

Low Cost Industrial Automation in Education Sector

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Abstract– The current challenges in industrial automation education revolve around the constraints of traditional PLC programming instruction. The existing methods often fail to provide students with practical experiences due to limitations in budget, accessibility to hardware, and an emphasis on theoretical knowledge. Bridging the gap between theory and application is crucial for students to grasp complex concepts effectively. Moreover, the demands of Industry 4.0 require the integration of IoT components, calling for innovative solutions that adapt to the evolving industrial landscape. Accessible and hands-on training methodologies are key to preparing students for the practical demands of the industry, necessitating cost-effective and interactive educational approaches that combine theoretical knowledge with real-world application.

Keywords – Industrial automation, Education, Comprehensive, Cost-effective, Hands-on learning, Practical application, Programmable Logic Control (PLC) programming Innovative architecture, Computer control, Personnel training.

I. INTRODUCTION

The significance of providing comprehensive educational resources to foster a deep understanding of industrial automation systems (IASs). It highlights the challenges associated with the prohibitive costs of hardware in educational settings and proposes an innovative architecture that combines industrial and prototype components to develop a scaled IAS at a fraction of the traditional expense. Through a detailed case study focused on a cost-effective automated coffee grinding module, the paper effectively demonstrates the feasibility of implementing functional IASs without incurring exorbitant costs. This approach aims to bridge the gap between theoretical knowledge and practical application, thus facilitating a more comprehensive educational experience in the realm of industrial automation [1].

On the other hand, the constraints that impede effective Programmable Logic Control (PLC) programming education. It highlights the limitations of theoretical and simulated instructional approaches, emphasizing the need for more practical, hands-on learning experiences. To address these challenges, the paper proposes the integration of a portable PLC training interface, serving as a bridge between theoretical knowledge and practical skills. By advocating for reformed teaching methodologies and the inclusion of practical experiments, the paper seeks to create a more balanced and effective educational framework that enhances students' practical skills and overall quality of personnel training in the field

of industrial automation [2]. The critical importance of hands-on learning experiences and practical application to equip students with the necessary skills for the dynamic industrial landscape. They provide valuable insights into innovative and cost-effective approaches that can revolutionize the way industrial automation education is imparted, effectively addressing the challenges related to costs, accessibility, and the gap between theory and practice. These contributions are crucial for preparing a skilled workforce capable of navigating the complexities of modern industrial automation systems.

II. METHODOLOGY

The comprehensive approach by emphasizing the integration of industrial and prototype components to develop a scaled industrial automation system (IAS) at a reduced cost. [1] It illustrates the methodology through a detailed case study on a cost-effective automated coffee grinding module. A reformative approach by advocating for the integration of a portable PLC training interface to bridge the gap between theoretical knowledge and practical skills. [2] It proposes the incorporation of practical experiments and updated teaching methodologies to enhance students' practical skills in industrial automation.

III. CONCLUSION

In conclusion, both initiatives seek to enhance industrial automation education by addressing the limitations that traditional methods often impose. Emphasizing the

significance of practical learning in tandem with theoretical knowledge, the proposed solutions aim to bridge the gap between classroom instruction and realworld applications. By offering portable and cost-effective training interfaces, these efforts not only cater to budgetary and logistical constraints but also foster a deeper understanding and interest in PLC programming and related concepts. The incorporation of IoT components and the introduction of innovative architectures demonstrate a forward-thinking approach that prepares students for the Ashwaghosh Ramteke Department of Electronics Engineering G.H. Raison college of Engineering, Nagpur, Maharashtra (India). ashwaghoshramteke15@gmail.com demands of the ever-evolving industrial landscape. Overall, these endeavors represent significant strides in improving the quality and accessibility of industrial automation education, ensuring that students are adequately equipped for the challenges of the modern industrial sphere.

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