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DESIGN AND DEVELOPMENT OF THE TRIGGER SYSTEM FOR PROTON COMPUTED TOMOGRAPHY APPLICATIONS

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Proton computed tomography (pCT) is a novel radiography technology that is used for treatment planning in proton therapy with better benefit of higher position accuracy than the conventional radiography. This work focused on the design and construction of a synchronizing system, the so-called the pCT trigger controller as a key communication part in the pCT prototype. This controller was designed using the MEGA2560 pro mini as a microcontroller unit (MCU). The MCU connected to the SAMKOON SK-070FE HMI touchscreen using Universal Asynchronous Receiver/Transmitter (UART) to create a graphical user interface (GUI) based on Modbus protocol via the C language program. The controller was tested at King Chulalongkorn Memorial Hospital (KCMH) on August 2021 and March 2022. It was found that the controller can send the programmed signals to control the rotational stage, ALPIDE sensors, and TSS interface box of the proton beam in a desired sequence. Where the ALPIDE sensor interfaced with EUDAQ2 software to record the hit map of protons on ALPIDE's active area.

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