ENEL 351 Project Proposal – Feb 7, 2025
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For my ENEL 351 project, I plan to create a gesture-based device controller with an STM32 Nucleo-64 microcontroller. The system will let users to manage domestic equipment like fans and lights with hand gestures, removing the need for physical interaction. The system will detect certain hand movements using an infrared gesture sensor (APDS-9960) and confirm actions using a mechanical push button (momentary switch).

The system will contain two LED indicators that will indicate whether each regulated item is turned on or off. A relay module will be used to turn on and off the fan and light based on the gestures detected by the IR gesture sensor, which will have four default gestures. In the event that gesture detection fails, the Nucleo-64's onboard push button will be utilized to select a mode and override manually.
The system will use the microcontroller's PWM output to control the relay module, while the gesture sensor will be read via an analog input. The mechanical push buttons and LED indicators will be connected via digital I/O.

Additional features may include, but are not limited to, a touch sensor-based button for gesture activation, as well as other personalized actions, and integration with a small OLED display to give a real-time interface for appliance status.
The project will be built with off-the-shelf sensor modules and electronic components procured from multiple providers as needed. The system will be powered by the Nucleo-64's onboard power system, with proper voltage regulation for peripheral components.

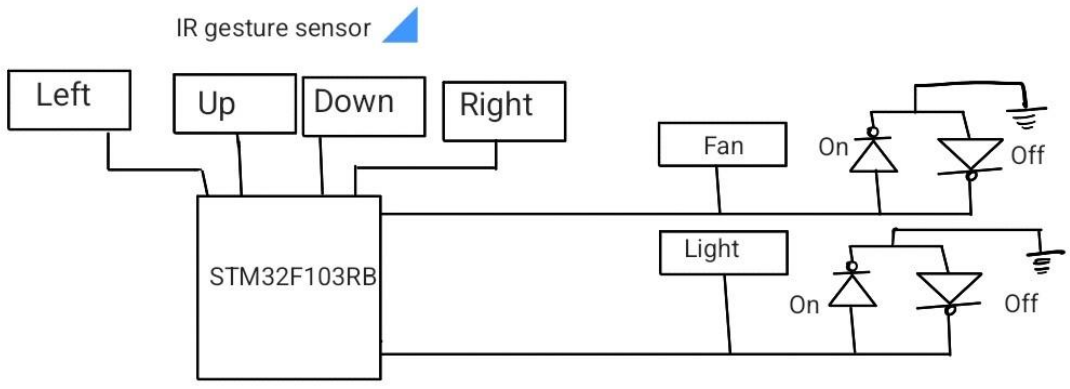

Figure 1: A Basic Schematic of the project