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研究領域：地震儀器、遙記式地震觀測網  
Specialty: Seismic Instrumentation, Seismic Telemetry System

### [ 學歷 Education ]

- 1979 : 台灣科技大學 學士  
B. A. , 1979 , Electronic Engineering, National Taiwan University of Science and Technology

### [ 經歷 Experiences ]

- 1976 - 1980 : 中研院地球所技佐 Electronic Technician, IES-Academia Sinica
- 1980 - 1985 : 技士 Electronic Technician, IES-Academia Sinica
- 1985 - 1992 : 荐任技正 Electronic Engineer
- 1992 - 2003 : 簡任技正 Electronic Engineer
- 2003 - 2017 : 研究技師 Research Scientist
- 2017 - : 客座專家 Visiting Specialist

### [ 榮譽 Honor ]

- 救國團青年獎章 (1981)
- 行政院傑出科技榮譽獎 (1982)
- 交通部研究成果優等獎 (1993)

### [ Training ]

- Instrumentation for Seismic Research Observatory, Albuquerque Seismological Laboratory, USGS, 1975.
- Instrumentation for SMA-1, SMA-2 Strong-motion Accelerographs, Kinematics Inc., 1975, 1982.
- 3-year MBA program for high-tech enterprises, Dept. of Business Administration, NCU, 1990-1993.
- Evaluation and testing of strong-motion accelerographs, USGS, 1993.
- Database and instrumentation for portable array, PASSCAL Instrument Center, IRIS, 1999.
- Dynamic Signal Analyzer, VAX/VMS System Management, VAX RDB/VMS Design, Labview and others.

### [ Engineering Contributions ]

#### I. Network deployment and operation

Lead a team to install, maintain and operate the instruments for:

1. Taiwan telemetered Seismographic Network (TTSN). 1973-1992.

2. The **TATO** station of Seismic Research Observatory (1976-1992), and Global Seismograph Network (1992- Present), in cooperation with Albuquerque Seismological Laboratory of USGS.
3. Strong Motion Accelerograph Array in Taiwan, Phase 1 (**SMART-1**), a cooperation program between University of California at Berkeley and Institute of Earth Sciences, 1980-1990.
4. Strong Motion Accelerograph Array in Taiwan, Phase 2 (**SMART-2**), 1990 - Present.
5. Lotung Large Scale Seismic Test Array (**LSST**), 1985-1990, and Hualien Large Scale Seismic Test Array (**HLSST**), 1993-2002.
6. Onshore/offshore wide-angle deep seismic profiling in Taiwan, 1994.
7. Tatunshan Micro-earthquake Monitoring Network, 1995-2001.
8. Strong Motion Downhole Array in Taipei Basin, 1994 - Present.
9. Broadband Array in Taiwan for Seismology (**BATS**), 1995 - Present.

## II. Seismic system development

1. Developed a computerized seismic monitoring system for Taiwan telemetered Seismographic Network (1988). The system consisted of a 64-channels A/D converter, a PDP-11/70 minicomputer, and a Micro-VAX workstation. Several tasks, such as data acquisition, event detection, automatic location and data reduction could be concurrently performed on the system.
2. Developed the data acquisition system for retrieving the seismic data from the SDP system of CWB's short period seismic network (1993). Using X-terminal, event location and it related waveform data, can be displayed and accessed by any user with local area network.
3. Implemented the telemetered data acquisition system for the **BATS**, 2000.
4. Implemented a system based on Earthworm software for CWB's broadband network, 2002.
5. Implemented an Earthworm system for BATS to exchange the realtime data between IES and CWB, 2003.

## III. Instruments and PC-Based data acquisition system development

1. Designed the amplifiers and filters for Taipei Basin research project, 1976.
2. Designed the interface circuit for G826A proton magnetometer, 1980.
3. Developed the signal condition box for the strong-motion building array. 1992.
4. Developed the data acquisition system for the Large Scale Seismic Test Program in Hualiean. The system used IEEE-488 controller and three 16-bit, 64-channel A/D converters to record the signal from accelerometers and pressure transducers. The recorded data had been applied to structure response and soil-structure interaction research, 1993.
5. Developed the automatic testing and calibration system for force balance accelerometer, 1994.
6. Developed the data acquisition system to upgrade existing PANDA-II data acquisition system. The system was developed on a Windows-2000 platform, used IASPEI Software Library and virtual instrument technology to record the real time data from PANDA-II telemetered system, 2000.
7. Designed and implemented a new prototype type data acquisition system for the strong-motion building array. The Labview and PCI-6033E data acquisition board from the National instruments and the IASPEI software library were used to create this application, 2003.

## IV. Technical service

1. Seismological Instrument Service Program, National Science Council, 1989-1992.
2. Evaluate the strong motion accelerographs for CWB's **TMSIP** program, 1992-Present.
3. Assisted CWB to setup broadband seismic network, 2001-2002.
4. Implemented a PC-based seismic data acquisition system for Hong Kong Observatory, 2002.
5. Developed the software for quickly and easily review, extract and convert huge amount data stream from different 24-bit data recorders, such as SMATAC-801H (Tokyo Sokushin), DL-24 (Geotech) and Q330 (Quanterra), 2003.

[ 著作 Publications ]

1. **Liu, C.C.**, Y.T. Yeh, 1985: Instrument final installation report for Lotung Large Scale Seismic Test Program, Open File Rept., Institute of Earth Sciences, Academia Sinica, ROC, 295pp.
2. **Liu, C.C.**, J.H. Wang, Y.T. Yeh, 1988: A multiple-purpose earthquake analysis system, Proc. of the second Taiwan symposium on Geophysics, pp. 203-210.
3. Wang, J.H., **C.C. Liu**, Y.B. Tsai, 1989: Local magnitude determined from a simulated Wood-Anderson seismograph, Tectonophysics, 166(1989) 15-26.
4. Yeh, Y.T., **C.C. Liu**, J.H. Wang, 1989: Seismic Networks in Taiwan, Proc. Natl. Sci. Council. ROC(A), Vol. 13, No. 1, 1989, pp. 23-31.
5. Huang, B.S., N.P. Chiu, **C.C. Liu**, 1991: Primary Study for S -Phase Observed at Lu-Tao and Lan-Hsu, Proceeding of the third Taiwan Symposium on Geophysics, pp. 47-59.
6. Yeh, Y.T., **C.C. Liu**, P.S. Wang, 1991, An Earthquake Database Management System, Proc. of The Fourth CODATA Task Group Meeting on the Survey of Data Sources in Asian- Oceanic Countries, Publishing.
7. Chiu, H.C., Y.T. Yeh, S.D. Ni, L. Lee, W.H. Liu, G. F. Wen and **C.C. Liu**, 1994, Anew Strong-motion Array in Taiwan: SMART-2, TAO, Vol 5, No. 4, 463-475.
8. Huang, W. G. , **C. C. Liu** and Y. T. Yeh (1994). Strong-motion earthquake records on the 20 January, 1994, in LSST array, Hualien, IESER94-001.
9. Huang, W. G. , **C. C. Liu**, S. N. Cheng and Y. T. Yeh (1994). Strong-motion earthquake records on the 5 June, 1994, in LSST array, Hualien, IESER94-002.
10. Wen, K.L, L.Y. Fei, H.Y. Peng and **C.C. Liu**, 1995, Site Effect Analysis From the Records of the Wuku downhold Array, TAO, Vol . 6, No. 2, 285-298.
11. Yang, Y. C., W. G. Huang, **C. C. Liu**, S. N. Cheng and Y. T. Yeh (1995). Strong-motion earthquake records on the 23 February, 1995, in LSST array, Hualien, IESER95-001.
12. Yang, Y. C., W. G. Huang, **C. C. Liu**, S. N. Cheng and Y. T. Yeh (1995). Strong-motion earthquake records on the 1 May, 1995, in LSST array, Hualien, IESER95-002.
13. Yang, Y. C., W. G. Huang, **C. C. Liu**, S. N. Cheng and Y. T. Yeh (1995). Strong-motion earthquake records on the 2 May, 1995, in LSST array, Hualien, IESER95-003.
14. Huang, B.S., T.L. Teng, **C.C. Liu**, T.C. Shin, 1996, Excitation of Short-Period Surface Waves in Taiwan by the Hyogo-ken Nanbu Earthquake of January 17, 1995, J. Phys. Earth, 44, 419-427, 1996.
15. W. G. Huang , **C. C. Liu**, S. N. Cheng and Y. T. Yeh (1996). Strong-motion earthquake records on the 7 October, 1995, in LSST array, Hualien, IESER96-001.
16. W. G. Huang , **C. C. Liu**, S. N. Cheng and Y. T. Yeh (1996). Strong-motion earthquake records on the 26 November, 1995, in LSST array, Hualien, IESER96-002.
17. W. G. Huang , **C. C. Liu**, S. N. Cheng and Y. T. Yeh (1997). Strong-motion earthquake records on the 28 May, 1996, in LSST array, Hualien, IESER97-001.
18. W. G. Huang , **C. C. Liu** and Y. T. Yeh (1998). Strong-motion earthquake records on the 17 July, 1998, in LSST array, Hualien, IESER98-001.
19. **Liu, C. C.**, Y. H. YeH, H. C. Chiu, and H. Kao, 1998. Seismic networks operated by the Institute of Earth Sciences, Academia Sinica, EOS Trans. AGU, 79, W79.
20. Kao, Hoon, P. R. Jian, K. F. Ma, B. S. Huang, **C.C. Liu**, Moment-tensor inversion for offshore earthquakes east of Taiwan and their implications to regional collision, Geophys. Res. Lett. Vol. 25, No. 19, 3619-3622, 1998.
21. Yeh, Y. H., R. C. Shih, C. H. Lin, **C. C. Liu**, H. Y. Yen, B. S. Huang, C. S. Liu, P. Z. Chen, C. S. Huang, C. J. Wu and F. T. Wu, 1998, Onshore/offshore wide-angle deep seismic profiling in Taiwan, TAO, 9, 301-316.
22. Yeh, Y. H., C.H. Lin, **C.C. Liu**, H.Y. Yen (1998), Geophysical monitoring volcano activities at Mt. Tatun, Western Pacific Geophysical Meetings, Taipei, Taiwan.
23. W. G. Huang , **C. C. Liu** and W. H. Liu (2000). LSST Strong-motion records from the Chi-Chi, Taiwan earthquake of 20 September 1999, IESER2000-001.
24. W. G. Huang , **C. C. Liu** and W. H. Liu (2000). LSST Strong-motion records from the Taitung, Taiwan earthquake of 1 November 1999, IESER2000-002.

25. W. G. Huang , **C. C. Liu** and W. H. Liu (2000). LSST Strong-motion records from the Hualien, Taiwan earthquake of 5 November 1999, IESER2000-003.
26. W. G. Huang , **C. C. Liu** and W. H. Liu (2001). LSST Strong-motion records from the Hualien, Taiwan earthquake of 14 July 2000, IESER2001-003.
27. W. G. Huang , **C. C. Liu** and W. H. Liu (2001). LSST Strong-motion records from the Hualien, Taiwan earthquake of 10 September 2000, IESER2001-004.
28. Shin, T. C., Y. B. Tsai, Y. T. Yeh, **C. C. Liu**, Y. M. Wu, 2003, Strong-Motion Instrumentation Programs in Taiwan, *International Handbook of Earthquake and Engineering Seismology*, pp. 1057-1062.
29. Teng , T.L., Y. M. Wu, T. C. Shin, Y. B. Tsai, W. H. K. Lee and **C. C. Liu**, N. C. Hsiao, 2004, Development of Modern Seismic Monitoring in Taiwan and Progress on Earthquake Rapid Reporting and Early Warning Systems. 兩岸強地動觀測暨地震測報研討會 , pp. 1-19.
30. **Liu , C.C.** , B. S. Huang, and W. H. K. Lee , (2006). A preliminary report of two earthquakes recorded by both broadband and rotation sensors , *Workshop on Measuring the Rotation Effects of Strong Ground Motion*, February 16, 2006.
31. **Liu , C. C.** , W. H. K. Lee, and C. F. Wu , (2006). Instrument testing and evaluation for the Taiwan Strong-Motion Instrumentation Program . *International Workshop for Site Selection, Installation and Operation of Geotechnical Strong-Motion Arrays*, May 17 – 19, 2006
32. B. S. Huang, **C. C. Liu**, C. R. Lin, C. F. Wu, W. H. K. Lee, (2006). Measuring Mid- and Near-Field Rotational Ground Motions in Taiwan. *Fall AGU Meeting, Dec. 11-15, 2006, San Francisco*.
33. **C. C. Liu**, W. T. Liang, W. G. Huang and B. S. Huang, (2007), The installation of seismic instruments in SBCB, Hsinchu, Taiwan site and introduction of broadband array observations in Taiwan. *First Asia workshop on superconducting gravimetry*, March 12 – 15, 2007.
34. Evans, J. R., A. Cochard, V. Graizer, B. S. Huang, K. W. Hudnut, C. R. Hutt, H. Igel, W. H. K. Lee, **C. C. Liu**, E. Majewski, R. Nigbor, E. Safak, W. U. Savage, U. Schreiber, R. Teisseyre, M. Trifunac, J. Wassermann, and C. F. Wu, Rotational seismology workshop of February 2006, U.S. Geol. Surv. Open File Rep., 2007-1145, 20 pp., 2007.
35. **C. C. Liu**, B. S. Huang, C. R. Lin, W. H. K. Lee, T. L. Teng, (2007).: Measuring Rotational Motions from Local Earthquakes at the HGSD Station in Taiwan. *First International Workshop on Rotational Seismology and Engineering Applications*, Sep. 18-20,2007.
36. W.H.K. Lee, B.S. Huang, **C.C. Liu**, T.L. Teng, and C.F. Wu (2007), Observations of Rotational Ground Motions from Local Earthquakes in Taiwan. *First International Workshop on Rotational Seismology and Engineering Applications*, Sep. 18-20, 2007.
37. Evans, J. R., R. Cowsik, C. R. Hutt, **C. C. Liu**, R. Nigbor, U. Schreiber, F. Vernon, and E. Wielandt (2007), Development of Methods for Testing Rotational Sensors. *First International Workshop on Rotational Seismology and Engineering Applications*, Sep. 18-20, 2007.
38. B. S. Huang, **C. C. Liu**, W. T. Liang and W. G. Huang, (2008). Plans for Taiwan earthquake and tsunami monitoring cooperation with countries surrounding the South China Sea. *International Symposium on Grid Computing (ISGC)*, April 7-11, 2008.
39. Lin, C.J. **C.C. Liu** (2008), Calibration the R-1 rotation sensors on CT-EW1 table, Institute of Earth Sciences, Academia Sinica, Open File Rep., IESER2008-001.
40. Huang. W. G., B. S. Huang, K. C. Chen, **C. C. Liu**, C. R. Lin, S. H. Tsao, Y. C. Hsieh, C. H. Chen (2008). Observations using the Taipei Basin Broadband Downhole Seismic Network: the December 26, 2006, Pingtung Earthquake Doublet, Taiwan. *Terr. Atm. Ocean Sci.*, 19, 761-766, doi:10.3319/TAO.2008.19.6.761 (PT).
41. W.H.K. Lee, B.S. Huang, C.A. Langston, C.J. Lin, **C.C. Liu**, T.C. Shin, T.L. Teng, and C.F. Wu (2009), Rotational Ground-Motion Observations from Explosions and Local Earthquakes in Taiwan: A Progress Review, *Bull. Seism. Soc. Am.* **99**, 958-967. Special Issue on Rotational Seismology and Engineering Applications.

42. Langston, C.A., W.H.K. Lee, C.J. Lin, and **C.C. Liu** (2009). Seismic wave strain, rotation, and gradiometry for the 4 March 2008 TAIGER Explosions, *Bull. Seism. Soc. Am.* **99**, 1287-1301. Special Issue on Rotational Seismology and Engineering Applications.
43. Lin, C.J. **C.C. Liu**, and W.H.K. Lee (2009). Recording rotational and translational ground motions of two TAIGER explosions in northeastern Taiwan on March 4, 2008, *Bull. Seism. Soc. Am.* **99**, 1237-1250. Special Issue on Rotational Seismology and Engineering Applications.
44. **Liu, C.C.**, B.S. Huang, W.H.K. Lee, and C.J. Lin (2009). Observing rotational and translational ground motions at the HGSD station in Taiwan from 2004 to 2008, *Bull. Seism. Soc. Am.* **99**, Special Issue on Rotational Seismology and Engineering Applications. -> **1228-1236**
45. Huang, B. S., T. S. Le, **C. C. Liu**, D. V. Toan, W. G. Huang, Y. M. Wu, Y. G. Chen, W. Y. Chang (2009). A portable broadband seismic network in Vietnam for investigating tectonic deformations, the earth's interior and experimentation for earthquake and tsunami early warning, *J. Asian Earth Sci.*, doi:10.1016 /j.jseaes.2009.02.012.
46. John Nábělek, György Hetényi, Jérôme Vergne, Soma Sapkota, Basant Kafle, Mei Jiang, Heping Su, John Chen, Bor-Shouh Huang, and the **Hi-CLIMB Team** (2009), Underplating in the Himalaya-Tibet collision zone revealed by the Hi-CLIMB experiment. *Science* **325**, 1371 (2009), DOI: 10.1126/science.1167719.
47. Lin, C.J., H.P. Huang, **C.C. Liu**, and H.C. Chiu (2010). Application of Rotational Sensors to Correcting Rotation-Induced Effects on Accelerometers, *Bull. Seism. Soc. Am.*, 100, 585–597, April 2010, doi: 10.1785/0120090123.
48. Chin-Jen Lin, John R. Evans , Charles R. Hutt , Robert L. Nigbor , **Chun-Chi Liu**, and Han-Pang Huang (2009), A Comparison of Some Rotational Sensors, Seismic Instrumentation Technology Symposium, Nov. 10-11, 2009.
49. **Chun-Chi Liu**, Chin-Jen Lin, Chien-Fu Wu, Jau-Yi Lin, John R. Evans, and William H. K. Lee (2009), Observing Rotational and Translational Ground Motions in Taiwan: 2008-2009, Seismic Instrumentation Technology Symposium, Nov. 10-11, 2009.
50. Lin, C.J., H.P. Huang, **C.C. Liu** and H.C. Chiu (2010) Application of Rotational Sensors to Correcting Rotation-Induced Effects on Accelerometers. *BULLETIN OF THE SEISMOLOGICAL SOCIETY OF AMERICA*, 100(2), 585-597.
51. Huang, W.G., B.S. Huang, J.H. Wang, K.C. Chen, **C.C. Liu**, K.L. Wen, S.H. Tsao, Y.C. Hsieh and C.H. Chen (2010) Enhancement of seismic observation in the Taipei metropolitan area from a downhole network”, *TERRESTRIAL ATMOSPHERIC AND OCEANIC SCIENCES*, 21(3),615-625.
52. Huang, B. S., **C. C. Liu**, Eric Yen, W. T. Liang, Simon C. Lin, W. G. Huang, S. J. Lee and H, Y. Chen (2010) TW E-science to Assistant Seismic Observations for Earthquake Research, Monitor and Hazard Reduction Surrounding the South China Sea”, editor(s): Eds. Eric Yen and Simon C. Lin, *Managed Grids and Cloud Systems in the Asia-Pacific Research Community*, pp. 165-178, Academia Sinica: Springer.
53. Bor-Shouh Huang, Po-Fei Chen, Yi-Ling Huang, Win-Gee Huang, and Chun-Chi Liu (2011) Investigation of T-Wave Propagation in the Offshore Area East of Taiwan from Early Analog Seismic Network Observations, *TAO*, 22(4), 383-391. doi: 10.3319/TAO.2011.03.09.01(T)
54. Chi, Wu-Cheng, W.H.K.Lee, J.A.D. Aston, C.J. Lin and **C. C. Liu** (2011) Inversion of ground motion data from a seismometer array for rotation using a modification of Jeager's method. Bulletin of the Seismological Society of America, Vol. 101, No. 6, pp. 3105–3109, December 2011, doi: 10.1785/0120100204 (short note).
55. Lee, W. H. K., J. R. Evans, B. S. Huang, C. R. Hutt, C. J. Lin, **C. C. Liu**, and R. L. Nigbor (2012). Measuring rotational ground motions in seismological practice. In: P. Bormann (Ed.), *New Manual of Seismological Observatory Practice 2 (NMSOP-2)* (pp. 1-27). Potsdam: Deutsches GeoForschungs Zentrum GFZ. doi:10.2312/GFZ.NMSOP-2\_IS\_5.3.
56. Lin, C. J., W. G. Huang, H. P. Huang, B. S. Huang, C. S. Ku and **C. C. Liu**, 2012, Investigation of array-derived rotation in TAIPEI 101, *J. Seismology*, doi: 10.1007/s10950-012-9306-7.
57. Chiu, H. C., F. J. Wu, C. J. Lin, H. C. Huang and **C. C. Liu**, 2012, Effects of rotation motions on strong-motion data, *J. Seismology*, doi: 10.1007/ s10950-012-9301-z.

58. Kendall, L. M., C. A. Langston, W. H. K. Lee, C. J. Lin, **C. C. Liu**, 2012, Comparison of point and array-computed rotations for the TAIGER explosions of 4 March 2008, J. Seismology, doi: 10.1007/s10950-012-9297-4.
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### [報告 Report]

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2. 劉忠智, 蔡義本, 1978, 臺灣自動測震網及地震研究觀測站系統, 中央研究院成立五十周年紀念論文集。
3. 劉忠智, 1980, G826A 質子磁力儀與 GP606 印字機的界面電路設計, 中央研究院地球科學研究所籌備處報告, 共 18 頁。
4. 劉忠智, 1980, 利用 L-4C 型地震感應器與積分器模擬 Wood-Anderson 地震儀, 中央研究院地球科學研究所報告, 共 23 頁。
5. 劉忠智, 劉文相, 1982, 核能電廠強震儀系統維護報告 (1), 中央研究院地球科學研究所報告, 共 68 頁。
6. 劉忠智, 劉文相, 1983, 核能電廠強震儀系統維護報告 (2), 中央研究院地球科學研究所報告, 共 67 頁。
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11. 劉忠智, 王錦華, 葉永田, 1987, 數位式地震資料處理系統之規畫, 行政院國家科學委員會防災科技研究報告 76-43 號, 共 48 頁。
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