHM)</b>
Journal Reviewer	<p><u>Geodetic</u> Journal of Geodesy (JOGE), Journal of Applied Geodesy (JAG), Sensors, Journal of Civil Structural Health Monitoring (JCSHM), Journal of Surveying Engineering (SUENG), Survey Review, Allgemeine Vermessungsnachrichten (AVN), VGI, Applied Geomatics (AGMJ)</p> <p><u>Engineering and Monitoring</u> International Journal of Damage Mechanics (IJDM), Journal of Bridge Engineering (BEENG), Structural Health Monitoring (SHM), Automation in Construction (AUTCON), Engineering Structures (ENGSTRUCT), Structures and Buildings (SB), Smart Infrastructure and Construction (SMIC), Structural Engineering (STENG)</p> <p><u>Sensors</u> Sensors, IEEE Sensors Letters</p> <p><u>Geophysical and Geotechnical</u> Acta Geodaetica et Geophysica (AGGE), Journal of Rock Mechanics and Geotechnical Engineering (JRMGE), Applied Sciences, Natural Hazards (NHAZ), Tunnelling and Underground Space Technology (TUST)</p>
Supervision of MSc and PhD thesis	Supervisor of more than 30 master and 3 PhD theses at Graz University of Technology (Austria)
Examination of PhD theses	Examiner of PhD theses at: Technical University of Munich (Germany), University of Cambridge (UK), Technische Universität Berlin (Germany), Queen's University Belfast (Ireland), University College Dublin (Ireland), Leibniz University Hannover (Germany), Universite de Strasbourg (France), Johannes Kepler University Linz (Austria), Graz University of Technology (Austria), Queen's University (Canada), The Hong Kong Polytec University (China)
Project examiner	Examiner of project proposals for Deutschen Forschungsgemeinschaft (DFG), Swiss National Science Foundation (snf), Canadian Foundation for Innovation (CFI)

## IX. Awards

2021	<b>Best Paper Award</b> at the 10 <sup>th</sup> International Conference on Structural Health Monitoring (SHMII) for the article: <i>Autonomous Integrity Monitoring of Shotcrete Tunnel Linings using Distributed Fiber Optic Sensing</i>
2019	<b>Best Paper Award</b> at the 2 <sup>nd</sup> International Conference on Smart Infrastructure and Construction, (ICSIC), Cambridge, UK for the article <i>Distributed fiber optic sensing on a large tunnel construction site: Increased safety, more efficient construction and basis for condition based maintenance</i>

- 2018      **Teaching Award of Excellence 2017/2018** awarded by the TU Graz for the Lecture: Advanced Engineering Geodesy
- 2018      **Staatspreis Patent (Federal Patent Award) 2017, Finalist** with the patent: Tübbingelement mit Dehnungsmessung, AT516158 (B1)
- 2016      **Best Paper Award** at the International Conference on Smart Infrastructure and Construction, (ICSIC), Cambridge, UK for the article *Condition monitoring of railway tracks and vehicles using fibre optic sensing techniques*
- 2015      **Houska Award 2015, Finalist** with the project: High Sensitive Monitoring of Water Dams in Pump-Storage Operation
- 2008      **Josef-Krainer-Award 2008** for the PhD Thesis: Analysis of Inhomogeneous Structural Monitoring Data
- 2007      **BMW Scientific Award 2007, 5<sup>th</sup> Place in category PhD thesis** for the PhD thesis: Analysis of Inhomogeneous Structural Monitoring Data
- 2007      **Austrian Construction Award** for the PhD thesis: Analysis of Inhomogeneous Structural Monitoring Data
- 1998      **Global Surveys Limited Prize** for the Best Final Year Student at the BEng (Hons) Engineering Surveying course at the Nottingham Trent University

Date: December 2024