



Technical Talk: From Sensors to Systems – Instrumentation & Measurement in Oil & Gas Industry

By

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He is the Chairman of eETD committee for 2025/2026 session.

On 21 May 2026, the Electronic Engineering Technical Division (eETD) of The Institution of Engineers, Malaysia (IEM), in collaboration with the Faculty of Electrical Engineering & Technology, Universiti Malaysia Perlis (UniMAP), successfully organized an online technical talk entitled “From Sensors to Systems: Instrumentation & Measurement in Oil & Gas Industry.” Conducted via Google Meet, the session attracted more than 105 participants, comprising engineering students and academic staff interested in instrumentation, automation, and process control applications within the oil and gas sector.

The programme formed part of eETD's continuous professional development (CPD) and knowledge-sharing initiatives aimed at bridging the gap between academia and industry while exposing participants to current engineering practices and emerging technologies in industrial automation and process control. The technical talk was delivered by Ir. Dr. Rafiuddin Abdulbrani, an expert in Industrial Automation and Process Control from Petra Energy Berhad. The session aimed to provide participants with practical insights into the critical role of instrumentation and measurement systems in ensuring safe, efficient, and reliable operations within modern process industries.



Figure 1: Promotional poster for the technical talk entitled "From Sensors to Systems: Instrumentation & Measurement in Oil & Gas Industry."

Opening Session

The session commenced with a welcoming address by the course coordinator, who introduced the speaker and highlighted the importance of instrumentation and measurement technologies in supporting industrial automation, process optimisation, and digital transformation initiatives across various sectors.

Dr. Rafiuddin began the talk by sharing his professional background and industry experience in automation, process control, and instrumentation engineering. He emphasised the growing demand for engineers with strong competencies in measurement technologies, data acquisition systems, and industrial control systems, particularly in highly regulated industries such as oil and gas.

My Engineering Journey





EDUCATION

- BEng Mechatronic Engineering, UniMAP (2010)
- MSc Electronic Systems Design Engineering, USM (2012)
- PhD Electrical & Electronics Engineering, UMPSA (2026)



INDUSTRY EXPERIENCE

- 13+ Years in Oil & Gas Offshore & Onshore Projects
- Malaysia, Brunei, Indonesia, India, Singapore, Thailand
- HUC, Commissioning & Start-Up



TECHNICAL EXPERTISE

- Instrumentation & Process Control
- MPFM, Coriolis & WCM
- DCS & SCADA
- Calibration & Troubleshooting



PROFESSIONAL RECOGNITION

- Professional Engineer (BEM)
- Professional Technologist (MBOT)
- ASEAN Chartered Professional Engineer

01

02

03

04

Confidential


Rafiuddin is presenting, annotating


My Experience in Process Measurement & Control



Former Experience:

- Agar Corporation (Malaysia)
- Projects in Malaysia, Brunei, Indonesia, Singapore & India



Confidential



Rafiuddin


Rafiuddin is presenting, annotating


Figure 2: Speaker sharing his industry experience

Understanding Instrumentation and Measurement

The presentation started with an introduction to the fundamental concepts of instrumentation and measurement. Participants were introduced to the role of instrumentation in accurately measuring process variables, monitoring plant conditions in real time, improving production efficiency, ensuring process safety and reliability, and supporting automation and process control systems.

Dr. Rafiuddin explained that instrumentation forms the foundation of modern industrial operations by providing accurate and reliable data required for decision-making and control. He highlighted the importance of measurement accuracy, calibration, signal conditioning, and data integrity in maintaining operational performance and safety standards.

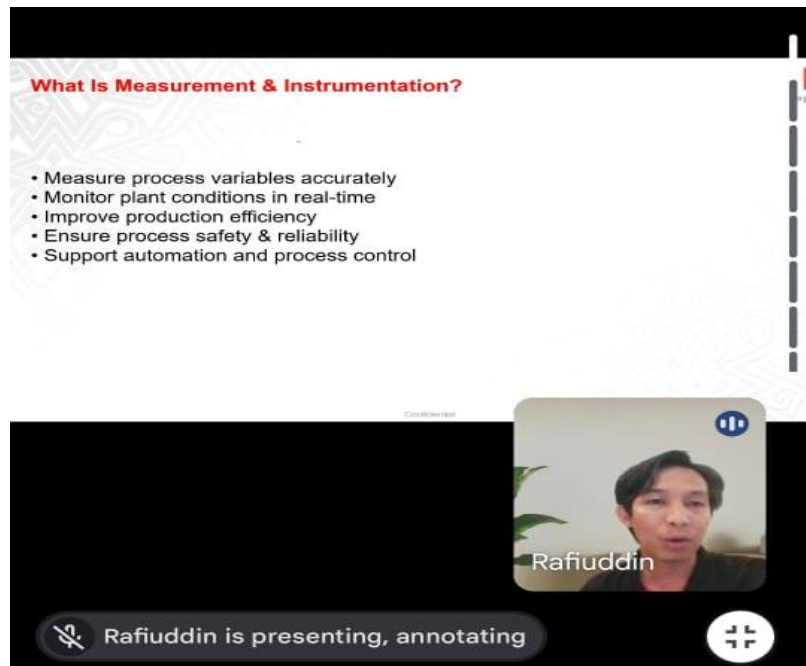


Figure 3: Sharing about the fundamental concepts of instrumentation and measurement.

Instrumentation Systems in the Oil and Gas Industry

A significant portion of the presentation focused on Multiphase Flow Metering (MPFM), a critical technology used in upstream oil and gas production for measuring the simultaneous flow of oil, gas, and water without the need for physical phase separation. Dr. Rafiuddin explained the measurement challenges associated with multiphase flows, including varying flow regimes, changing fluid properties, and fluctuating production conditions.

The speaker introduced the key components of MPFM systems, including pressure transmitters, temperature sensors, density measurement devices, flow conditioning elements, and advanced computational algorithms used to estimate phase fractions and flow rates. Participants learned how MPFM technology supports production optimization, well performance monitoring, reservoir surveillance, and fiscal allocation by providing continuous and accurate production data.

The session also highlighted the integration of MPFM systems with SCADA, DCS, and digital oilfield platforms, enabling real-time monitoring, predictive analytics, and remote operation capabilities. Through practical industry examples, participants gained a deeper appreciation of the role of advanced instrumentation and data-driven technologies in improving operational efficiency and reducing production costs within the oil and gas sector.

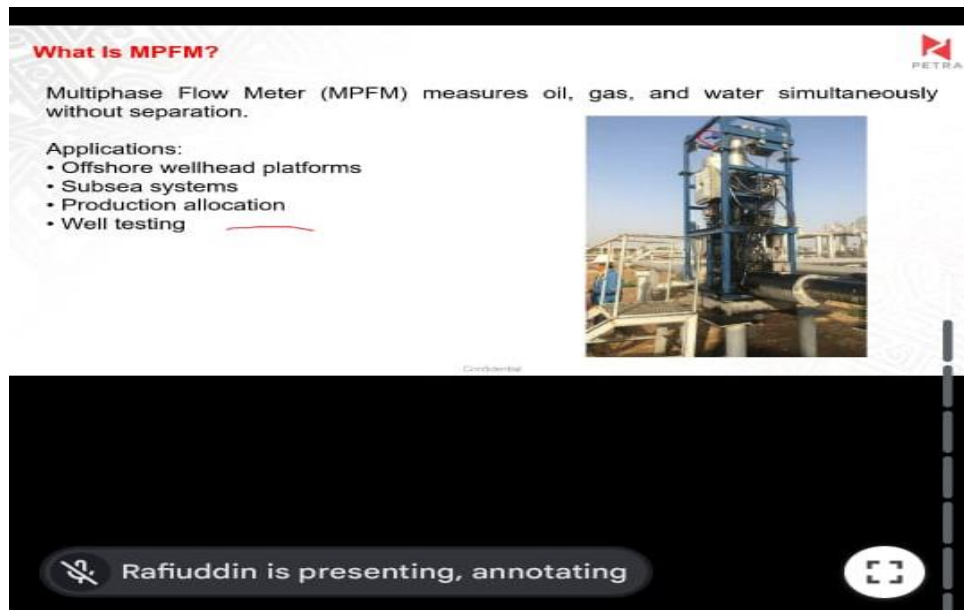


Figure 4: Sharing about Flow Meter Technology

From Sensors to Systems

One of the key highlights of the talk was the explanation of how individual sensors are integrated into larger automation and process control systems. Participants gained insights into the complete measurement chain, beginning with data acquisition at the sensor level and extending to signal transmission, control algorithms, process visualization, and decision-making systems.

The speaker demonstrated how modern instrumentation systems support predictive maintenance, process optimisation, operational efficiency, and digitalisation initiatives under Industry 4.0. Emerging technologies such as Industrial Internet of Things (IIoT), smart sensors, wireless instrumentation, and real-time analytics were also discussed as key enablers of intelligent industrial operations.

Industry Insights and Career Development

Throughout the session, Dr. Rafiuddin shared practical experiences from his involvement in industrial projects and provided valuable insights into the challenges faced by instrumentation engineers in the field. Topics such as equipment reliability, process safety, hazardous area classifications, maintenance strategies, and troubleshooting techniques were discussed extensively.

The speaker also encouraged students to continuously develop their technical competencies in automation, control systems, programming, and data analytics to remain competitive in the evolving engineering landscape. Participants were introduced to potential career pathways within instrumentation engineering, process control, industrial automation, and digital manufacturing.

Interactive Discussion Session

The technical talk concluded with an interactive question-and-answer session, during which participants actively engaged with the speaker on topics related to instrumentation selection, calibration practices, industrial communication protocols, process safety systems, and future trends in automation technology.

The discussion enabled participants to gain a deeper understanding of real-world industrial applications and the multidisciplinary nature of instrumentation and measurement engineering.

Conclusion

The technical talk entitled “From Sensors to Systems: Instrumentation & Measurement in Oil & Gas Industry” was highly informative and beneficial to all participants. The session successfully provided valuable exposure to the principles, technologies, and practical applications of instrumentation and measurement systems within the oil and gas industry.

Participants gained a better understanding of the critical role played by sensors, transmitters, control systems, and automation technologies in ensuring operational efficiency, safety, and reliability. The programme also strengthened the connection between academic learning and industrial practice while inspiring students to pursue careers in instrumentation, automation, and process control engineering.