

ZEIT4500/4501/4297/4901/4902 Engineering Seminar Records

Student ID: z5364422

Student Name: Harrison Faure

Topic of the Seminar: The safe design of large-scale solar and BESS systems
Source of the Seminar: https://eaondemand.engineersaustralia.org.au/Play?pId=9638a68a-34a9-4955-9790-41602c4626f6
Name(s) and organisation(s) of the speaker(s): Lovepreet Samrao, Mechanical Systems Engineer, Engineering Systems Management Bachelor of Engineering (Honours) degree focused on Mechanical Engineering from the University of South Australia (UniSA).
Date or year of the seminar was given: 19/06/2024
Date of the seminar been watched by the student: 09/10/2024
Reflection on the seminar by the student (250-500 words): <p>Lovepreet Samra presented the seminar focused on the safe design of large-scale solar and battery energy storage systems. The speaker had extensive expertise in hazard identification and his knowledge of this and system safety was particularly evident – particularly in the context of renewable energy systems.</p> <p>His presentation was structured to address the types of solar and battery energy systems first highlighting battery energy storage systems BESS, solar farms, and hybrid systems. Next the safety in design was analysed providing an in-depth definition into the actions taken in the design phase to mitigate risks throughout the life cycle of the system.</p> <p>The discussion on Hazards and Operability studies (HAZOPS) was very informative and provided an in depth look into the various hazard identification techniques.</p> <p>The importance of integrating safety into the design process rather than treating it as an afterthought was one of the key takeaways from the seminar. Australia has had a significant rise in solar and battery installations and energy storage capacity is expected to rise significantly by 2050. The speaker emphasised that the operational phase poses the greatest safety risks as 48% of identified hazards are projected to occur during this period.</p> <p>The speaker also covered the legislative and regulatory requirements which govern renewable energy systems and noted that these standards must be followed to ensure long term safety. The seminar offered valuable insights in to the challenges and solutions that occur when designing safe and reliable large-scale energy storage systems.</p>
Topic of the Seminar: Telecommunications outages - what and why?
Source of the Seminar: https://eaondemand.engineersaustralia.org.au/Play?pId=ad424a37-1d8f-449f-a26d-57e7c76b804e

Name(s) and organisation(s) of the speaker(s):

Dr. Mark Gregory, Associate Professor and telecommunications researcher at RMIT University. He is also a Fellow of Engineers Australia and a member of the Telecommunications Association.

Date or year of the seminar was given: 27/09/2024

Date of the seminar been watched by the student: 09/10/2024

Reflection on the seminar by the student (250-500 words):

The seminar was given by Dr. Mark Gregory and provided valuable insight as to the different impacts of telecommunications outages and their potential impact on businesses and consumers. The speaker detailed recent outages in Australia and provided analysis on the 2023 incident that affected emergency services highlighting the vulnerabilities of the current telecommunications structure.

The speaker discussed various causes of outages, such as overloading, misconfiguration, and third-party failures, and alluded to the crowdstrike incident. This provided a broader perspective on how interconnected systems can lead to network failures. A standout point that was raised was the significant effect of single points of failure, demonstrated in the 2012 Warrnambool telephone exchange fire which the speaker was quite knowledgeable about. The speaker highlighted how the inevitability of such risks has been acknowledged by Telstra due to the high cost of duplication which presents a national challenge in balancing cost risk and resilience.

The speaker emphasized the need for legislative reform concerning minimum performance standards for different communications providers which was a critical takeaway. It was communicated that while self-regulation dominates the telecommunications industry the limitation is becoming increasingly evident especially as outages continue to have dire consequences – such as loss of access to emergency services.

The seminar used an effective combination of practical examples and technical discussions like the Optus national outage, to drive the point home of the importance of transparency, proper risk management, and regulatory oversight. The speaker calls for a structured national approach to disaster preparedness and compensation which resonated strongly with myself, particularly in light of the seemingly increased reliance on telecommunications in both urban and remote areas of Australia.

Topic of the Seminar: High speed PCB design
Source of the Seminar: https://eaondemand.engineersaustralia.org.au/Play?pld=2b3ac0d2-0e17-4b8d-9adf-a94186c9db12
Name(s) and organisation(s) of the speaker(s): Heidi Garry Carney and Sten Iverson, both Field Application Engineers at Altium.
Date or year of the seminar was given: 16/06/2020
Date of the seminar been watched by the student: 10/10/2024
<p>Reflection on the seminar by the student (250-500 words):</p> <p>The seminar presented by speakers Heidi Garry Carney and Sten Iverson who offered a detailed exploration of high-speed PCB design and the application of different CAD tools to manage electromagnetic interference (EMI) and signal integrity.</p> <p>Heidi's component of the presentation focused on aspects of PCB design, such as differential pair routing, impedance control, and crosstalk. The speaker explained how high-speed designs are influenced by factors like the return path for electrical energy, dielectric constants, and signal skew, and therefore they must be carefully managed to prevent signal degradation and EMI.</p> <p>Sten Iverson's gave a live demonstration of Altium Designer's tools which are used to provide practical insights into how these PCB concepts are implemented in real-world applications. The speaker gave explanation of how to use the tool's impedance profile settings and the signal integrity analysis highlighted how design decisions at both the PCB and Schematic level affect system performance. The speaker also included a component on adjusting the transmission line impedance and handling this via impacts on signal integrity in high-frequency designs.</p> <p>The seminar provided a good balanced mix of practical application and theory and emphasized the importance of a holistic approach to PCB design. PCB design in future should include considerations where both schematic-level decisions and PCB layout influence the final signal performance. The live demonstration given enforced the value of utilising simulation tools to mitigate design errors before fabrication due to their predictive capabilities, saving time and resource sin the development process.</p>

Topic of the Seminar: Coober Pedy Hybrid Renewable and Future Directions in Hybridisation
Source of the Seminar: https://eaondemand.engineersaustralia.org.au/Play?pld=df940851-1d6d-4fa1-b36e-3134c1873b96
Name(s) and organisation(s) of the speaker(s): Trevor Spence – Senior Project Engineer for Technology Development at EDL. Mark Paterson – Senior Manager, Innovation and Technology at EDL.
Date or year of the seminar was given: 18/08/2024
Date of the seminar been watched by the student: 11/10/2024
Reflection on the seminar by the student (250-500 words): The seminar was insightful and help me understand the integration of renewable energy into remote Australian communities and the two speakers Trevor Spence and Mark Paterson provided depth on the topic. The speakers representing EDL provided an overview of the projects at Coober Pedy and Agnew that are comprehensive examples of how hybrid renewable systems can greatly reduce reliance on traditional diesel power generation. For me it was interesting to see how technological advancements, such energy storage systems and dynamic resistors have evolved to provide more sustainable and reliable energy solutions. The key takeaway from the presentation was the growing viability of renewable energy projects without the need for large subsidies which is ultimately driven by decreasing costs of energy storage and renewable technology. The topic of energy spillage has been the topic of high discussion and a target for potential future improvements such as hydrogen storage. This helped me take a glimpse into the next phase of innovation in energy. The seminar highlighted the critical role of hybrid renewable systems in the future for Australia's energy industry and demonstrated the potential for community-focused energy solutions that are sustainable and are resilient to natural fluctuations in renewable energy supply.

Topic of the Seminar: Hardware testing of large-scale solar plant controllers
Source of the Seminar: https://eaondemand.engineersaustralia.org.au/Play?pld=477c7fda-926c-4e51-8863-c9854e9f3a6e
Name(s) and organisation(s) of the speaker(s): Dr Ruifeng (Richard) Yan Senior Lecturer, University of Queensland Dr Feifei Bai Senior Lecturer, Griffith University Dr Yi Cui Research Fellow, University of Queensland
Date or year of the seminar was given: 21/07/2022
Date of the seminar been watched by the student: 11/10/2024
Reflection on the seminar by the student (250-500 words): <p>The seminar demonstrated the collaboration between industry partners and University of Queensland's (UQ) latest research which focused on the hardware testing of solar plant controllers and the dynamic response of modern appliances and photovoltaic (PV) inverters.</p> <p>The seminar was led by speakers Dr. Richard Young, Dr. Fabi Zhang, and Dr. In Rui, and the presentation outlined the importance of sustainable energy generation ensuring that it is reliable particularly as energy sources like solar become prevalent in Australia. The key takeaway that I had from the first part of the presentation was the complexity of commissioning large-scale solar farms. The speaker outlined that delays and mismatches between software and hardware models has direct financial repercussions, which emphasized the importance of pre-commissioning tests. The speakers proposed that the creation of a hardware-in-the-loop (HIL) testing platform is a promising approach to address these challenges.</p> <p>The second component of the presentation was about air conditions and aimed to highlight important distinctions between modern inverter-based appliances and traditional motor-based models, this included the ability of inverter-based systems to support frequency stability. The development of a new model for these appliances to manage load should offer greater accuracy in predicting their behaviour under frequency disturbances.</p> <p>Finally, the third component of this seminar was Dr. In Rui's discussion on PV inverters which underscored the discrepancies between the inverters' real performance and the issues surrounding standards compliance, a crucial issue for network operators. This discussion highlighted the need for accurate data-driven models to predict inverter behaviour.</p> <p>Overall, the event showed cutting-edge work that will be essential in the future for the continuous integration of renewable energy into Australia's power grid.</p>

Topic of the Seminar: Nuclear powered submarines for Australia
Source of the Seminar: https://eaondemand.engineersaustralia.org.au/Play?pId=56fac085-506d-4943-97e7-8b0bf45d2dd4
Name(s) and organisation(s) of the speaker(s): Cmdr Peter Bullard Royal Navy (Rtd) EA Sydney Nuclear Engineering Panel Prof Anna Paradowska Industrial Engagement Manager, ANSTO
Date or year of the seminar was given: 03/12/2021
Date of the seminar been watched by the student: 12/10/2024
<p>Reflection on the seminar by the student (250-500 words):</p> <p>The speaker Dr. Ana Zoric focussed on the announcement of the AUKUS agreement and how it marks a significant shift in Australia's defence strategy, as the country moves towards acquiring and building nuclear-powered submarines.</p> <p>Both speakers Commander Peter Bullard and Dr. Ana Zoric, give a comprehensive analysis of the engineering skills, infrastructure, and training required to support this new direction. The speaker Commander Bullard outlined the unique capabilities of these nuclear-powered submarines, such as their independence from surface operations due to their prolonged range and the extended operational capacities that can be provided. The speakers extensive experience in the Royal Navy provided deep insights into the safety, operational, and maintenance, requirements of these submarines. The speaker outlined the complexity of nuclear reactor management, the advanced stealth technologies necessary for modern underwater warfare, and the critical importance of efficient cooling systems. The speaker emphasized the need for a well-trained and robust nuclear workforce and highlighted the significance of skilled personnel in ensuring safety and operational efficiency.</p> <p>The speaker Dr. Ana Zoric, who was representing the Australian Nuclear Science and Technology Organisation (ANSTO), aimed to build upon the previous speaker and expanded on Australia's existing nuclear capabilities and expertise. The speaker outlined role of ANSTO in advanced manufacturing, nuclear research, and reactor management, emphasizing again the importance of Australia's existing nuclear infrastructure at Lucas Heights. The speaker also brought up ANSTO's capacity to support nuclear stewardship, including waste management, safety regulation, and training the next batch of engineers and scientists.</p> <p>The seminar shed light on the many factors that play into the demands of Australia's nuclear future, requiring careful coordination between industry, defence, and education helping to ensure the safe and effective integration of different nuclear technologies into the country's defence capabilities.</p>

Topic of the Seminar: Toward zero carbon power
Source of the Seminar: https://eaondemand.engineersaustralia.org.au/Play?pId=8d7e5ed0-8454-11ea-bd7c-c5eb82267822wd
<p>Name(s) and organisation(s) of the speaker(s):</p> <p>Commander Peter Bullard - Retired Navy Commander, with experience in nuclear-powered submarine operations and maintenance, training nuclear operators, nuclear plant safety regulation, and submarine design in the UK.</p> <p>Dr. Roman Handro - Industrial Engagement Manager at the Australian Nuclear Science and Technology Organisation (ANSTO) and Professor in Advanced Structural Materials at the University of Sydney.</p>
Date or year of the seminar was given: 22/04/2024
Date of the seminar been watched by the student: 14/10/2024
<p>Reflection on the seminar by the student (250-500 words):</p> <p>The seminar discusses the topic of energy technology and highlights the future as well as the challenges in engineering design, in particular managing the CO2 emissions and managing costs. The particular focus is on how to calculate future costs using method flow diagrams which aim to help in planning for future technological advancements.</p> <p>The speaker shared an example involving a 25-year calculation projection for fuel and electricity which illustrated that by 2030, 12% of electric power will be generated from alternative fuel sources. The speaker believes that this number will increase to 19% in 20 years from that.</p> <p>The speakers conducted analysis of energy prices and from this analysed the need to monitor market trends such as the fluctuating cost of fuel and raw materials – including natural gas. An example used was, the price of solar panels and other technologies like wind power, which should become more affordable whilst traditional energy generation methods using less renewable sources such as fossil fuels, coal and matorral gas may become less viable.</p> <p>The seminar emphasized that the goal is to make wind-energy and solar panel more cost-effective for long term use. The speakers put particular emphasis on the importance of improving technology to make renewable energy more competitive by reducing production costs. They also outlined the discussion surrounding Japan's energy strategy which puts emphasis on nuclear power's long-term potential and the need to develop new plants by 2050.</p> <p>The overall message of the seminar is that whilst promising the engineering and economic challenges that come with renewable energy need mor careful management to ensure future sustainability.</p>

Topic of the Seminar: State of the Art in Utility Scale Energy Storage
Source of the Seminar: https://eaondemand.engineersaustralia.org.au/Play?pld=a5309310-8dc1-11ea-a3c6-73856e816abdwd
Name(s) and organisation(s) of the speaker(s): Professor Terry Moga – Professor in Chemical Engineering, Head of Chemical Engineering, and Director of the Priority Research Centre for Frontier Energy Technologies and Utilisations at the University of Newcastle.
Date or year of the seminar was given: 04/05/2020
Date of the seminar been watched by the student: 16/10/2024
Reflection on the seminar by the student (250-500 words): <p>The seminar was given by the speaker Professor Terry Moga, and upon reflection it is clear that his expertise in energy systems and chemical engineering is critical to addressing Australia's future energy needs. The speaker focussed on the energy-water nexus as well as minimisation of greenhouse gas emissions and how that highlights the significance of transitioning towards sustainable technologies.</p> <p>Energy storage is an important concept especially in the context of utility-scale applications and was the central theme of the speaker's presentation. Professor Moga's detailed exploration of various energy storage technologies, such as mechanical, chemical, and thermochemical systems, offered great insights into how each system functions and the potential applications in renewable energy and energy efficiency.</p> <p>The speaker placed emphasis on not solely relying on batteries but considering alternatives such as chemical or thermal storage to help meet future energy demands which really underscored the complexity of energy storage solution challenges. The speaker introduces various important concepts like reduction-oxidation systems and calcium looping as advanced models for energy storage which provided a window into the future for innovative approaches to reducing emissions whilst maintaining grid stability – These approaches may end up playing a significant role.</p> <p>The speakers research had great depth as well as practical applications, particularly in optimising systems and reducing the environmental footprint of energy storage technologies for real world use. This helps ensure that they are both sustainable and cost effective.</p> <p>The seminar was a call to action for collaboration between government, industry, and academia to advance these technologies. The speaker outlined the importance of continued research and development in areas such as energy storage systems and how the importance of this cannot be understated, especially as the world transitions to low-carbon energy solutions.</p>