

Case Study L2-003

Semantic Integrity (Domain Locking)

The "Musical Algorithm" (Tuning vs. Accord)

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Case Study Metadata

Dataset ID: L2-003

Category: Semantic Integrity — Level 2

Focus: Domain Polysemy (Anti-Hallucination)

Model: Generic NMT

Domain: Diabetes Management / Control Systems

1 The Context: Algorithmic Adjustment

The patent describes a **"Tuning module"** (Segment 6) used to adjust insulin therapy parameters based on patient data.

Key Concept

The Polysemy Spectrum:

In technical contexts, "Tuning" has two distinct translation vectors:

- **Control Systems/Medicine:** *Réglage, Ajustement* (Optimization of parameters, PID tuning)
- **Music/Law:** *Accord* (Pitching an instrument, or reaching an agreement)

2 The Glitch: The "Dictionary First" Error

The Generic NMT model selected the most common dictionary definition for "Tuning," ignoring the medical context.

2.1 The Translation Failure

Critical Issue

Why "Accord" Fails Here:

The phrase "Module d'accord" in a diabetes patent sounds absurd to a French native speaker (implying a "Chord Module" or "Agreement Module"). This creates a **cognitive dissonance** that immediately flags the text as a low-quality machine translation, damaging the credibility of the entire filing.

| Source (English) | AI Hallucination (Failure) | Golden Rewrite (Correct) |
|---|---|---|
| "...a tuning module comprising a processor..." | <p>× Wrong Vector Space:</p> <p>"...module d'accord comprenant un processeur..."</p> <p>(Musical/Legal Connotation)</p> | <p>✓ Domain Standard:</p> <p>"...module de réglage comprenant un processeur..."</p> <p>(Control System Terminology)</p> |

Table 1: Domain Polysemy Failure: Tuning vs. Accord

3 Alignment Methodology

To prevent this polysemy error, we apply a **Domain Locking Protocol** (Checklist B1).

Alignment Methodology

The Protocol:

1. **Domain Detection:** Identify the text as "Medical / Control Systems" based on context keywords (insulin, glucose, processor, parameters).
2. **Vector Exclusion:** Explicitly **BAN** the Music/Legal vector space for the token "Tuning".
3. **Collocation Enforcement:**
 - IF "Tuning" is near module, parameter, PID, loop
 - THEN Force Mapping → *Réglage* or *Ajustement*

Portfolio: Patent Translation AI Alignment Framework

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