

数字孪生与人工智能双赋能的智能建造专业教学改革与实践——以南宁学院智能建造专业为例

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摘 要 : 在国家“双碳”战略与建筑行业数字化、智能化转型背景下, 传统土木工程人才培养模式已无法适配智能建造产业发展需求。应用型本科高校智能建造专业亟需重构课程体系、革新教学模式。南宁学院立足“应用型、开放式、新体验”办学理念, 依托2025年获批招生的智能建造本科专业, 以风力发电混塔技术、无人机智能检测技术两大微专业为双切入点, 融入专业人才培养方案既定核心课程与实践环节, 构建数字孪生与人工智能双赋能的人才培养体系。文章剖析智能建造行业人才能力诉求与专业教学现存痛点, 搭建“三阶四维五贯通”教学改革总体框架, 对接人才培养方案现有课程完成内容重构与技术融合, 设计“课内—平台—项目”三级递进实践教学体系, 形成双微专业驱动、课岗赛创融通的育人范式。

关 键 词 : 数字孪生; 人工智能; 智能建造; 无人机智能检测

Teaching Reform and Practice of Intelligent Construction with Dual Empowerment from Digital Twins and Artificial Intelligence—Taking the Intelligent Construction Major at Nanning University as an Example

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Abstract : Against the backdrop of the national "dual carbon" strategy and the digital and intelligent transformation of the construction industry, the traditional civil engineering talent cultivation model can no longer meet the development needs of the intelligent construction industry. Applied undergraduate institutions specializing in intelligent construction urgently need to reconstruct their curriculum systems and innovate teaching methods. Based on the educational philosophy of "application-oriented, open, and new experience," Nanning University leverages its newly approved intelligent construction undergraduate program (2025) to integrate two micro-specialties—wind power hybrid tower technology and drone intelligent inspection technology—into the established core curriculum and practical components of the professional talent training plan. This forms a dual-empowerment talent cultivation system combining digital twins and artificial intelligence. The article analyzes the competency demands of the intelligent construction industry and the existing pain points in professional teaching, proposing an overarching framework for teaching reform with "three stages, four dimensions, and five integrations." It aligns with the existing curriculum of the talent training plan to achieve content restructuring and technological integration, designing a three-tiered progressive practical teaching system ("classroom—platform—project") that fosters a dual micro-specialty-driven model, seamlessly integrating courses, job requirements, competitions, and innovation.

Keywords : digital twin; artificial intelligence smart construction; intelligent drone inspection

引言

随着我国“碳达峰、碳中和”战略纵深推进, 新能源风电、智慧城市、智慧工地等新业态快速崛起, 智能建造成为建筑产业转型升级的核心方向^[1]。钢—混凝土组合塔筒(混塔)在风电工程中占比逐年攀升, 无人机低空遥感、智能巡检、结构病害自动识别技术广泛应用于建筑检测、路桥运维、风电塔筒监测等场景, 行业对智能建造人才提出传统土木功底+数字孪生建模+人工智能分析+智能装备