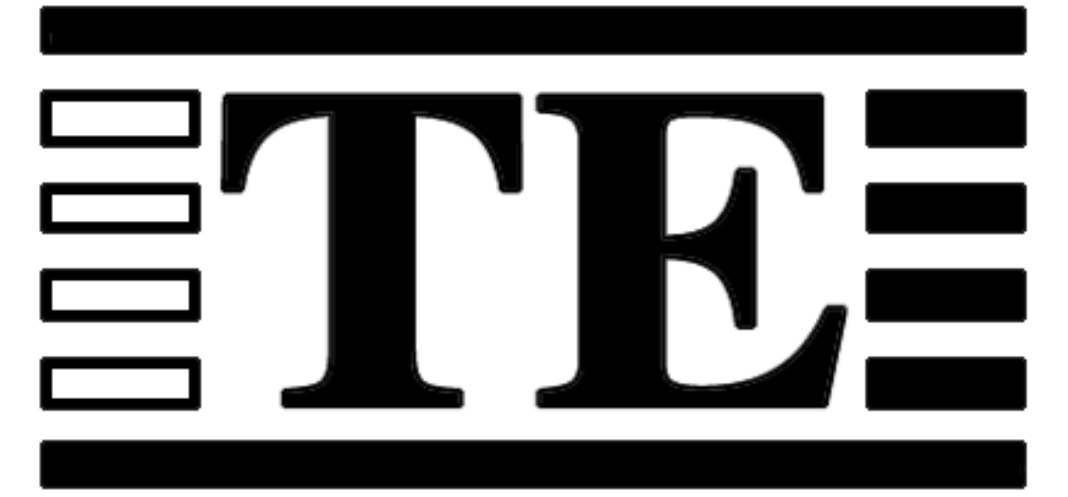# Gesture Recognition System
(Simple Wireless Natural User Interface)

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Abstract

Inside the world of electronics there is a large diversity of fields, in this Final Degree Project, we will focus in the ambit of the **human-machine interaction**.

We will perform the prototype of a **simple natural user interface** that is able to **recognizes hand gestures** and control an extern system by **wireless communication**. To do that, we will use a **microcontroller** based system that will process the acquired reads from an **accelerometer** and determines the gesture accomplished to transmit it later through **Bluetooth Low Energy** link to the reception system.

We will start by implementing the **hardware design** of the system, designing the electrical schematic and the CAD design of the printed circuit board, manufacturing the board and doing the components solder process. Once completed the hardware of the system we will continue with the **software design**, at both side of the system: the prototype manufactured and the extern system (We will control the mouse and keyboard of a PC), that allows verify the correct functionality of the system.

Complementary to the hardware and software development, we will work out the **3D model** of the prototype enclosure.

Specifications

The most significant specifications of the system:

- Gesture Recognition
- Wireless Communication
- Low power consumption
- Wearable design
- Automatic proximity connection (max. 10m)
- LED status indicator
- Two functional modes:

  - Streaming: To manage continuous data reception systems.
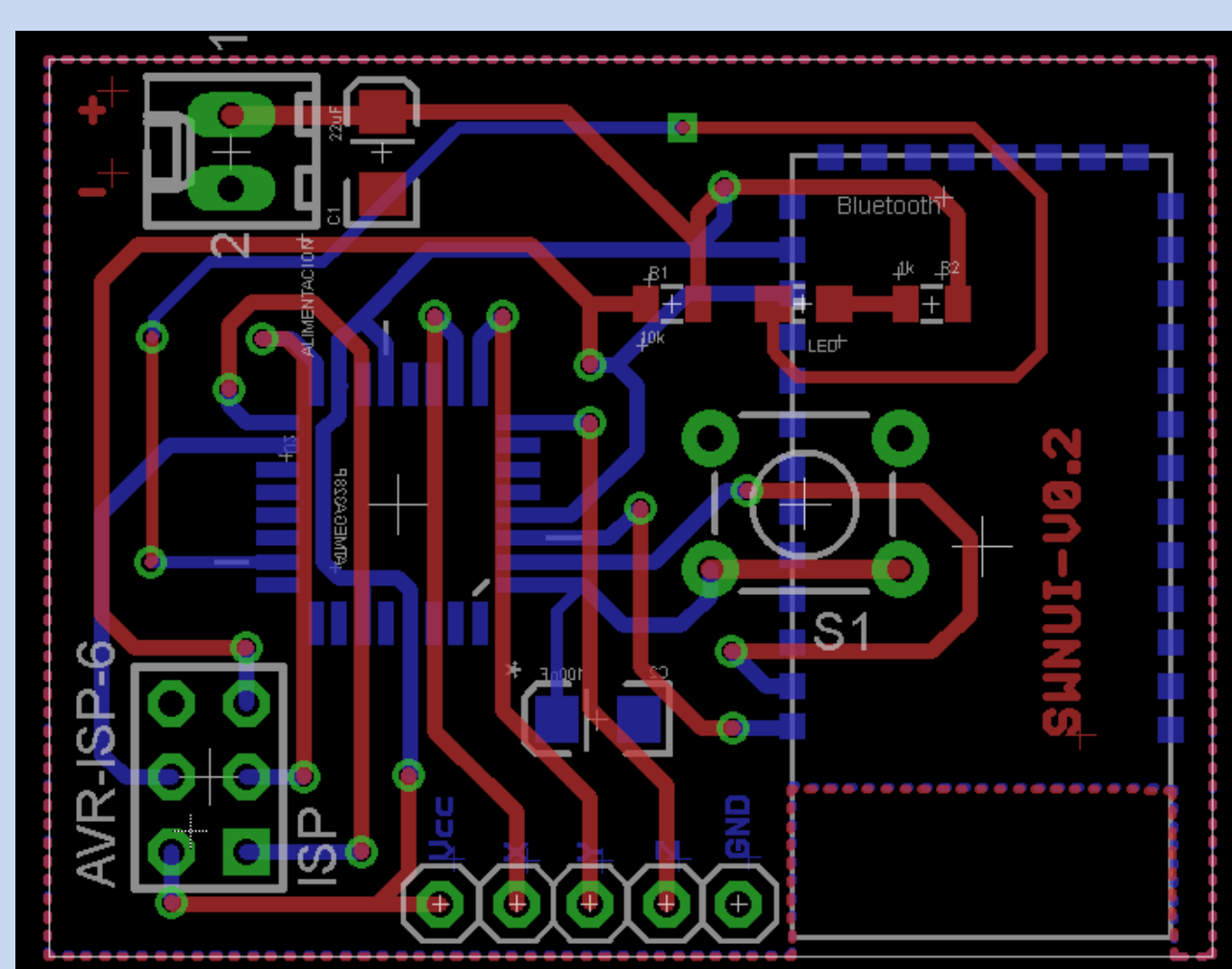 - Gesture: To manage discrete data reception systems
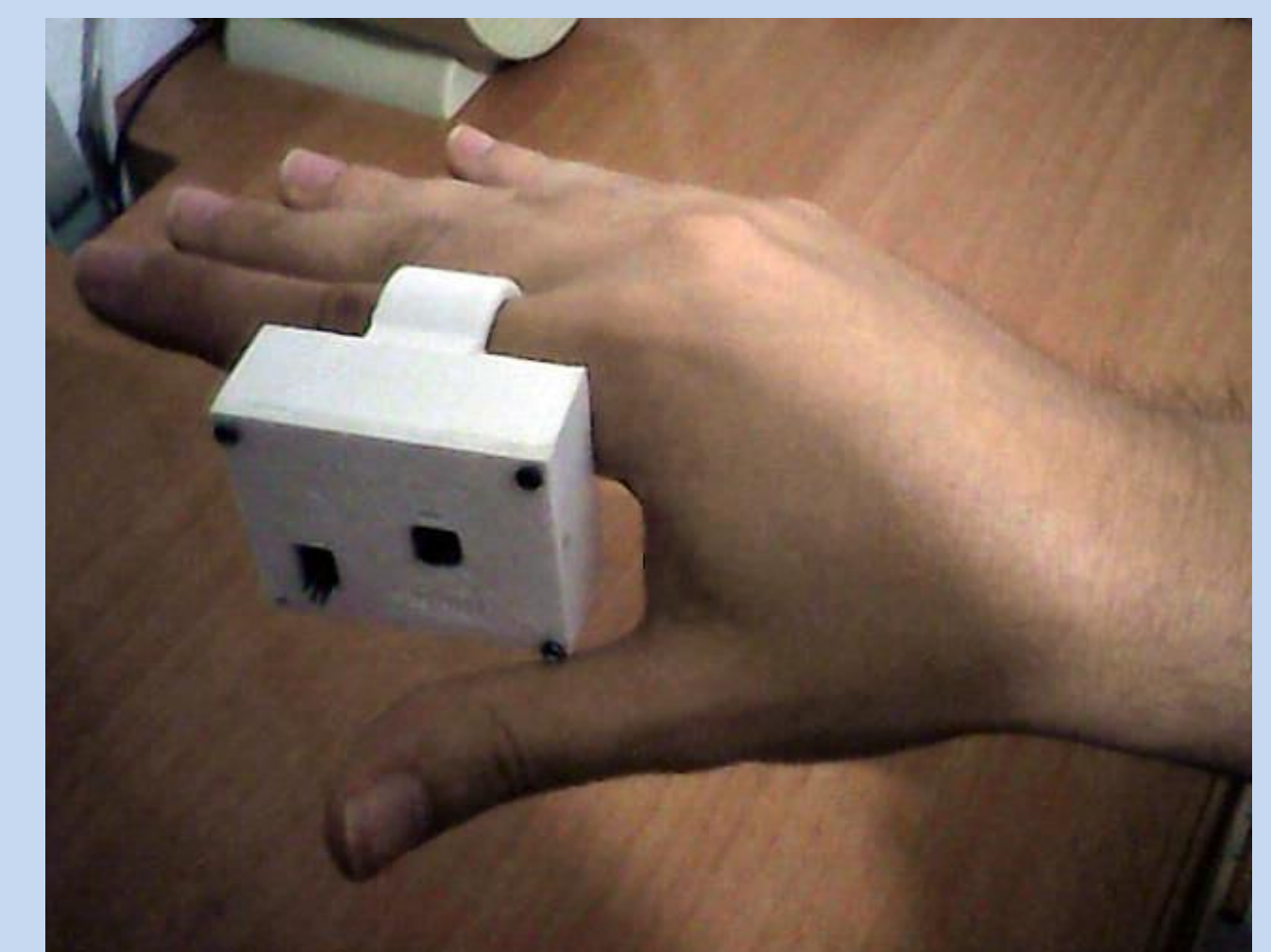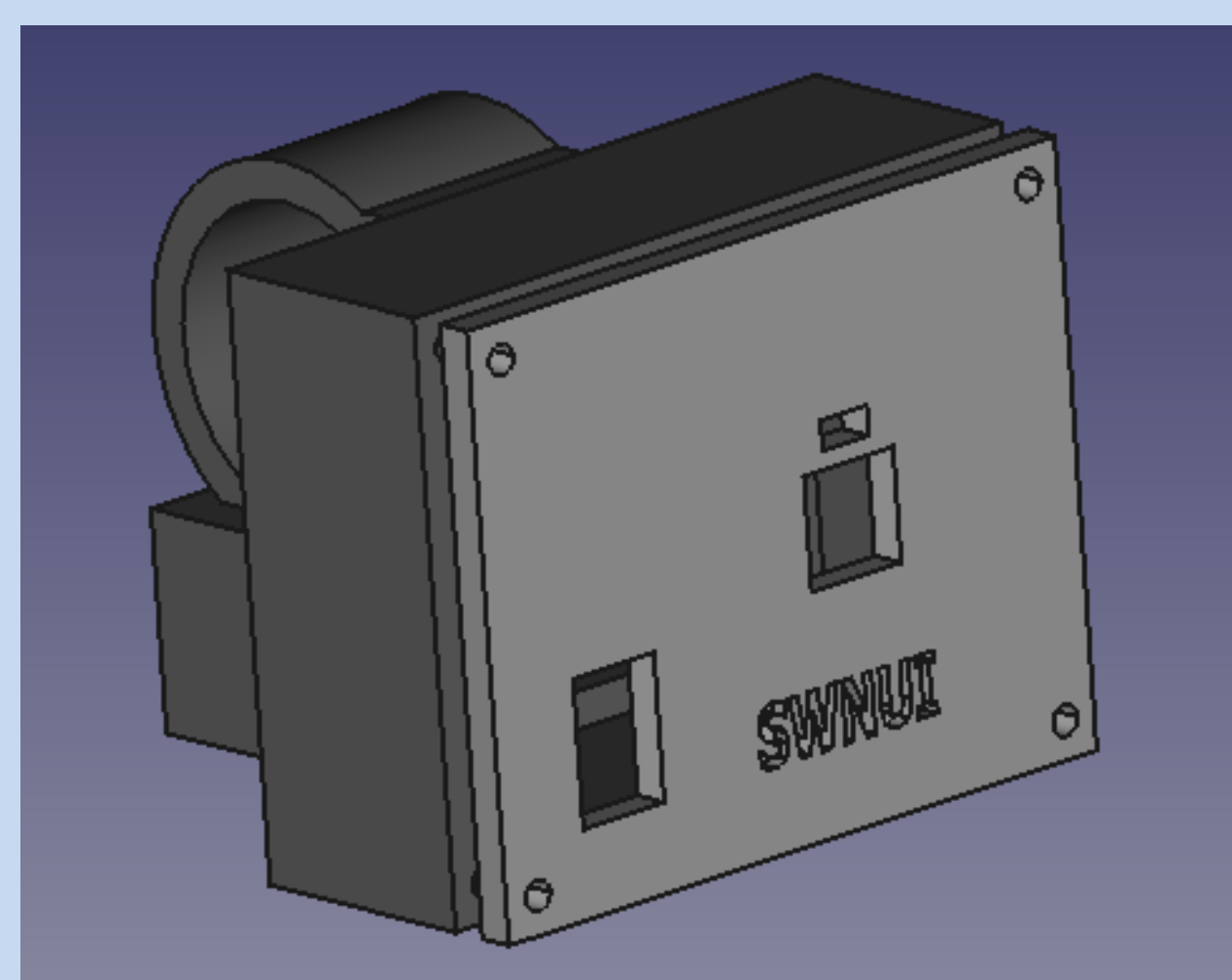
Electrical Diagram
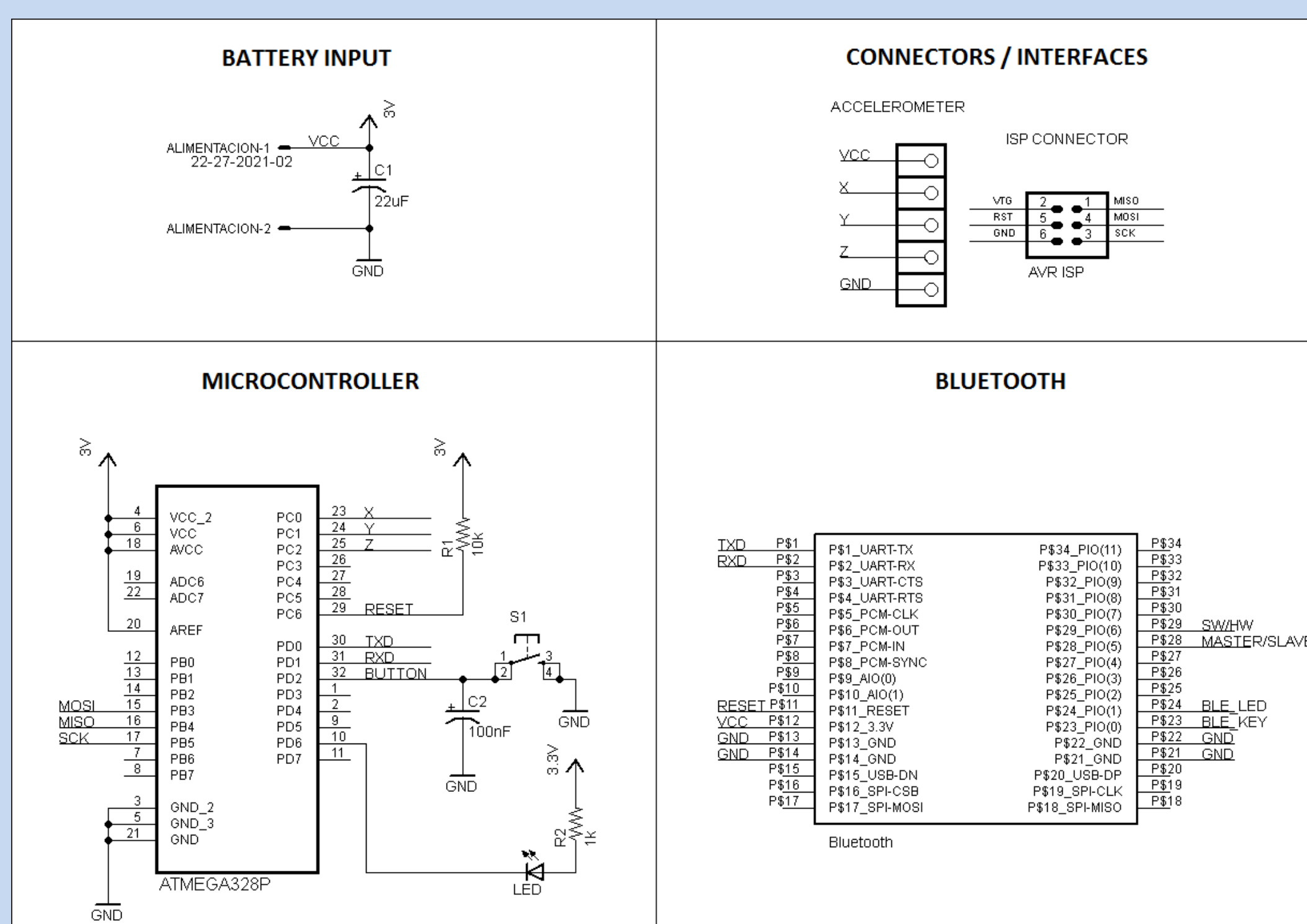
Functional Diagram
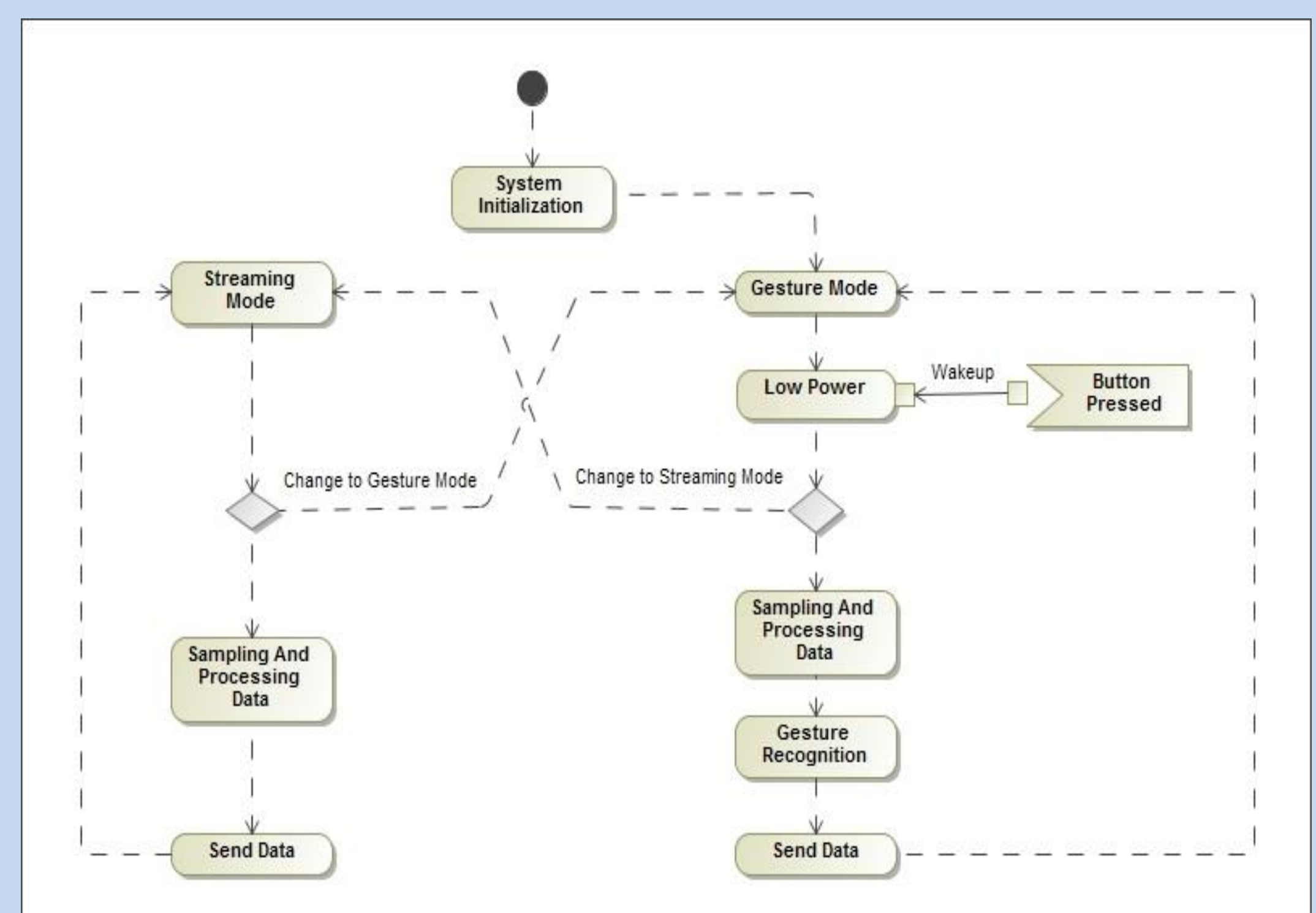
Printed Circuit Board

3D Model & Final Prototype

Conclusions, Future Work and Repository

Conclusions

- IMU based solutions beats optical systems for gesture recognition (no need direct vision).
- Gesture recognition will become an important part of the *wearables* devices.
- NUIs will increase their importance in society (due rise of the *wearable* and low size MEMs technologies).

Future work

- Improve the low power of the system.
- Improve the mechanical part of the system (size and appearance).
- Design a SOC solution for all the system (Combine accelerometer, BLE and custom functionality).
- Transform the prototype into a final product.