Project Proposal: Punched Card Reader

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Project Overview

Our project proposes the design and implementation of an Arduino-based punched card reader. It aims to emulate historical slow I/O devices with a pedagogical emphasis for CSCI 1670 (Operating Systems). The reader will pull a punched card through an array of optical sensors, leveraging Pulse-Width Modulation (PWM) to manage the speed of the card's movement. The analog readings from the sensors will be interpreted using the Arduino's Analog-to-Digital Converter (ADC) to determine the presence or absence of holes in the card. An interrupt service routine (ISR), triggered by a sensor that detects whether a card is inserted (i.e., the presence of a card), will initiate the reading process. The processed data will be transmitted to a host local machine as a string through serial communication. A watchdog timer will be implemented as a fail-safe mechanism to reset the system in the event of malfunctions, thereby ensuring the system's reliability.

Design Rationale

Our project will leverage the Arduino's built-in features, including *Pulse-Width Modulation (PWM)* to control the speed of the card reader and an *Analog-to-Digital Converter (ADC)* to read the analog signals from the optical sensors. Based on an event-driven approach, the system will utilize an *Interrupt Service Routine (ISR)* to handle card insertion events, thereby initiating the reading process without requiring continuous polling. To ensure system reliability, a *watchdog timer* will be implemented as a fail-safe fallback to reset the system in case of malfunctions. Once the data is processed, it will be transmitted to a host local machine via *serial communication*, making the information accessible and fulfilling the device's I/O functionality.

Deliverables and Fulfillment Criteria

Hardware and Testing Plan

Uncertainties

Preliminary List of Components to be Ordered

References