RP2040 Switch Monitor

Project Description

This Arduino project is designed for an RP2040-based microcontroller. It actively monitors four digital input pins connected to switches. The code detects both press (HIGH to LOW transition) and release (LOW to HIGH transition) events for each switch and sends a corresponding message over the serial port.
Additionally, the program sends a "heartbeat" message every five seconds to signal that it is running correctly. The onboard LED flashes briefly in sync with this heartbeat message.

Features

- Monitors 4 digital inputs for state changes.
- Sends a custom serial message for both switch press and release events.
- Sends a periodic heartbeat message every 5 seconds.
- Flashes the onboard LED to provide a visual indicator of the heartbeat.
- Uses internal pull-up resistors, simplifying the external circuit.

Hardware & Connection

Serial Communication

To read the output from this device, you must configure your serial monitor or receiving application with the following settings:

- **Baud Rate**: 9600
- **Data Bits**: 8
- **Parity**: None
- **Stop Bits**: 1

This configuration is commonly referred to as **9600 8N1**.

Serial Protocol

The device communicates using a custom serial protocol with two distinct message types. All messages are framed with control characters.

Control Characters

Mnemonic	Hex Value	Description
ENQ	0x05	Enquiry
DLE	0x10	Data Link Escape
STX	0x02	Start of Text
ETX	0x03	End of Text

Switch Event Message

This message is sent whenever a switch is pressed or released.
Structure:
ENQ | DLE | STX | 'S' | Switch # | Event Type | DLE | ETX

- **'S'**: Identifies the message as a Switch event.
- **Switch #**: An ASCII character from '1' to '4' indicating which switch triggered the event.
- **Event Type**: An ASCII character indicating the event type:
    - 'P': The switch was pressed.
    - 'R': The switch was released.

Heartbeat Message

This message is sent every 5 seconds to indicate the device is operational.
Structure:
ENQ | DLE | STX | 'H' | DLE | ETX

- **'H'**: Identifies the message as a Heartbeat.

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