Learning Electronics Through Projects

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Abstract

Key elements of an Independent Studies in Physics, taken by the author under Dr. Feng Jin in Fall, 2020, including the project selection process, major hardware components and software designs of the device, is presented along with the actual product of the project, a functioning WiFi-connected internet weather clock. The focus for this independent studies project is electronics and the intent was to learn more about electronics through a personal project with some tangible product in the end. Several project ideas were researched and examined, and the weather clock project was ultimately selected because of its feasibility and involvement of various aspects of electronics. An Arduino compatible board is used, an esp32 microcontroller, which serves as the brain of the device. A low power E-paper display is used to display the weather information. The hardware interface between the esp32 and the e-paper display is through a custom designed and fabricated PCB, and control software is written in C++ using the Arduino API (application programming interface). The metal frame that holds the clock was designed by the author and made by the department machinist John Decker.