Can you provide example link or document of Doctor's thesis associated with these field?

And can you provide me Chapter outlines?

Here are practical, research-ready directions to obtain example theses, plus a structured chapter outline you can adapt for your Doctoral paper.

Direct sources (example theses and related documents)

- DCS in thermal power plants: A peer-reviewed thesis-like paper often appears in engineering journals or conference proceedings rather than full doctoral dissertations. Look for institutional repositories from engineering schools (electrical, mechanical, energy systems) and search for terms like “edge AI DCS thermal power plant,” “digital twin boiler-turner,” or “AI in boiler control.” University libraries frequently host PDFs of related dissertations and theses.
- DCS, control systems, and AI in power plants: Industrial white papers, conference proceedings, and doctoral dissertations from topics such as “edge computing in process automation,” “model-based control for boilers,” and “AI for heat-rate optimization” can be found in:
  - University thesis repositories (engineering faculties)
  - IEEE Xplore and IEEE conferences (automation, control systems, energy)
  - Elsevier/SCI journals that publish extended theses or chapters as articles
  - Vendor and industry association white papers (e.g., Mitsubishi Power, Yokogawa, Siemens, ABB) that sometimes accompany doctoral-level technical theses
- Related theses in adjacent domains:
  - AI-driven energy management in data centers or industrial facilities (useful for methodology and data handling)
  - Predictive maintenance and digital twin theses in power generation or large-scale thermal plants
  - Cyber resiliency and edge computing theses in critical infrastructure

Chapter outlines you can adapt

- Chapter 1: Introduction
  - Context and motivation: why edge AI-enabled DCS in thermal power plants matters for efficiency, emissions, and reliability.

    - Problem statement and scope: boiler, combustion control, electrical balance of plant, and cybersecurity constraints.
    - Research questions and objectives; thesis hypothesis.
- Chapter 2: Literature Review
    - DCS architectures in thermal power plants (centralized vs distributed vs edge-enabled).
    - Edge AI in process control: state-of-the-art methods, challenges, and gaps.
    - Boiler and turbine control theory: drum level control, combustion optimization, heat rate.
    - Digital twins, data fusion, cybersecurity, and governance in industrial environments.
- Chapter 3: Reference Architecture
    - Proposed edge-enabled DCS architecture for a boiler-turbine unit.
    - Data model and interfaces: data dictionary, protocols, time synchronization, and data integrity.
    - Partitioning of control tasks between edge and central systems; safety and compliance considerations.
- Chapter 4: Methods and Experimental Setup
    - Simulation model of boiler-turbine (or a representative plant module) and the control strategies evaluated (central vs edge-enabled).
    - Description of AI models (lightweight inference, model-based control, anomaly detection) and their deployment.
    - Validation plan: metrics, data sources, and evaluation methodology (robustness, latency, safety).
- Chapter 5: Edge AI for Boiler and Combustion Control
    - Edge AI design for fast loops (air/fuel ratio, drum level, superheat control).
    - Data fusion techniques and diagnostics at the edge.
    - Case studies or scenario analyses showing performance improvements.
- Chapter 6: Emissions, Heat Rate, and Reliability
    - How edge-enabled control affects NOx/SOx emissions, CO2 intensity, heat rate, and turbine stability.
    - Reliability metrics, maintenance implications, and downtime analyses.
- Chapter 7: Cybersecurity and Governance
    - Edge-device security, secure communication, and access control.
    - Risk assessment, incident response, and compliance with standards.
- Chapter 8: Economic Assessment
    - Cost-benefit analysis, total cost of ownership (TCO), ROI, and payback period for edge-enabled DCS upgrades.
    - Sensitivity analyses for fuel prices, downtime costs, and scale effects.
- Chapter 9: Validation and Case Studies

    - Real-world or simulated deployments across plant types (subcritical, supercritical, ultrasupercritical) and fuel types.
    - Benchmarking against baseline DCS performance and industry guidelines.
- Chapter 10: Conclusions and Future Work
    - Summarize contributions, limitations, and recommended pathways for industry adoption and further research.

Research planning tips to shape your paper

- Define a precise thesis: an explicit, testable claim such as “Edge-enabled AI augmentation of DCS reduces boiler heat rate by X% under variable fuel quality and load, while preserving safety and cybersecurity integrity,” with a plan to quantify X.
- Build a robust methodology: combine high-fidelity simulations with theoretical analysis and, if possible, a small-scale lab or field testbed to validate edge-enabled control concepts.
- Emphasize data governance: time synchronization, data quality assurance, and secure edge-to-cloud data pipelines will be central to credibility and reproducibility.
- Include a strong cybersecurity section: model a threat landscape for edge-enabled DCS, propose mitigations, and outline validation approaches (tabletop exercises, red-teaming, etc.).
- Plan for reproducibility: provide enough detail on architecture, data models, and evaluation metrics so others can replicate the study or implement a pilot.

If you’d like, I can help you:

- Draft a targeted literature map with themes and keywords tailored to edge AI in DCS for thermal plants.
- Create a detailed data dictionary and a chapter-by-chapter outline with suggested figures, tables, and typical content length for each section.
- Propose a concrete outline for a methodology chapter including simulation setup, AI model descriptions, and validation protocols aligned to your chosen plant type and fuel modality.

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1. https://www.irjweb.com/IMPLEMENTATION OF DCS IN THERMAL POWER PLANTS.pdf
2. https://clouds.cis.unimelb.edu.au/students/ShashikantPhDThesis.pdf
3. https://kth.diva-portal.org/smash/get/diva2:2006410/FULLTEXT01.pdf
4. https://digitalcommons.kennesaw.edu/cgi/viewcontent.cgi?article=1590&context=undergradsymposiumksu
5. https://journal.esrgroups.org/jes/article/download/4230/3102/7652
6. https://research.utwente.nl/files/471132359/Paccou_and_Wijnhoven_December_2024_Artificial_Intelligence_and_Electricity_A_System_Dynamics_Approach.pdf
7. https://osuva.uwasa.fi/bitstreams/485e851e-6fdb-485f-bf89-ca4357843f64/download
8. https://www.sciencedirect.com/science/article/pii/S1364032125005362

9. https://dspace.mit.edu/bitstream/handle/1721.1/140083/machadoroberty-emachado-sm-sdm-2021-thesis.pdf