

# FEDERAL FINANCIAL REPORT

(Follow form instructions)

|                                                                                                                                                                                                                                                                                                |                          |                                                                                                                                                |                                                                                                                                                                              |                                                                                                     |                                 |                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|---------------------------------|-----------------------|
| 1. Federal Agency and Organizational Element to Which Report is Submitted<br>Office of Naval Research Global<br>86 Blenheim Crescent, Ruislip MX HA4 7HB, United Kingdom                                                                                                                       |                          | 2. Federal Grant or Other Identifying Number Assigned by Federal Agency<br>(To report multiple grants, use FFR Attachment)<br>N62909-16-1-2057 |                                                                                                                                                                              | Page<br>1                                                                                           | of<br>pages                     |                       |
| 3. Recipient Organization (Name and complete address including Zip code)<br>National Applied Research Laboratories (NARLabs)<br>3F, 106, Heping E. Rd., Sec. 2, TA AN DIST., 10622 Taipei City, REPUBLIC OF CHINA(TAIWAN)                                                                      |                          |                                                                                                                                                |                                                                                                                                                                              |                                                                                                     |                                 |                       |
| 4a. DUNS Number<br>658460555                                                                                                                                                                                                                                                                   | 4b. EIN<br>44-4444444    | 5. Recipient Account Number or Identifying Number<br>(To report multiple grants, use FFR Attachment)                                           | 6. Report Type<br><input type="checkbox"/> Quarterly<br><input type="checkbox"/> Semi-Annual<br><input type="checkbox"/> Annual<br><input checked="" type="checkbox"/> Final | 7. Basis of Accounting<br><input type="checkbox"/> Cash <input checked="" type="checkbox"/> Accrual |                                 |                       |
| 8. Project/Grant Period<br>From: (Month, Day, Year)<br>03/23/2016                                                                                                                                                                                                                              |                          | To: (Month, Day, Year)<br>05/26/2016                                                                                                           |                                                                                                                                                                              | 9. Reporting Period End Date<br>(Month, Day, Year)<br>05/26/2016                                    |                                 |                       |
| 10. Transactions                                                                                                                                                                                                                                                                               |                          |                                                                                                                                                |                                                                                                                                                                              | Cumulative                                                                                          |                                 |                       |
| (Use lines a-c for single or multiple grant reporting)                                                                                                                                                                                                                                         |                          |                                                                                                                                                |                                                                                                                                                                              |                                                                                                     |                                 |                       |
| Federal Cash (To report multiple grants, also use FFR Attachment):                                                                                                                                                                                                                             |                          |                                                                                                                                                |                                                                                                                                                                              |                                                                                                     |                                 |                       |
| a. Cash Receipts                                                                                                                                                                                                                                                                               |                          |                                                                                                                                                |                                                                                                                                                                              | NT\$ 322,300                                                                                        |                                 |                       |
| b. Cash Disbursements                                                                                                                                                                                                                                                                          |                          |                                                                                                                                                |                                                                                                                                                                              | NT\$ 322,300                                                                                        |                                 |                       |
| c. Cash on Hand (line a minus b)                                                                                                                                                                                                                                                               |                          |                                                                                                                                                |                                                                                                                                                                              | NT\$ 0                                                                                              |                                 |                       |
| (Use lines d-o for single grant reporting)                                                                                                                                                                                                                                                     |                          |                                                                                                                                                |                                                                                                                                                                              |                                                                                                     |                                 |                       |
| Federal Expenditures and Unobligated Balance:                                                                                                                                                                                                                                                  |                          |                                                                                                                                                |                                                                                                                                                                              |                                                                                                     |                                 |                       |
| d. Total Federal funds authorized                                                                                                                                                                                                                                                              |                          |                                                                                                                                                |                                                                                                                                                                              | NT\$ 1,825,991                                                                                      |                                 |                       |
| e. Federal share of expenditures                                                                                                                                                                                                                                                               |                          |                                                                                                                                                |                                                                                                                                                                              | NT\$ 1,824,431                                                                                      |                                 |                       |
| f. Federal share of unliquidated obligations                                                                                                                                                                                                                                                   |                          |                                                                                                                                                |                                                                                                                                                                              | NT\$ 0                                                                                              |                                 |                       |
| g. Total Federal share (sum of lines e and f)                                                                                                                                                                                                                                                  |                          |                                                                                                                                                |                                                                                                                                                                              | NT\$ 1,824,431                                                                                      |                                 |                       |
| h. Unobligated balance of Federal funds (line d minus g)                                                                                                                                                                                                                                       |                          |                                                                                                                                                |                                                                                                                                                                              | NT\$ 1,560                                                                                          |                                 |                       |
| Recipient Share:                                                                                                                                                                                                                                                                               |                          |                                                                                                                                                |                                                                                                                                                                              |                                                                                                     |                                 |                       |
| i. Total recipient share required                                                                                                                                                                                                                                                              |                          |                                                                                                                                                |                                                                                                                                                                              | NT\$ 1,179,167                                                                                      |                                 |                       |
| j. Recipient share of expenditures                                                                                                                                                                                                                                                             |                          |                                                                                                                                                |                                                                                                                                                                              | NT\$ 1,179,167                                                                                      |                                 |                       |
| k. Remaining recipient share to be provided (line i minus j)                                                                                                                                                                                                                                   |                          |                                                                                                                                                |                                                                                                                                                                              | NT\$ 0                                                                                              |                                 |                       |
| Program Income:                                                                                                                                                                                                                                                                                |                          |                                                                                                                                                |                                                                                                                                                                              |                                                                                                     |                                 |                       |
| l. Total Federal program income earned                                                                                                                                                                                                                                                         |                          |                                                                                                                                                |                                                                                                                                                                              | 0                                                                                                   |                                 |                       |
| m. Program income expended in accordance with the deduction alternative                                                                                                                                                                                                                        |                          |                                                                                                                                                |                                                                                                                                                                              | 0                                                                                                   |                                 |                       |
| n. Program income expended in accordance with the addition alternative                                                                                                                                                                                                                         |                          |                                                                                                                                                |                                                                                                                                                                              | 0                                                                                                   |                                 |                       |
| o. Unexpended program income (line l minus line m or line n)                                                                                                                                                                                                                                   |                          |                                                                                                                                                |                                                                                                                                                                              | 0                                                                                                   |                                 |                       |
| 11. Indirect Expense                                                                                                                                                                                                                                                                           | a. Type<br>Predetermined | b. Rate<br>2%                                                                                                                                  | c. Period From<br>3/23/2016                                                                                                                                                  | d. Base<br>NTD 3,003,598                                                                            | e. Amount Charged<br>NTD 60,072 | f. Federal Share<br>0 |
|                                                                                                                                                                                                                                                                                                |                          |                                                                                                                                                | g. Totals:                                                                                                                                                                   | NTD 3,003,598                                                                                       | NTD 60,072                      | 0                     |
| 12. Remarks: Attach any explanations deemed necessary or information required by Federal sponsoring agency in compliance with governing legislation:                                                                                                                                           |                          |                                                                                                                                                |                                                                                                                                                                              |                                                                                                     |                                 |                       |
| 13. Certification: By signing this report, I certify that it is true, complete, and accurate to the best of my knowledge. I am aware that any false, fictitious, or fraudulent information may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 18, Section 1001) |                          |                                                                                                                                                |                                                                                                                                                                              |                                                                                                     |                                 |                       |
| a. Typed or Printed Name and Title of Authorized Certifying Official<br>Fong-Zhi Chen, Acting Director General<br>Instrument Technology Research Center, National Applied Research Center                                                                                                      |                          |                                                                                                                                                |                                                                                                                                                                              | c. Telephone (Area code, number and extension)<br>+886-3-5779911 ext. 105                           |                                 |                       |
|                                                                                                                                                                                                                                                                                                |                          |                                                                                                                                                |                                                                                                                                                                              | d. Email address<br>Chen@narlabs.org.tw                                                             |                                 |                       |
| b. Signature of Authorized Certifying Official<br>F. Z. Chen                                                                                                                                                                                                                                   |                          |                                                                                                                                                |                                                                                                                                                                              | e. Date Report Submitted (Month, Day, Year)<br>08/22/2016                                           |                                 |                       |
| 14. Agency use only:                                                                                                                                                                                                                                                                           |                          |                                                                                                                                                |                                                                                                                                                                              |                                                                                                     |                                 |                       |

Standard Form 425  
OMB Approval Number: 0348-0061  
Expiration Date: 10/31/2011

## Paperwork Burden Statement

According to the Paperwork Reduction Act, as amended, no persons are required to respond to a collection of information unless it displays a valid OMB Control Number. The valid OMB control number for this information collection is 0348-0061. Public reporting burden for this collection of information is estimated to average 1.5 hours per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0060), Washington, DC 20503.

| REPORT DOCUMENTATION PAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |             |                                          |                                                | Form Approved<br>OMB No. 0704-0188             |                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------------------------------|------------------------------------------------|------------------------------------------------|-------------------------------------------|
| <p>The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.</p> <p>PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.</p> |             |                                          |                                                |                                                |                                           |
| 1. REPORT DATE (DD-MM-YYYY)<br>08/22/2016                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |             | 2. REPORT TYPE<br>Final Technical Report |                                                | 3. DATES COVERED (From - To)<br>March-May 2016 |                                           |
| 4. TITLE AND SUBTITLE<br>CSP-IEEE Instrumentation and Measurement Technology Conference 2016 (IEEE I2MTC 2016)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |                                          | 5a. CONTRACT NUMBER                            |                                                |                                           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                                          | 5b. GRANT NUMBER<br>N62909-16-1-2507           |                                                |                                           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                                          | 5c. PROGRAM ELEMENT NUMBER                     |                                                |                                           |
| 6. AUTHOR(S)<br>Hwang, Chi-Hung                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                                          | 5d. PROJECT NUMBER                             |                                                |                                           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                                          | 5e. TASK NUMBER                                |                                                |                                           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                                          | 5f. WORK UNIT NUMBER                           |                                                |                                           |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)<br>National Applied Research Laboratories,<br>3F, 106, Hoping E. Rd., Sec. 2, TA AN Dist., 10622 Taipei City, Republic of China (Taiwan)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |                                          | 8. PERFORMING ORGANIZATION<br>REPORT NUMBER    |                                                |                                           |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)<br>Office of Naval Research Global<br>86 Blenheim Crescent<br>Ruislip MX HA4 7HB<br>United Kingdom                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |                                          | 10. SPONSOR/MONITOR'S ACRONYM(S)<br>ONR Global |                                                |                                           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                                          | 11. SPONSOR/MONITOR'S REPORT<br>NUMBER(S)      |                                                |                                           |
| 12. DISTRIBUTION/AVAILABILITY STATEMENT<br>Approved for Public Release; distribution is Unlimited.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             |                                          |                                                |                                                |                                           |
| 13. SUPPLEMENTARY NOTES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                                          |                                                |                                                |                                           |
| 14. ABSTRACT<br>IEEE Instrumentation and Measurement Technology Conference 2016 (is always abbreviated as IEEE I2MTC 2016 or I2MTC 2016) is the flagship conference of IEEE Instrumentation and Measurement Society. In 2016, the Conference attracts more than 235 attendees from 41 countries/areas. There were 1 plenary talk, 2 keynotes, 16 tutorials and 294 papers presented during the Conference. I2MTC 2016 included new technical activities, the industry sessions, special talks which highlighted the issues of paper preparation for submission, and a special invited talk session. All the key events and the hot topics revealed by this conference would be reported and highlighted in this report.                                                                                                                                                                                                                                             |             |                                          |                                                |                                                |                                           |
| 15. SUBJECT TERMS<br>Conference, IEEE, Instrumentation, Measurement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                          |                                                |                                                |                                           |
| 16. SECURITY CLASSIFICATION OF:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                                          | 17. LIMITATION OF<br>ABSTRACT                  | 18. NUMBER<br>OF<br>PAGES                      | 19a. NAME OF RESPONSIBLE PERSON           |
| a. REPORT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | b. ABSTRACT | c. THIS PAGE                             |                                                |                                                | 19b. TELEPHONE NUMBER (Include area code) |



## INSTRUCTIONS FOR COMPLETING SF 298

**1. REPORT DATE.** Full publication date, including day, month, if available. Must cite at least the year and be Year 2000 compliant, e.g. 30-06-1998; xx-06-1998; xx-xx-1998.

**2. REPORT TYPE.** State the type of report, such as final, technical, interim, memorandum, master's thesis, progress, quarterly, research, special, group study, etc.

**3. DATE COVERED.** Indicate the time during which the work was performed and the report was written, e.g., Jun 1997 - Jun 1998; 1-10 Jun 1996; May - Nov 1998; Nov 1998.

**4. TITLE.** Enter title and subtitle with volume number and part number, if applicable. On classified documents, enter the title classification in parentheses.

**5a. CONTRACT NUMBER.** Enter all contract numbers as they appear in the report, e.g. F33315-86-C-5169.

**5b. GRANT NUMBER.** Enter all grant numbers as they appear in the report. e.g. AFOSR-82-1234.

**5c. PROGRAM ELEMENT NUMBER.** Enter all program element numbers as they appear in the report, e.g. 61101A.

**5e. TASK NUMBER.** Enter all task numbers as they appear in the report, e.g. 05; RF0330201; T4112.

**5f. WORK UNIT NUMBER.** Enter all work unit numbers as they appear in the report, e.g. 001; AFAPL30480105.

**6. AUTHOR(S).** Enter name(s) of person(s) responsible for writing the report, performing the research, or credited with the content of the report. The form of entry is the last name, first name, middle initial, and additional qualifiers separated by commas, e.g. Smith, Richard, J, Jr.

**7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES).** Self-explanatory.

**8. PERFORMING ORGANIZATION REPORT NUMBER.** Enter all unique alphanumeric report numbers assigned by the performing organization, e.g. BRL-1234; AFWL-TR-85-4017-Vol-21-PT-2.

**9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES).** Enter the name and address of the organization(s) financially responsible for and monitoring the work.

**10. SPONSOR/MONITOR'S ACRONYM(S).** Enter, if available, e.g. BRL, ARDEC, NADC.

**11. SPONSOR/MONITOR'S REPORT NUMBER(S).** Enter report number as assigned by the sponsoring/monitoring agency, if available, e.g. BRL-TR-829; -215.

**12. DISTRIBUTION/AVAILABILITY STATEMENT.** Use agency-mandated availability statements to indicate the public availability or distribution limitations of the report. If additional limitations/ restrictions or special markings are indicated, follow agency authorization procedures, e.g. RD/FRD, PROPIN, ITAR, etc. Include copyright information.

**13. SUPPLEMENTARY NOTES.** Enter information not included elsewhere such as: prepared in cooperation with; translation of; report supersedes; old edition number, etc.

**14. ABSTRACT.** A brief (approximately 200 words) factual summary of the most significant information.

**15. SUBJECT TERMS.** Key words or phrases identifying major concepts in the report.

**16. SECURITY CLASSIFICATION.** Enter security classification in accordance with security classification regulations, e.g. U, C, S, etc. If this form contains classified information, stamp classification level on the top and bottom of this page.

**17. LIMITATION OF ABSTRACT.** This block must be completed to assign a distribution limitation to the abstract. Enter UU (Unclassified Unlimited) or SAR (Same as Report). An entry in this block is necessary if the abstract is to be limited.

Office of Naval Research Global (ONRG)  
Final CSP (Collaborative Science Program) Report

**Administrative Details:**

Event Name: **IEEE Instrumentation and Measurement Technology Conference 2016  
(IEEE I<sup>2</sup>MTC 2016)**

Event Dates: **May 23<sup>rd</sup> ~May 26<sup>th</sup>, 2016**

Event City and Country: **Taipei, Taiwan**

Grantee (Name and Contact Information):

**NATIONAL APPLIED RESEARCH LABORATORIES**

**3F, NO. 106, SEC. 2, HEPING E. RD., TAIPEI City 10622, Taiwan**

Principal Investigator (Name and Contact Information):

**Chi Hung Hwang**

**E-mail: [chhwang@narlabs.org.tw](mailto:chhwang@narlabs.org.tw)**

**Phone no. +886-35779911 ext. 557**

ONRG CSP Grant Number:

**N62909-16-1-2507**

Date of the Final Report:

**Aug. 15, 2016**

**Abstract:**

IEEE Instrumentation and Measurement Technology Conference 2016 (is always abbreviated as IEEE I<sup>2</sup>MTC 2016 or I<sup>2</sup>MTC 2016) is the flagship conference of IEEE Instrumentation and Measurement Society. The I<sup>2</sup>MTC is held annually, and the first Conference was held in 1984 in Long Beach, California. The I<sup>2</sup>MTC 2016 in Taipei is the 31<sup>st</sup> annual meeting in its history. I<sup>2</sup>MTC is an international technical forum focused on science and application of instrumentation and measurement. The Conference consists of tutorials, technical conference sessions (both oral and poster sessions), exhibits, keynotes and plenary talk integrated with social activities. In 2016, the Conference attracts more than 235 attendees from 41 countries/areas. There were 1 plenary talk, 2 keynotes, 16 tutorials and 294 papers presented during the Conference. Other than traditional events, I<sup>2</sup>MTC 2016, included new technical activities, the industry sessions, special talks which highlighted the issues of paper preparation for submission, and a special invited talk session which responded the question on the "Opportunities, Challenges, and the Future in Instrumentation and Measurement". All the key events and the hot topics revealed by this conference would be reported and highlighted in this report.



## **Event Summary:**

### **1. Focusing Theme of the Conference**

The theme of IEEE I<sup>2</sup>MTC 2016 was decided to be "Measuring the pulse of Industries, Nature and Humans", and the purpose of the theme was to highlight the challenges of sustainable development of the region and even the worldwide. Within IEEE Region 10 (including Asia and Oceania), which is of denser populations, strong SEMI industries, and complex natural disaster, the economy grew rapidly in the past two decades thanks to strong manufacturing benefited by an extreme large working population, cheap electrical power, low cost water supply, and even natural resources. The strong economy growth changes daily life of people, as industrial waste and land development introduce a high pressure to the environment. Meanwhile, the natural disaster complexities are high in this region. Typical natural disaster such as earthquakes, volcanic eruptions, and typhoons are always followed by tsunamis, landslides and floods over wide-territory. There are new challenges introduced by human activities, smog, PM 2.5, in addition to the natural (mining rare-earth miner) and manmade toxicants spreading. In 2010, the Society called for proposals for a potential solution on controlling the oil spill from explosion spreads in Gulf of Mexico which revealed the important direction we could pursue. Back to the conference theme, the "pulse" means the signal (message) from industries, nature and humans after excited by the economic activities of humans; "measuring" is to detect and to understand the messages; the purpose of the theme is to highlight the importance of Instrumentation and Measurement Technology to the lives and livelihood of people, especially the abuse natural resources for economic development and the impact on humans.

### **2. Technical Program**

The organization committee of I<sup>2</sup>MTC 2016 Conference organized 26 tracks, including 13 special issues. The regular Trackers of the conference are,

- Advances in Instrumentation and Measurement Developments and Techniques
- Data Acquisition Systems and Real-Time Measurements
- Energy and Power Systems
- Image Processing and Computational Intelligence Techniques
- Measurement and Instrumentation for Industrial Applications and Processes
- Measurement Applications and Software
- Measurement of Electric and Magnetic Quantities
- Measurement Systems and Theory
- Measurement, Instrumentation, and Methodologies for Medical, Biomedical, and Healthcare Systems
- Non-invasive Measurement Techniques and Instrumentation
- Robotics, Control, Mechanical, and Material Measurements
- Sensors, Actuators, Transducers, and Sensor Fusion
- Signal Processing Techniques

The other 13 Special Sessions have been proposed, whose topics are

- Six-Port and Multi-Port Technology for RF Sensing Applications
- Impedance Spectroscopy for Measurement and Sensor Solutions
- Advances in Industrial Tomography: Sensor design, Instrumentation, Image Reconstruction algorithms and Measurement
- Advanced Measurement and Data Processing for Complex Engineering System Health Monitoring
- Navigation technologies and related applications
- Advanced Measurement and Instrumentation for NDT&E
- Instrumentation and measurement for improving quality, reliability and safety: new perspectives for research and industry
- Sensors and Instrumentation for Structural Health Monitoring

- Nanotechnology applications in Instrumentation and Measurement
- Smart Medical Devices for Diagnosis
- Networking Measurement
- Wearable and Implantable Wireless Sensors for Healthcare
- Measurements for emerging power systems

To complete the paper review procedures, the Conference organizer invited 3 professors (all of them are associated editors of IEEE Transactions on Instrumentation and Measurement) as Technical Program Committee Co-Chairs. In addition to TPC co-chairs, there were 20 Associate Technical Program Committee Co-chairs and 250 reviewers to ensure the submitted papers have been reviewed by at least 2 reviewers to ensure the paper qualities.

The final decision of the submission papers was made after two phases peer review procedures; thanks to great reviewing works done by all TPC members, 294 out of 560 submitted papers have finally been accepted for publication during the Conference. To accommodate all accepted papers, 28 oral sessions and 2 plenary poster sessions were arranged.

The conference technical program has been arranged as the table hereinafter, for details please refer to the website (<http://2016.imtc.ieee-ims.org/> - This website will be accessible for years)

### 3. Statistic of Accepted Papers

There were 560 papers submitted to the paper submission system. Before distributing all the submitted papers to reviewers, the papers which did not meet the basic requirements were first rejected. Therefore, only 80% papers have been distributed to TPC members for first review. After first review, 93 papers were decided to be accepted (the acceptance ratio was 21.6%, rejection ratio was 22.8% and 55.6% of the papers have to be revised). For the second review, the authors had to resubmit revised papers and a letter indicating the changes of resubmitted papers and the answers to all questions of reviewers. The reviewing procedures have made many authors decide to withdraw papers. The final acceptance ratio of regular papers was about 65%. The statistic of the submissions was presented as the following tables.

|                  | Submission | To review | 1 <sup>st</sup> Review |          |         | 2 <sup>nd</sup> Review |          |          | Acc. Rate |
|------------------|------------|-----------|------------------------|----------|---------|------------------------|----------|----------|-----------|
|                  |            |           | Accepted               | Rejected | Revised | Withdrawn              | Accepted | Rejected |           |
| Regular Paper    | 551        | 353       | 89                     | 84       | 180     | 32                     | 132      | 16       | 62.61%    |
| Special Sessions | 86         | 77        | 4                      | 14       | 59      | 14                     | 54       | 0        | 75.32%    |
| Total Paper      | 537        | 430       | 93                     | 98       | 239     | 46                     | 186      | 16       | 64.88%    |
| Industry Papers  | 23         | 23        | Not Apply to           |          |         | 6                      | 15       | 2        | 65.22%    |
| Total            | 560        | 453       | 93                     | 98       | 262     | 52                     | 201      | 18       | 64.90%    |
| Total Rejected   | 116        |           |                        |          |         |                        |          |          |           |
| Total Accepted   | 294        |           |                        |          |         |                        |          |          |           |

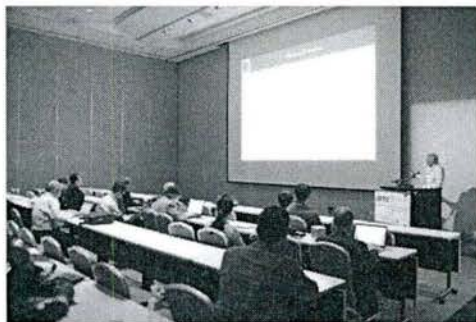
The top 10 most paper submission countries/areas are tabulated hereinafter with acceptance ratio. Considering the Conference is in Asia, therefore China, Taiwan, Malaysia, and India were on the list. As for the acceptance ration, Austria, Italy, UK, China and Germany are the top five.



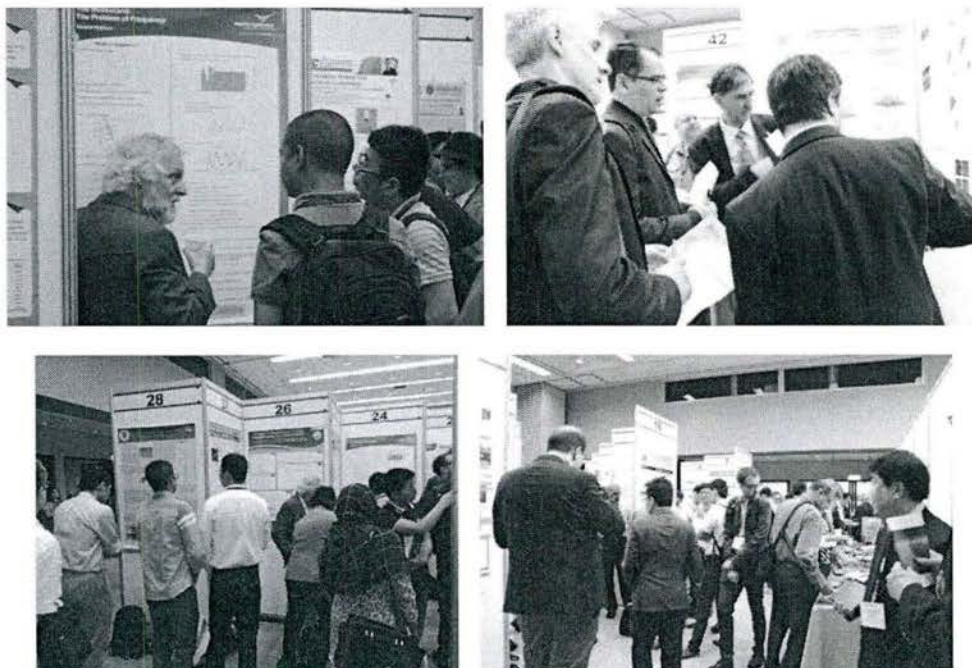
| Country        | No. of Accepted | No. of rejected | Acceptance Ratio |
|----------------|-----------------|-----------------|------------------|
| P.R. China     | 104             | 32              | 76.5%            |
| Italy          | 43              | 2               | 95.6%            |
| Taiwan         | 34              | 15              | 69.4%            |
| Brazil         | 14              | 7               | 66.7%            |
| USA            | 15              | 6               | 71.4%            |
| Malaysia       | 12              | 10              | 54.5%            |
| Germany        | 9               | 3               | 75.0%            |
| United Kingdom | 10              | 2               | 83.3%            |
| Canada         | 8               | 2               | 80.0%            |
| Austria        | 10              | 0               | 100.0%           |
| India          | 10              | 6               | 62.5%            |
| Total          | 269             | 85              | 76.0%            |

#### 4. Oral Sessions, Poster Sessions and Exhibition

As indicated previously, there were 28 oral sessions and 2 plenary poster sessions arranged for the Conference. The oral sessions ran in parallel, 5 to 6 sessions were arranged at the same time. Within a single oral session, in general, 5 papers were presented. As for the poster sessions, both two sessions were arranged in the late morning and ran as a single session, while 74 papers were presented for a single poster session. To attract all participants to visit the poster sessions, the café breaks were arranged at the same time and same place of the oral sessions. Meanwhile, the exhibition area was also located at the same conference space to enhance the interactions between the attendees and the exhibitors.



The oral sessions were in parallel. Each session was chaired by two senior professors to ensure the oral presentations could run smoothly and the papers have been well discussed.



Poster sessions gathered conference attendees for discussion and exchanged achievements of researches and ideas.



Exhibition booths were set up at the same place of poster session. The arrangement made all attendees to be able to visit the booths after they met authors of the papers they were interested in.

## 5. Plenary Talk and Keynotes

The organization committees have invited 3 plenary speakers to share their experiences and viewpoints from academia research, industry and sensor application aspects. The talks have been arranged on the early morning from Tuesday to Thursday during the conference week. The topics and speakers were arranged as the following;

- Prof. Din Ping Tsai, Director and Distinguished Research Fellow of Research Center for Applied Sciences of Academia Sinica / "Plasmonic Metamaterials for Energy, Environment and Better Life" – Tuesday;
- Dr. JC Hsu, Vice President of MediaTek Ltd./ "IoT market and applications enabled by measurement and connectivity technologies" – Wednesday;



- Mr. Giuseppe Izzo, Regional Vice President of Greater China and South Asia Region, STMicroelectronics / "Smart Living in the Age of Digital Connectivity: Trends, Technology and Applications" – Thursday.



Prof. Din Ping Tsai presented "Plasmonic Metamaterials for Energy, Environment and Better Life" at plenary talk session.



Dr. JC Hsu presented "IoT market and applications enabled by measurement and connectivity technologies" on Wednesday morning keynote session.



Mr. Giuseppe Izzo shared his experience on "Smart Living in the Age of Digital Connectivity: Trends, Technology and Applications" on Thursday morning Keynote Session.

## 6. Invited Talks

I<sup>2</sup>MTC 2016 initiated an invited talk session entitled "Opportunities, Challenges, and the Future in Instrumentation and Measurement" to enhance the dialogue between academia and industries, also to find a direction for future development. We invited the immediate past President of IMEKO Prof. Pasquale Daponte (President of Italy Electronic Association), Chair of Asia Pacific Laboratory Accreditation Cooperation (APLAC) Nigel N. L. Jou, Director General of Center for Measurement Standards Dr. Tzeng-Yow LIN, the Director General of Instrument Technology Research Center Prof. J. Andrew Yeh, and Jun Watanabe from ALPS Japan to share their viewpoints from different aspects of measuring, accreditation, instrumentation traceability, 3D printing medical devices and instrumentation and measurement technologies for manufacturing industry. This event was chaired by Society Executive Vice-President Max J. Cortner who is from industry section. The presentations delivered by all speakers and the dialogue between invited speakers and conference attendees provided new prospects to all audiences. This invited talk session was held on May 25 Wednesday morning. The talks were as following;

- Prof. Pasquale Daponte , "Emerging technologies for measuring"
- Dr. Nigel N. L. Jou, "Application of Instrumentation and Measurement to Accreditation - from Accreditor's Viewpoint"
- Dr. Tzeng-Yow LIN, "Measurement Traceability for New-Era Instrumentation: Taiwan Implementation"
- Prof. J. Andrew Yeh, "Roadmap of Medical Devices Industry in Taiwan -3D Printing Application"
- Mr. Jun Watanabe, "Creating IoT (Internet of Things) Solutions"

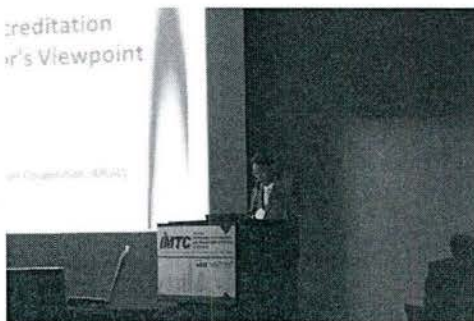




Invited Talk Session was chaired by IEEE IMS Executive Vice President Max Cortner.



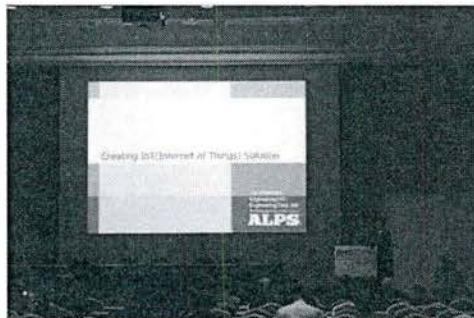
Prof. Pasquale Daponte presented "Emerging technologies for measuring."



Nigel N. L. Jou presented "Application of Instrumentation and Measurement Accreditation - from Accreditor's Viewpoint."



Dr. Tzeng-Yow LIN presented "Measurement Traceability for New-Era Instrumentation: Taiwan Implementation."



Jun Watanabe (ALPS, Japan) presented "Creating IoT (Internet of Things) Solutions."



Mr. You in place of Prof. J. Andrew Yeh presented "Roadmap of Medical Devices Industry in Taiwan -3D Printing Application."



There were dialogues between attendees and all the speakers after presenting ( from left to right: VP Max Cortner, Nigel N. L. Jou, Dr. Tzeng-Yow LIN, Jun Watanabe, Prof. Pasquale Daponte, Mr. You).

## 7. Publications of Conference Paper

All the accepted papers including industrial papers were distributed to all conference registered attendees through cloud server. After the conference, all the accepted and presented conference papers (excluding the 17 industrial papers) have been submitted for publication through IEEE Xplore. Now the I<sup>2</sup>MTC 2016 Conference Proceedings has been proved for publication which could be founded by accessing the link hereinafter.

<http://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=7508333>

The I<sup>2</sup>MTC 2016 Special Issue of IEEE Transactions on Instrumentation and Measurement (as TIM) will contain papers selected on the basis of the results of regular peer review of the manuscripts submitted for consideration by the participants of I<sup>2</sup>MTC 2016. For I<sup>2</sup>MTC 2016, the special issue manuscript was uploaded in the period of June 20 to July 3, 2016. And now, all submitted papers are subjected to peer review procedures.

## 8. Hot Topics of the Conference

There were 560 papers submitted to the Conference, as listed in the table hereinafter. According to the paper submission numbers, not including special session papers, the first five hot topics of Conference 2016 are

- *Measurement and Instrumentation for Industrial Applications and Processes*
- *Image Processing and Computational Intelligence Techniques*
- *Advances in Instrumentation and Measurement Developments and Techniques*
- *Sensors, Actuators, Transducers, and Sensor Fusion*
- *Measurement, Instrumentation, and Methodologies for Medical, Biomedical, and Healthcare Systems*

Considering the "Measurement and Instrumentation for Industrial Applications and Processes" is too general to specify the special instrumentation and measurement technologies which the colleagues of the I&M Society are really interested in, "Non-invasive Measurement Techniques and Instrumentation" should be considered as one of the hot topics. Meanwhile, out of the 13 special sessions, "tomography" and "Measurements for Emerging Power Systems" are the special two hot topics which attracted more than 30 paper submissions.



| Tracks                                                                                          | Accepted | Rejected | Withdrawn* | Subtotal |
|-------------------------------------------------------------------------------------------------|----------|----------|------------|----------|
| Advances in Instrumentation and Measurement Developments and Techniques                         | 21       | 4        | 24         | 49       |
| Data Acquisition Systems and Real-Time Measurements                                             | 10       | 8        | 5          | 23       |
| Energy and Power Systems                                                                        | 19       | 6        | 3          | 28       |
| Image Processing and Computational Intelligence Techniques                                      | 28       | 9        | 13         | 50       |
| Industry Papers                                                                                 | 15       | 2        | 6          | 23       |
| Measurement and Instrumentation for Industrial Applications and Processes                       | 31       | 21       | 27         | 79       |
| Measurement Applications and Software                                                           | 9        | 8        | 1          | 18       |
| Measurement of Electric and Magnetic Quantities                                                 | 8        | 1        | 8          | 17       |
| Measurement Systems and Theory                                                                  | 5        | 7        | 11         | 23       |
| Measurement, Instrumentation, and Methodologies for Medical, Biomedical, and Healthcare Systems | 21       | 10       | 13         | 44       |
| Non-invasive Measurement Techniques and Instrumentation                                         | 24       | 8        | 5          | 37       |
| Robotics, Control, Mechanical, and Material Measurements                                        | 5        | 4        | 0          | 9        |
| Sensors, Actuators, Transducers, and Sensor Fusion                                              | 28       | 9        | 10         | 47       |
| Signal Processing Techniques                                                                    | 12       | 6        | 9          | 27       |
| Special Sessions (13 tracks)                                                                    | 58       | 14       | 14         | 86       |
| Total Submission                                                                                |          |          |            | 560      |

\*All the conference papers were subjected two phase review procedures. Many papers have been withdrawn because the authors could not meet the revision required by the reviewers within a month after the first phase review

## 9. News With Respect to Previous Conference

Beyond the Conference tradition, the organization committees reviewed the experiences of previous events and tried to implant new ideas to the conference program and do tests; in general, I<sup>2</sup>MTC 2016 is a test vehicle, and the organizing committee members devoted a lot of time to adjusting the program and making it better. The new aspects of the conference are highlighted hereinafter.

First of all, the conference was rescheduled from the second week to the third week of May. It was because most of the universities in North America end the spring semester by the second week of May. By rescheduling the conference time, we expected most of the colleagues from North America could be relieved from the conflict of doing heavy work before the end of the semester and be able to travel to attend the conference. We expected that more attendees from that area could be attracted to the Conference. On the contrary, however, considering the new Conference schedule might overlap with the other events, such rearrangement cause a high risk and high uncertainty to the conference organization. According the statistic of attendees after the conference, it was apparently that the amount of Conference

attendees was indeed dropped in compared to the averages of the last few years. On the other hand, thanks to strong supports from Region 10, the registrations were slightly increased with respect to the previous conferences held in Region 10.

Second, the conference tracks have been reintegrated based on the statistics of previous papers; the tracks could well reflect the trends of research activities on technologies and applications of instrumentation and measurement. In addition, all of the submitted papers could be assigned to tracks and been reviewed properly.

Third, to the enhance industry engagement and increase exchange between industry members, as well as between industry and academic members, I<sup>2</sup>MTC 2016 conference introduced the industry sessions. The industry sessions were different from the Industrial Applications and Processes track in regular sessions. For industry sessions, the role of industrial colleagues was emphasized. We intended to provide industrial colleagues the opportunities to present new technologies, new applications, or even new challenges. Foreseeing the essential difference between academia and industry, the submitted industry papers were limited to be less than 3 pages instead of 5-6 pages full paper. An additional request was that the first or the corresponding authors of submitted industry papers must be from industry sector to ensure that the major contribution did come from industry colleagues. Considering the paper lengths and review procedures for industry and regular sessions were not consistent, all accepted industrial papers would not be submitted for publication in IEEEExplore. Though high submission number was not expected, fortunately, the conference gathered enough qualified industry papers. The poster and oral sessions of industry papers were arranged on Thursday morning and afternoon respectively.

The last change was that the organizing committees have decided to provide conference proceedings from cloud server instead of distributing it via USBs or CDs. In the past decade, whenever we attended a conference, in most of the cases, we would receive an USB or a CD, in which the conference proceedings have been stored. In a realistic scenario, many USBs which we got from the conference might not be used again for years. Currently, cloud service is the most convenient way to store and to share documents, which dramatically changes the usage of store devices. To reflect the Conference theme we have highlighted this year, we would like I<sup>2</sup>MTC 2016 to be a "green" conference. Therefore, the Conference made a discussion and decided to distribute the conference proceedings through cloud service.

#### 10. Attributes of Attendees Nationality

| Nation/Area    | No. of Attendees | Nation/Area | No. of Attendees | Nation/Area  | No. of Attendees |
|----------------|------------------|-------------|------------------|--------------|------------------|
| Australia      | 3                | India       | 7                | Saudi-Arabia | 1                |
| Austria        | 9                | Iran        | 2                | Serbia       | 1                |
| Bangladesh     | 1                | Italy       | 38               | Singapore    | 1                |
| Belgium        | 2                | Japan       | 7                | Slovenia     | 1                |
| Brazil         | 4                | Macao       | 1                | Korea        | 4                |
| Canada         | 10               | Macedonia   | 1                | Spain        | 1                |
| China          | 118              | Malaysia    | 7                | Sweden       | 2                |
| Czech Republic | 3                | Mexico      | 2                | Switzerland  | 1                |
| Egypt          | 1                | New Zealand | 2                | Taiwan       | 43               |



|         |   |          |   |                |    |
|---------|---|----------|---|----------------|----|
| Estonia | 2 | Nigeria  | 1 | Tunisia        | 1  |
| Finland | 2 | Pakistan | 5 | United Kingdom | 5  |
| France  | 3 | Poland   | 1 | United States  | 13 |
| Germany | 9 | Portugal | 6 | Vietnam        | 1  |
| Hungary | 1 | Romania  | 1 | Uruguay        | 1  |

#### **11. Attendees from US Government Associated**

According to the list of attendees, 3 participates were from US government associated departments, including ONRG Singapore, Navy Academy and National Laboratory.

**Fund Utilization:**

The fund was utilized for Conference Venue related expense which included conference rooms (R101 AB, R101CD, R105, 201 A, B, C, D, E, F, 202, and lobby for Conference Registration and Information), projectors and microphones, setups for poster sessions, booths and directional signs. The expense for conference venue related was tabulated hereinafter.

| Items                                         | Amount              | Remakes                                                                               |
|-----------------------------------------------|---------------------|---------------------------------------------------------------------------------------|
| Conference Venue Expense                      | <b>2,098,850.00</b> |                                                                                       |
| 1. Conference Room                            | 1,374,850.00        | All purchases were obeyed Procurement Law and under the supervision of MOST of Taiwan |
| 2. Projector and Audio Facilities             | 224,000.00          |                                                                                       |
| 3. Poster & Booth Setup                       | 500,000.00          |                                                                                       |
| Revenue                                       | <b>2,098,850.00</b> |                                                                                       |
| 1. Fund from ONRG                             | 322,300.00          | exchange rate 1 USD =32.23 NTD                                                        |
| 2. Fund from MOST, Taiwan                     | 1,000,000.00        |                                                                                       |
| 3. Fund from MICE Program, Taiwan             | 347,691.00          |                                                                                       |
| 4. Local Patrons+ IEEE IMS                    | 428,859.00          | Local patrons include the research institutes, industries and personals+ IEEE IMS     |
| Balance<br>(Revenue-Conference Venue Expense) | 0.00                |                                                                                       |



**Notable Outcomes:**

1. There were more than 325 attendees from 41 countries/areas participated the Conference. This was the highest number of the participating attendees to the Conference held in Asia in the I<sup>2</sup>MTC history.
2. 294 papers (oral sessions in parallel, 2 plenary poster sessions), 16 tutorials, 1 plenary, 2 keynotes, 1 plenary tutorial and 5 invited talks have been organized during the four-day Conference. The conference also gathered 13 exhibitors, which was also the highest number of exhibitors ever.
3. The first five hot topics of Conference 2016 are
  - (1) Image Processing and Computational Intelligence Techniques;
  - (2) Advances in Instrumentation and Measurement Developments and Techniques;
  - (3) Sensors, Actuators, Transducers, and Sensor Fusion;
  - (4) Measurement, Instrumentation, and Methodologies for Medical, Biomedical, and Healthcare Systems
  - (5) Non-invasive Measurement Techniques and Instrumentation
4. All the regular conference papers submitted for publication to IEEEExplore have been accepted and published, which indicated that all papers have been reviewed properly and all accepted conference papers have met the publication criteria of IEEE.

### **Lessons Learned:**

1. From statistic of paper submissions amount and the acceptance ratio, the results indicate that Italy, China, UK, Austria and Germany are highly interested in attending this annual conference meeting and the qualities of papers are relatively excellent.
2. The Conference has been rescheduled to the third week of May in order to attract more attendees from North America; nevertheless, the number of attendees from North America, especially from US, is below the expect number. Foreseeing the people from North America are important members of Instrumentation and Measurement Society, more plans on attracting attendees from North America have been initiated.
3. One of the conference attendees passed away because of myocardial infarction after he has arrived Taiwan. The Conference has a contract for accident insurance for all attendees in case there is any accident occurred within the Conference venue. However, the insurance contract does not include the emergency health treatment. For this year, the organizing committee missed to arrange an emergency-aid team at the Conference and social activities venues. Because of this sad incident, an emergency-aid team and a proper insurance of emergency health treatment should be seriously considered for the future Conference organization.
4. Although the scopes of the Conference have been defined to be instrumentation and measurement associated, not a small number of papers have been rejected because of out of the scope. Instrumentation and measurement are typical multidisciplinary technologies; therefore, to synchronize the viewpoint between the authors and the reviewers could be important to avoid too many papers to be rejected not because of the paper quality but out of conference scope.
5. The conference usually attracts more than 300 people worldwide; however, the majority is from China, Italy, Taiwan and Malaysia. Travelling expense and accommodation cost of the conference venue are two major concerns which cause some regular attendees from Brazil and Italy to choose to be absent. However, most of the cost concerns are not based on the real ground. Therefore, it is greatly significant if the conference can provide more clear information about the travelling and accommodation cost as soon as possible.