

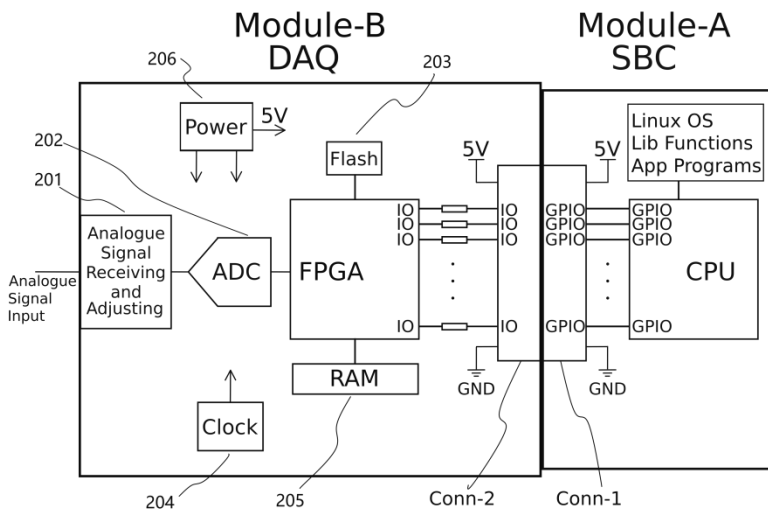


Figure 1A

Abstract: The present disclosure relates to modular design method of a data acquisition and processing apparatus based on FPGA and single-board computer, and a such apparatus designed with the method. The method comprises: separating the circuitry of the data acquisition and processing

apparatus to be designed into two function modules: a computing module and a data acquisition (DAQ) module; adopting a single-board computer (SBC) with a GPIO connector as a computing module; adopting a data acquisition (DAQ) module with a FPGA as its core processor and controller, and with an IO connector corresponding to the GPIO connector on the aforesaid SBC; electrically connecting an aforesaid SBC and an aforesaid DAQ module via the above mentioned connectors on them; stipulating a communication protocol to govern the data and instruction exchanges between the aforesaid two connected modules; designing FPGA IP to control the DAQ process of a DAQ module, process the acquired data and implement the aforesaid communication protocol in the FPGA, and loading this IP onto a DAQ module; designing library functions to implement the aforesaid communication protocol on a SBC; designing software programs running on a SBC and carrying out multiple tasks: exchanging instruction and data with a connected DAQ module by calling the aforesaid library functions, processing data coming from the DAQ module, accomplishing other functionalities as required.