

Automation Control Development with Capstone Projects

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I. Abstract

This article presents the development of the automation control projects developed in the Mechanical Engineering Technology Program of the Engineering Technology Department at Old Dominion University. These capstone projects are designed to help students gain industrial application experiences on design, test, and implementation. Two projects on automation controls are the focus of this article: (1) an automatic ship-bottom blasting machine and (2) a fully automated Car Jack. Three major topics are presented in each project: (1) introduction of the background, (2) methods to solve the problems in mechanical designs and automation controls such as hydraulic circuit and/or PLC programming, and (3) implementation and test results.

II. Introduction

The course objectives of Automation and Controls that offered in the Mechanical Engineering Technology Program of the Department of Engineering Technology at Old Dominion University are:

- (1) Pneumatic components and pneumatic circuit designs.
- (2) Feedbacks from electrical sensors and related ladder diagrams.
- (3) Introduction to Programmable Logical Controllers (PLC) and PLC ^{[1][2]} programming.
- (4) Integration of pneumatic, electrical, and/or hydraulic components with PLC programming controls.

To ensure students have hands-on experiences in this course, a two-hour/week lab is also required to teach the students with integrate mechanical, pneumatic, and electrical components in ladder diagrams and PLC programming. Basically, the lab includes three main sessions: (1) four weeks of pneumatic applications, (2) four weeks of pneumatic components, electrical sensors, and ladder diagrams, and (3) five weeks of PLC programming using IDEC ^[3] and TRiLOGI ^[4] PLCs. In addition, the simulation software of Automation Studio ^[5] is also used in each project so that students can check their designs before the actual implementation. Depending on the

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Robotic Sailing Alexander Schlaefer, Ole Blaurock, 2011-07-15 While sailing has a long tradition both as a means of transportation and as a sport robotic sailing is a fairly new area of research One of its unique characteristics is the use of wind for propulsion On the one hand this allows for long range and long term autonomy On the other hand the dependency on changing winds presents a serious challenge for short and long term planning collision avoidance and boat control Moreover building a robust and seaworthy sailing robot is no simple task leading to a truly interdisciplinary engineering problem These proceedings summarize the state of the art as presented at the International Robotic Sailing Conference 2011 Following an overview of the history of autonomous sailing a number of recent boat designs is presented ranging from small one design boats to vessels built to cross the Atlantic Ocean Subsequently various aspects of system design and validation are discussed further highlighting the interdisciplinary nature of the field Finally methods for collision avoidance localization and route planning are covered

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 VII Task Performance Sensing and Online Engineering & Internet of Things Michael E. Auer, Danilo G. Zutin, 2017-09-14 This book discusses online engineering and virtual instrumentation typical working areas for today s engineers and inseparably connected with areas such as Internet of Things cyber physical systems collaborative networks and grids cyber cloud technologies and service architectures to name just a few It presents the outcomes of the 14th International Conference on Remote Engineering and Virtual Instrumentation REV2017 held at Columbia University in New York from 15 to 17 March 2017 The conference addressed fundamentals applications and experiences in the field of online engineering and virtual

instrumentation in the light of growing interest in and need for teleworking remote services and collaborative working environments as a result of the globalization of education The book also discusses guidelines for education in university level courses for these topics **Federal Register** ,2000-06-08 Computerworld ,1981-09-21 For more than 40 years Computerworld has been the leading source of technology news and information for IT influencers worldwide Computerworld s award winning Web site Computerworld com twice monthly publication focused conference series and custom research form the hub of the world s largest global IT media network *Proceedings* American Society for Engineering Education. Conference,1993 **Annual Air Traffic Control Association Fall Conference Proceedings** Air Traffic Control Association. Fall Conference,2001 **Winter Annual Meeting** American Society of Mechanical Engineers,1998 *Paper* ,1998 **Proceedings. College Industry Education Conference** ,1990 *PM Network* ,1998 **The Vertical Farm** Kheir Al-Kodmany,Andrew Keong Ng,Abel Tablada,Chittaranjan Kole,2024-10-25 Amid economic uncertainties fluctuating oil prices and a rising environmental consciousness the need for sustainable and efficient food production has become dire The Vertical Farm Scientific Advances and Technological Developments systematically navigates the realm of vertical farming VF rooted in a robust scientific foundation Unveiling the intricate convergence of plant biology environmental science and agronomy it provides a profound understanding of contemporary agriculture The book spans lighting systems and climate control mechanisms focusing on sustainability From small urban initiatives to significant commercial endeavors real world case studies showcase VF s adaptability scalability and resilience Addressing multiple challenges the book explores economic considerations and public perceptions recognizing their roles in fostering meaningful advancements in agricultural innovation A volume in the Nextgen Agriculture series this book is valuable to scientists practitioners and students in urban agriculture and planning horticulture engineering landscape architecture and plant technology sciences **Annual Index/abstracts of SAE Technical Papers** ,2006 **FIE '98, Tempe, Arizona** ,1998 **IECON '01** IEEE Industrial Electronics Society. Conference,2001 ASEE Annual Conference Proceedings American Society for Engineering Education. Conference,2005 Annual Conference & Exposition American Society for Engineering Education,2005

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