An Analysis Of Synchronous And Asynchronous Communication

The authors propose a criterion for the comparison of different sampling strategies (synchronous, asynchronous and random) and filtering algorithms used in digital instruments which provide the estimate of the time average of a signal processed with a nonlinear conversion of multiple inputs (e.g. wattmeters, RMS voltmeters, . . .). This criterion uses the Bayesian approach to incorporate, for every sampling strategy, any prior information on the influences of each incidental quantity which can vary the output of the instrument, transforming this output into a statistic. The asymptotic mean-squared error of the measurements has been assumed as an estimator of the error and its general expression, valid for the most common sampling strategies used in practice, has been deduced. This asymptotic error is a function of the frequency response of the digital filter used and, eventually, of the characteristic function of the probability distribution selected for the random variables generating the sampling instants. The particular formulae for different sampling strategies and filtering algorithms are discussed and compared.

Online first-year writing courses, with all of their promise, still maintain alarmingly low retention and student satisfaction rates, driving online curriculum designers to take another look at ways to increase both retention and satisfaction. To replicate the high rates of face-to-face classes, we must revisit and revise our approach to communication in the first-year writing online classroom. Think about it: The online classroom has abandoned a mainstay in education for thousands of years - synchronous communication. Why have we been so quick to dispose of it? Are we now paying the price? This research will provide additional value to the existing body of knowledge through analyzing the findings of several studies and determining if a causal link exists between synchronous instructor / student communication and student satisfaction and retention rates in post-secondary first-year online composition courses. The research will also examine if the student's perceived level of teacher presence impacts student satisfaction and retention rates. From this analysis, this thesis will also draw conclusions and make recommendations regarding professional development policies and best practices regarding synchronous communication in the first-year online composition course.

In modern life, reactive systems are widely used in cyber-physical systems (CPS), such as airplanes and medical devices. One common characteristic of these systems is that they provide services by continuously interacting with our physical world. Thus, they often have strict requirements for functionality and timing. A system is classified as safety-critical if its malfunction may harm our well-being. Synchronous languages are ideally suited for designing safety-critical reactive systems. These languages provide guarantees on soundness such as determinism and reactivity of correct synchronous programs, which are known to be causal. Consequently, this allows the formal verification of functional properties and Worst-Case Reaction Time (WCRT). However, since the invention of the synchronous paradigm, there has been not many innovations regarding WCRT analysis. There has been only limited efforts to try and further both precision and scalability during these analyses, especially for programs involving a large number of threads. In addition, utilising power management in the synchronous paradigm, which is a key aspect for battery powered CPS, has received scant attention. In this thesis, we aim to address these shortcomings. WCRT analysis is essential for reactive systems, since they interact with our physical world. An output is considered correct if it is delivered in a timely manner. However, as the size of modern systems grow, existing techniques fail to deliver preciseWCRT estimates in a scalable manner. Our first attempt to solve this problem is presented in Chapter 3. We propose an iterative WCRT analysis called ILPC (ILP concurrent), based on Integer Linear Programming (ILP). ILP is conventionally

known to be scalable, but produces pessimistic estimates. We discover that this is due to the abstraction of tick alignment in the ILP model, which trades precision for scalability. A key to achieve both precision and scalability is to incorporate the tick alignment but keep it separate from path analysis. In ILPC we divide WCRT analysis into two parts, and for each partwe develop suitable ILP based techniques. The proposed algorithm combines the two parts in an iterative manner to compute the WCRT. Our second attempt for scalable WCRT analysis is presented in Chapter 4, and it is based on explicit path enumeration. Conventional explicit path enumeration techniques include model checking and reachability analysis. A well-known problem of this approach is state explosion caused by the composition of concurrent threads. To tackle this problem, we develop a WCRT analysis technique called WCRT algebra, which is an adaptation of a min-max-plus algebra. We propose the idea of WCRT equivalence in modelling the control ow, and subsequently realise this as Tick Cost Automata (TCA). Using TCAs can effectively allow concurrent threads to be quickly composed without sacrificing precision. Both ILPc and WCRT algebra are benchmarked against the state-of-the-art published WCRT techniques using a set of industrial applications. The results show that both techniques are as precise as the existing techniques while being orders of magnitude faster in many instances. On average, ILPc is over 10 times faster than published WCRT techniques, and over 1000 times faster for large programs. WCRT algebra is about 3.5 time faster than ILPc. Finally, the last aspect this thesis tackles is the power management question for synchronous programs. While there are many exiting algorithms available for Real-Time Operating systems, they are not suited to the synchronous paradigm since they are tightly coupled with their adjoining schedulers. In Chapter 5, we propose a framework to combine Dynamic Voltage Frequency Scaling (DVFS) with the synchronous paradigm for the first time. Along with the framework, we develop a bi-criteria optimisation technique to automatically explore the trade-o s between timing and energy consumption using the concept of Pareto Optimality. We evaluate our approach against a conventional approach, where a single frequency is used throughout the execution. The results show that the proposed approach is able to produce more non-dominated options for the user providing more exibility. In conclusion, this thesis has pushed the boundary of the synchronous paradigm and opens new opportunities for its applications, especially for safety-critical CPS, which may have energy and timing constraints.

The synchronous motor, despite its apparently inherent drawbacks, has become one of the most commonly used driving units for supplying power. In particular, the rapid progress in high-power semiconductor technology has opened up attractive possibilities for designing fast and multivariable controllers for handling abnormal operational conditions. A systematic study of the questions related to the nonstationary performance of synchronous motors accompanied by a change in kinetic energy of their inertial masses is presented in this volume. Special attention is paid to the transient stability of synchronous motors subjected to various abnormal operating conditions. The generalized investigations fully exploit the optimization offered by computer methods, enabling the authors to avoid the basic drawbacks of the purely analytical methods and to draw up some generalized diagrams of the ultimate transient stability limits. Theoretical results are compared with a number of practical examples. Of the transient faults, the problems of resynchronisation are the most closely examined, e.g. Analysis of Synchronous Machines, Second Edition is a thoroughly modern treatment of an old subject. Courses generally teach about synchronous machines by introducing the steady-state per phase equivalent circuit without a clear, thorough presentation of the source of this circuit representation, which is a crucial aspect. Taking a different

approach, this book provides a deeper understanding of complex electromechanical drives. Focusing on the terminal rather than on the internal characteristics of machines, the book begins with the general concept of winding functions, describing the placement of any practical winding in the slots of the machine. This representation enables readers to clearly understand the calculation of all relevant self- and mutual inductances of the machine. It also helps them to more easily conceptualize the machine in a rotating system of coordinates, at which point they can clearly understand the origin of this important representation of the machine. Provides numerical examples Addresses Park's equations starting from winding functions Describes operation of a synchronous machine as an LCI motor drive Presents synchronous machine transient simulation, as well as voltage regulation Applying his experience from more than 30 years of teaching the subject at the University of Wisconsin, author T.A. Lipo presents the solution of the circuit both in classical form using phasor representation and also by introducing an approach that applies MathCAD®, which greatly simplifies and expands the average student's problem-solving capability. The remainder of the text describes how to deal with various types of transients—such as constant speed transients—as well as unbalanced operation and faults and small signal modeling for transient stability and dynamic stability. Finally, the author addresses large signal modeling using MATLAB®/Simulink®, for complete solution of the non-linear equations of the salient pole synchronous machine. A valuable tool for learning, this updated edition offers thoroughly revised content, adding new detail and better-quality figures.

In order to be successful, online learning should be planned systematically. It can be said that offering distance education courses without preparation and knowledge about the theoretical background can cause drawbacks. While distance education has become widespread and popular, it is observed that there could be problems in its application. Such problems can include technical problems, inability to meet the learning needs at the learners' own speeds, lack of communication among learners and between learners and teachers, and lack of quality materials appropriate for online learning or the inclusion of materials used in traditional methods directly into online learning. For successful online courses, these critical aspects of distance education are important, and they should be taken into account by the institutions and the instructors offering online courses. The Handbook of Research on Managing and Designing Online Courses in Synchronous and Asynchronous Environments provides up-to-date knowledge and experiences regarding technologies, processes, and environments for online course design in distance education systems and covers topics related to the aspects of successful distance education systems with a focus on teaching and learning in online environments. Focusing on topics such as instructional design and integrated systems, it is an ideal guide for online course designers, instructional designers, curricula developers, administrators, educators, researchers, trainers, and students.

Performance Analysis for Synchronous and Asynchronous Tasks on an MP System with Priority DispatchingAnalysis of Synchronous Machines, Second EditionCRC Press

The pervasiveness, as well as the functionality and complexity of embedded systems have significantly increased in recent years. As a result, new challenges were brought to the designing tools. Synchronous programming languages are categorized as one class of the best available tools for designing embedded systems, providing support of

concurrency and formal methods to verify embedded systems for safety critical applications. However, the determinism of concurrency relies upon the synchrony hypothesis, which must be verified through Worst Case Reaction Time (WCRT) analysis. The existing approaches for WCRT analysis are based on the techniques that are developed for Worst Case Execution Time (WCET) analysis, which may inefficient for WCRT analysis. This thesis addresses this issue and proposes a new Integer Linear Programming (ILP) based approach for WCRT analysis. The proposed approach is based on the synchronous programming language called Precision Timed C (PRET-C). The context in the synchronous program level is encoded in the WCRT analysis framework to improve the tightness of the WCRT estimations. For the purpose of evaluating the proposed approach, the state-of-the-art ILP based approach is replicated for PRET-C. The replicated approach is partially based on the existing techniques for WCET analysis. The two approaches are benchmarked in terms of WCRT tightness and analysis time. The obtained WCRT estimations are identical for both approaches. The analysis time of the replicated approach increases exponentially with the size and complexity of the benchmark programs. In comparison, the analysis time of the proposed approach does not show a clear trend of increase with the increase of size and complexity of the benchmark programs. The proposed approach is significantly faster than the replicated approach in large benchmark programs.

This thesis provides a crosstalk analysis of optical chip interconnects via single-mode waveguides with synchronous transmission and asynchronous transmission. This crosstalk model is general and can be used for any type of waveguide network. Three cases of laser sources will be considered: (1) each channel operates with an independent laser sources, (2) all laser sources have the same mean wavelength but with different phase noise processes, and (3) all laser sources are identical with the exception of the initial phases. The analysis takes into account the coupling-induced crosstalks between adjacent waveguides, the laser linewidth, the shot noise, the dark current generated by the photodiode, and the post-detection thermal noise. Bit error probabilities versus received peak powers are presented together with power penalties.

This dissertation, "An Analysis of a Two-axis Excitation System for Synchronous Machines" by ???, Shih-jung, Yang, was obtained from The University of Hong Kong (Pokfulam, Hong Kong) and is being sold pursuant to Creative Commons: Attribution 3.0 Hong Kong License. The content of this dissertation has not been altered in any way. We have altered the formatting in order to facilitate the ease of printing and reading of the dissertation. All rights not granted by the above license are retained by the author. DOI: 10.5353/th_b3125200 Subjects: Electric machinery, Synchronous Electric machinery - Alternating current

Presents the design and simulation of seven synchronous and self-timed 32-bit adders. This research shows that self-timed adders can provide performance gains while consuming less energy. Also, it shows the inadequacy of characterizing self-timed adder performance using randomly distributed input operands, and presents a new self-timed adder characterization benchmark.

This book complements available one-make books on domestic synchronous clocks. It is also a history of science book that sets British domestic synchronous clocks, their manufacturers and technology in their social context. Part I covers the historical background, British domestic synchronous clock manufacturers and brands, how synchronous clocks work, domestic synchronous clock cases, practical advice on the servicing of domestic synchronous clocks and analysis of the marketing and reliability of British domestic synchronous clocks. This analysis provides an explanation of the rise and eventual fall of their technology. Part II

contains galleries of a selection of British domestic synchronous clocks and of the movements with which they are fitted. There is a front and back view of each clock, together with a brief description. Views of each movement include views with the movement partly dismantled, together with a brief technical description of the movement. This profusely illustrated book is primarily for fellow enthusiasts and is based on an extensive archive of information on domestic synchronous clocks, their movements and their manufacturers. Current electrical regulations mean that professional clockmakers are reluctant to repair synchronous clocks. In fact, provided that they have not been mistreated, synchronous clocks are usually reliable, and quite easy to maintain.