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Title	An IoT Integration into a CPM Machine: An Investigation of a Simplified Model in a Senior Design Project
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Abstract

This paper presents a case of a senior design project conducted by students who took an electrical power track. The selected topic was related to current electrical engineering trends, rather than conventional electrical power senior design. This project aims to combine the Internet of Things and application software development in order to enhance the operation of a knee continuous passive motion (CPM) machine. The goal is to build a basic CPM machine such that the IoT-upgraded version could be controlled by a smart phone, collected, transferred and stored physical therapy data on the network. A simplified model of CPM machine was built to serve such purpose. A user interface was created via a smart phone application for the user to setup a basic operation of the CPM machine. This application communicated with a microcontroller that regulated the mechanical movement via the motor driver. The axial movement was operated through a gear box that converted torque to the push-and-pull operation according to the designed speed. Once the thigh and calf support completed a cycle movement, a limit-switch was activated and then a control signal was sent to initiate the data transferred through the Internet. The data was stored in the Google Sheets platform. The utilization of an IoT technology and a smart phone based user-interface was proven to be successful in the primary goals and objectives.