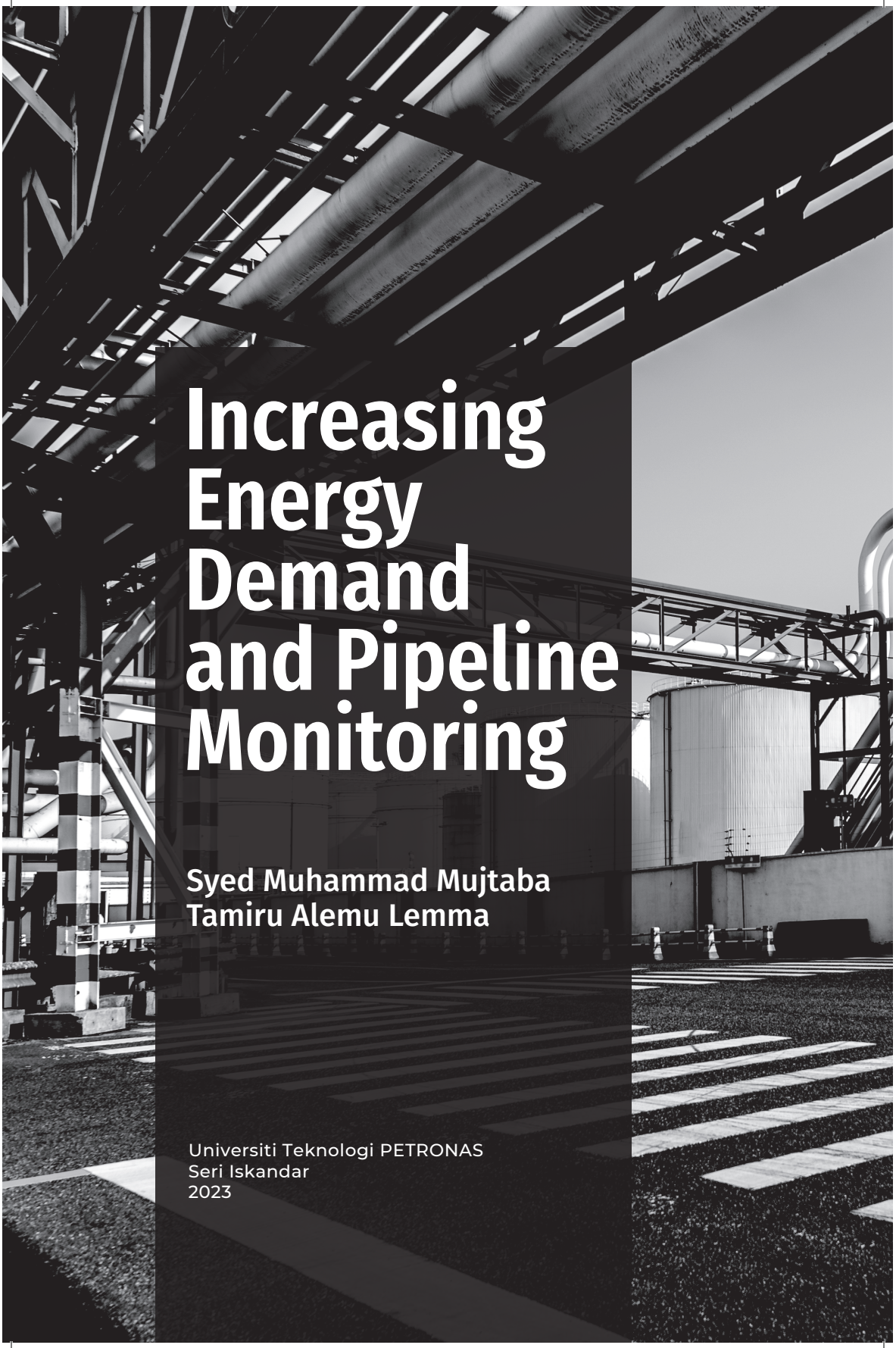
# Increasing Energy Demand and Pipeline Monitoring



# Increasing Energy Demand and Pipeline Monitoring

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Universiti Teknologi PETRONAS
Seri Iskandar
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# PREFACE

I want to take the opportunity to thank the Almighty for his blessings, my supervisor, Dr Tamiru Alemu Lemma, for his teachings and endless support, and finally, my family for their continued patience. Let us present the book entitled 'Increasing Energy Demand and Pipeline Monitoring.' This book conveys my research findings in simple layman's terms. It is useful for university students, oil and gas industry professionals, and individuals from related fields.

Our life is incomplete without energy. Energy is consumed from the tiny led bulb in our house to industrial machines, mainly from fossils. However, we are in a phase to shift toward renewable energy, but still, a significant portion of global energy is dependent on petroleum products. Pipelines are the only fastest and most economical means for oil and gas transportation. As a matter of fact, existing pipelines are getting older day by day; conversely, the energy demands are skyrocketing. Thus, pushing the pipeline to deliver fuel at maximum capacity and without interruption. Unfortunately, pipeline age and other factors are responsible for pipeline leakage, resulting in terrific blasts. Many lives and assets are lost when incidents happen. Thus, this book addresses this issue and proposes an improvement in the current practice of pipeline monitoring system.

The first chapter highlighted the rapidly growing pipeline market and pipeline safety concerns. The second chapters discuss the introduction of leak detection, diagnostics, and critical assessment of the current pipeline monitoring system challenges. Following the previous chapter, Chapter Three covers potential fault/leak detection techniques based on data. It includes computational intelligence techniques, statistical techniques, and model identification techniques. Chapter Four presents

the application of stochastic models and adaptive thresholds for leak detection in gas pipelines. A pipeline leak detection system based on system identification and adaptive thresholds is described in detail in the final chapter, followed by the conclusions and the future of leak monitoring.

Finally, thanks to the Center of Graduate Services, UTP for their graduate assistantship scheme during my masters and the UTP Press for motivating and guiding me to finalize this book. Last but not least, thanks to the Yayasan Universiti Teknologi Petronas Fundamental Research Grant (YUTP-FRG), Cost Centre number '015LC0-251' to financially support this work.

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