Guidance - Detailed Design Document

Document Title	Guidance – Detailed Design Document
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1.0 Purpose

The purpose of this document is to give a detailed summary of the design and purpose of each of the elements of the prototype.

2.0 Scope

3.0 Problem Description

3.1: There is a need for a halo traction system with integrated real-time and continuous load monitoring to ensure that the applied force remains within the desired therapeutic range and to improve patient safety.

3.2: device addresses the challenge of accurately monitoring and recording load distribution in a halo traction system to improve patient safety and treatment outcomes. Current systems lack real-time data tracking, making it difficult for physicians to ensure consistent and appropriate traction forces over extended periods. This can lead to inconsistent treatment adjustments, increasing the risk of complications such as nerve damage, discomfort, or ineffective spinal correction. By providing continuous load monitoring with real-time data transmission, the device enables precise load adjustments, helping physicians make informed clinical decisions. Additionally, automated data logging reduces reliance on manual tracking, minimizing errors and ensuring comprehensive documentation for long-term patient care.

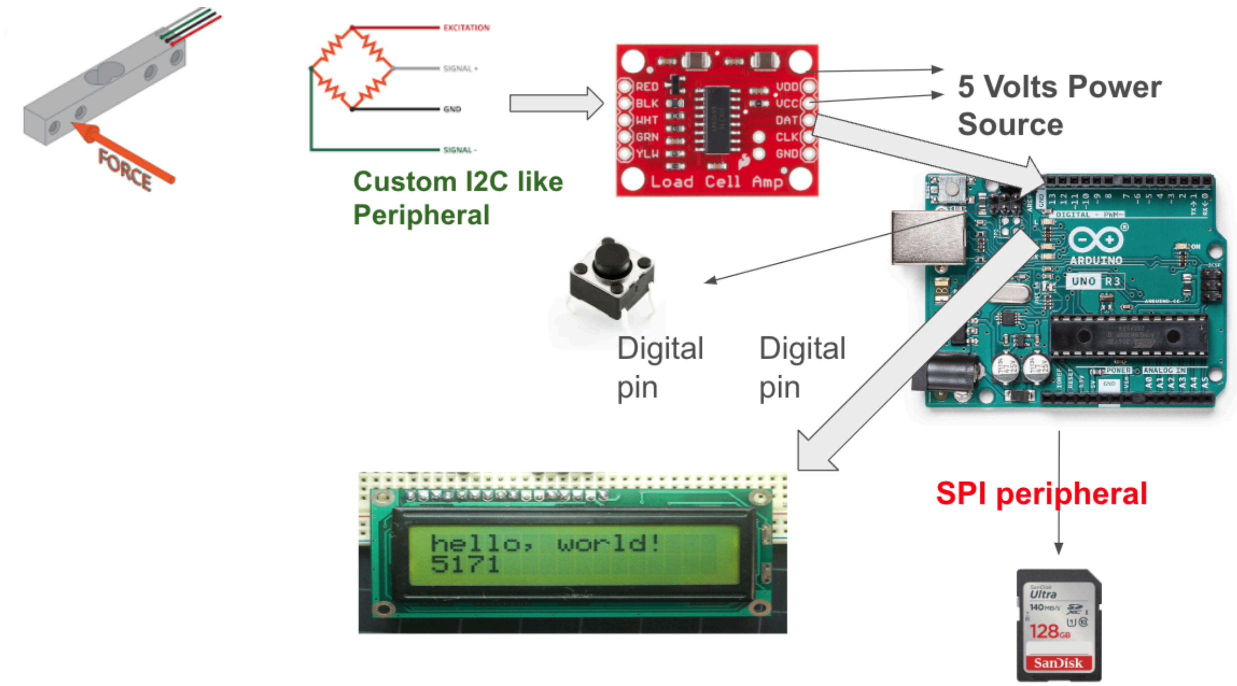
4.0 Device Description

4.1: Our device will provide real-time load monitoring and recording in a halo traction system to ensure that patients receive consistent and appropriate traction forces. By continuously tracking the applied load, it will help prevent excessive or insufficient force, reducing the risk of complications such as nerve damage, discomfort, or ineffective spinal correction. Additionally, the device will automate data logging, allowing physicians to review historical load trends and make informed treatment adjustments without relying on manual tracking.

4.2: The device will use a 50kg load cell to measure the applied force in real time, with data processed by a microcontroller unit (MCU). The system will store readings on an SD card and transmit them via USB serial communication, ensuring easy access to historical data. A calibration button and LCD screen will allow physicians to validate and adjust readings as needed. To ensure reliability, the device will be powered by a validated battery system and designed for continuous 24-hour operation with durability testing to confirm long-term functionality.

5.0 Functional Breakdown

A



B

6.0 References

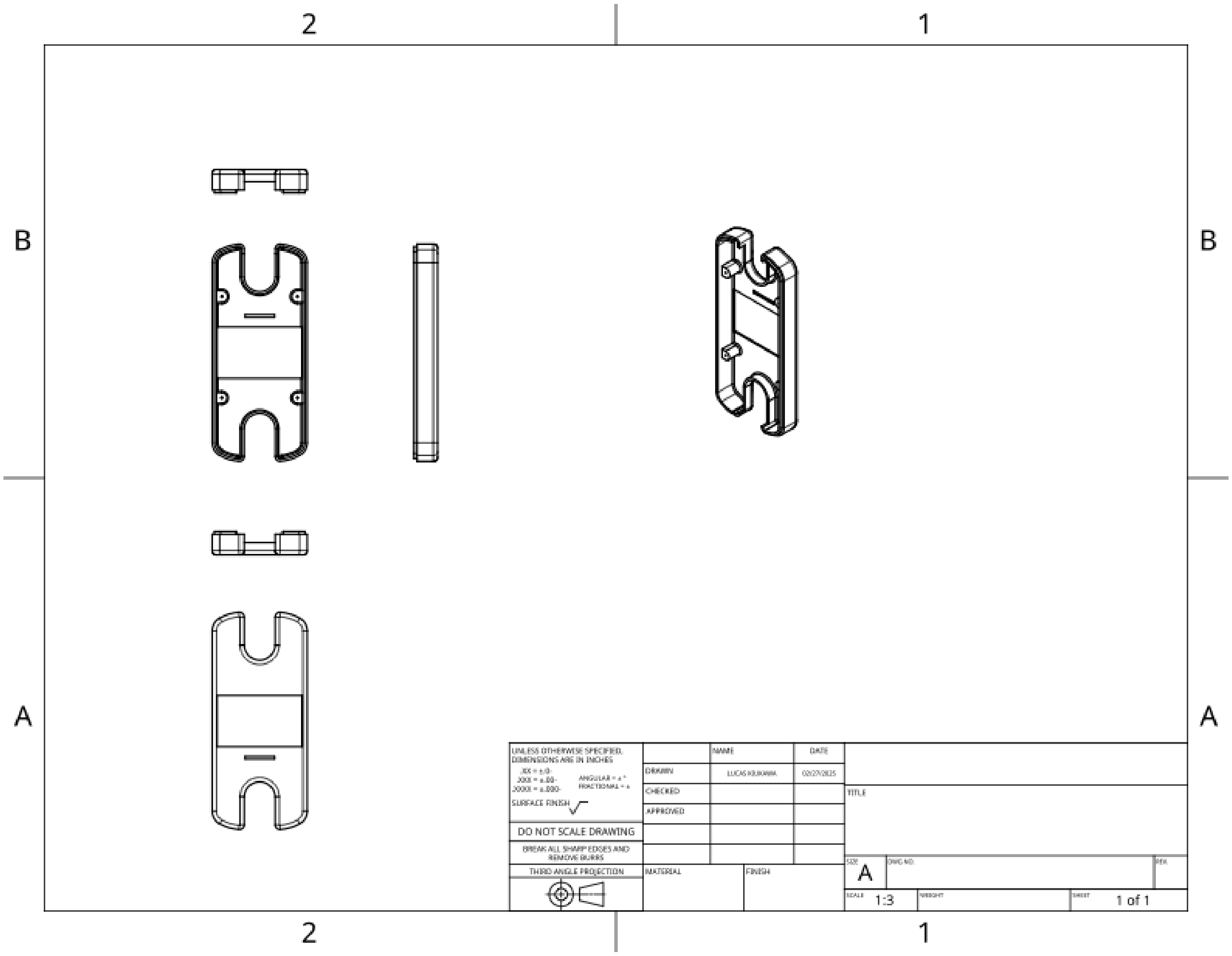
7.0 Signatures and Approvals

Appendices

A **Block Diagram for electronic components**
B1 **CAD OnShape Outer Casing Drawing 1**
B2 **CAD Onshape Outer Casing Drawing 2**

Add in specific design documents here:

B1: CAD OpenShape Outer Casing Drawing 1



B2: CAD Onshape Outer Casing Drawing 2.