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TEACHING CYBER-PHYSICAL-SOCIAL-SYSTEMS THROUGH PROJECTS BASED LEARNING

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In most educational institutions of higher learning across the globe, educators as well as students have been using internet extensively for academic work during the past two years. A positive outcome of this has been that the campuses have become smarter as internet is a primary tool used in most of classrooms. However, using this technology for developing various Project-Based Learning (PBL) courses such as Internet of Things (IoT), Fundamentals of Automation, Industrial IoT, and Cybersecurity have been challenging. Most of these course curriculums fall under the broad category of Cyber-Physical-Systems (CPS). This paper presents the efforts to partially overcome these challenges in light of the emerging approach of Cyber-Physical-Social-Systems (CPSS), wherein the social aspect involves different levels and modes of interactions distinct from a traditional brick and mortar classroom. The CPSS model is developed based on the experiences of some of the co-authors and others who have developed a series of CPS courses starting from pre-Covid-19 pandemic but mainly moved to remote learning and hybrid modes during the pandemic. These courses are taught to interdisciplinary program students which comprise of engineering, design, computer applications, and in some cases even management specializations. Problem statements are identified with surveys and students are encouraged to develop solutions for areas for local problems with aspect of the "social" element of a CPSS. The courses involve up to 60 % learning through activities and projects, requiring advance planning and resource management by the faculty teams. The paper first describes the project goals, learning objectives and outcomes for sample courses, with an overall objective of sensitizing students to use technology for solving problems for social good. After sharing the details of some of these completed projects as well as work-in-progress for present students, a model of CPSS in education through hybrid PBL is proposed that may be applicable or adaptable to different learning styles, scenarios, and socio-cultural contexts

keywords: [project goals](#), [internet of things](#), [scenarios](#).