Henet Switch Control Plugin for Unreal Engine

This plugin provides a simple way to monitor a serial port for switch press events from a Henet-protocol compatible hardware device and expose them to the Unreal Engine Blueprint system.

Features

- Opens and closes a serial port connection on command.
- Listens for switch press/release events and heartbeat signals on a specified port.
- Communicates with hardware using the Henet protocol.
- Exposes events through a flexible 3-node Blueprint system.
- Runs all serial communication on a background thread to prevent any impact on game performance.

Compatibility

This plugin is designed for **Unreal Engine 5.6**.

Installation

1. Download the latest HenetSwitchControl-vX.X.X.zip file from the GitHub Releases page.
2. In your Unreal Engine project, create a Plugins folder at the root if it doesn't already exist.
3. Extract the downloaded zip archive into your project's Plugins folder. The structure should be YourProject/Plugins/HenetSwitchControl/.
4. Restart the Unreal Editor.
5. Open the Plugins window (Edit > Plugins) and verify that "Henet Switch Control" is enabled under the "Project" or "Installed" category.

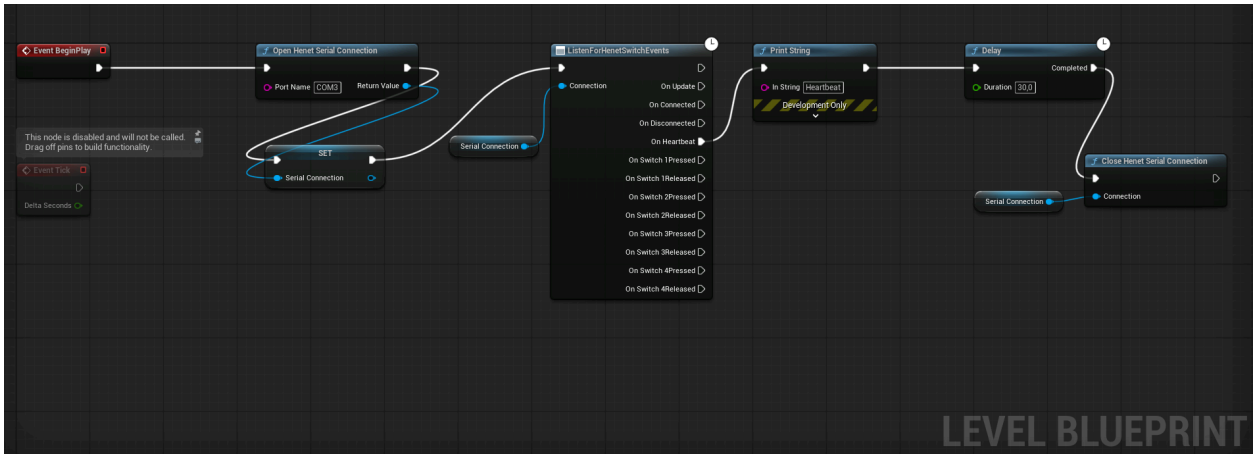
How to Use

The plugin uses three main Blueprint nodes. Here is the standard workflow:

1. **Node 1: Open Connection**
   - In your Blueprint (like the Level Blueprint), call **Open Henet Serial Connection** on an event like Event BeginPlay.
   - Specify the **Port Name** (e.g., "COM3").
   - Drag from the blue **Return Value** pin and select **"Promote to Variable"**. Name it SerialConnection. This is very important.
2. **Node 2: Start Listener**
   - Drag off the execution pin from setting the variable and add the **Listen For Henet Switch Events** node.

- Plug your new SerialConnection variable into the Connection input.
- Plug a **self** reference into the World Context Object input.
- Connect the various output execution pins (OnConnected, OnHeartbeat, OnSwitch1Pressed, etc.) to your game logic.

3. **Node 3: Close Connection**
   - On an event like Event End Play, get your SerialConnection variable.
   - Call the **Close Henet Serial Connection** node and plug your variable into its Connection input. This is critical for preventing memory leaks and editor crashes.



Logging

You can set verbose logging (Verbose or VeryVerbose) in Unreal editor console command:
```
log LogHenetSwitchControl VeryVerbose
```

Or in DefaultEngine.ini:
```
[Core.Log]
LogHenetSwitchControl=Verbose
```

How It Works

The plugin's architecture is designed for performance and flexibility by separating the connection from the event listeners.

1. **FHenetSerialPortReader (C++ Worker)**
   - This is a C++ class running on a dedicated background thread (FRunnable).
   - It handles all low-level, blocking serial port I/O and parses the incoming Henet protocol byte stream.
   - This design ensures that reading data from the port can never stall or impact the main game thread.
2. **UHenetSerialConnection (C++ Connection Object)**
   - This is a UObject that acts as a "handle" or "reference" to the connection.
   - When created by the Open Henet Serial Connection node, it spawns the

FHenetSerialPortReader worker and holds its thread-safe event queue.
    - This object is protected from garbage collection while it's active.
3. **UHenetSwitchControlLibrary (C++ Blueprint Library)**
    - This library provides the simple Open (Node 1) and Close (Node 3) functions that appear in Blueprints. They are responsible for creating and destroying the UHenetSerialConnection object.
4. **UHenetSwitchMonitorNode (C++ Async Listener Node)**
    - This is the Listen For Henet Switch Events node (Node 2).
    - It is an async action (UBlueprintAsyncActionBase) that takes a UHenetSerialConnection object as input.
    - It runs a timer on the game thread to poll the connection's event queue and fire the appropriate output execution pins (OnHeartbeat, OnSwitch1Pressed, etc.).
    - You can have multiple, separate listener nodes all monitoring the *same* connection object.

This design keeps all blocking I/O on a background thread, while the listener(s) safely poll for events on the game thread, guaranteeing smooth performance.