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FIRMWARE AND HARDWARE DEVELOPMENT OF AN EDUCATIONAL PROGRAMMABLE LOGIC CONTROLLER

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Rezumat. *Această lucrare descrie un nou automat programabil (AP) care integrează componente hardware și software de ultimă generație, oferind o experiență educațională imersivă și interactivă. Se detaliază elementele constructive, caracteristicile și beneficiile noului AP dezvoltat, subliniind potențialul acestuia de a oferi studenților o platformă de învățare. Este evidențiată, de asemenea, rentabilitatea deciziilor arhitecturale, scopul final fiind acela de a crea un AP care să fie atât relevant pentru standardele industriei, cât și accesibil pentru universități și școli de învățământ superior.*

Abstract. *This paper describes a novel PLC system that integrates cutting-edge hardware and software components, offering an immersive and interactive educational experience. The design, features, and benefits of the newly developed PLC are detailed, highlighting its potential to empower learners in various educational settings. Moreover, the cost-effectiveness of architectural decisions is also highlighted, with the end goal being to create e PLC that is both relevant to industry standards and affordable for universities and higher education schools.*

Keywords: PLC, Programming, Hardware & Software Development

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1. Introduction

Programmable Logic Controllers (PLCs) have long been the cornerstone of industrial automation, driving efficiency and productivity across numerous industries. Despite their widespread use, however, they have remained largely inaccessible to educational institutions due to their cost, complexity, and limited scope of application. Recognizing the critical need for a product that is relevant to the modern-day industry, while remaining cost-effective and affordable, a set of specifications were laid out, quantifying the needs and capabilities of the PLC [1], [2].

2. Programmable logic controllers – literary review

A programmable logic controller represents a computation device that can execute a program in a closed loop, reacting to outside stimuli and being able to influence the environment it is integrated inside of. At the very basic level, a PLC should be able to: