* **Project Objective:**
  + Develop a contactless control system for domestic appliances using hand gestures and manual inputs.
  + Ensure that the system retains the last valid gesture (persistent command) until a new gesture is detected.
* **Key System Components:**
  + **Gesture Sensor:** PAJ7620U2 (communicates via **I2C2**) (PB8 for SCL and PB9 for SDA).
  + **Touch Sensor:** AT42QT101X Capacitive Touch Sensor sending its signal to **PA0**.
  + **Backup Push Buttons:** Configured on PA1 and PA4, used for momentary override of sensor commands.
  + **Output Control:**
    - **IR\_UD\_PIN (PC10):** Controls the up/down relay signal.
    - **IR\_LR\_PIN (PC11):** Controls the left/right relay signal.
  + **LED Indicator (LD2):** Provides visual confirmation of the system status (active gesture mode).
* **Interfaces and Communication:**
  + **I²C2:** Interfaces with the PAJ7620U2 gesture sensor.
  + **USART (Optional):** Available for debugging via printf (not required for normal operation).
  + **GPIO:** Manages the touch sensor input, backup push button override, and relay outputs.
* **Functional Highlights:**
  + **Persistent Gesture Command:** The system stores the last valid gesture command until a new gesture is registered.
  + **Touch Toggle:** Pressing the AT42QT101X touch sensor (at PA0) toggles the active gesture processing mode.
  + **Backup Override:** Push buttons override the sensor commands momentarily to force outputs high.
  + **Output Control:** Based on persistent sensor data and any overrides, the outputs (PC10 and PC11) change state to control connected appliances.

**Voltage Levels:**

* + Logic circuits operate at 3.3V.
  + Relay modules use a 5V power supply.
  + The fan and lights are powered by 5V