

Academy Task 2

ARM

Low Voltage

DEBOUNCING

What is bouncing

Switch bounce is the rapid, unintended connecting and breaking of contact that occurs when a mechanical switch is actuated. Instead of a single clean transition from open to closed (or vice versa), because when the two contact plates of a push button connect they vibrate unintentionally as they hit each other so bouncing occurs

How to prevent it

There are a lot of methods to prevent it the easiest and the most straightforward way to debounce a button is to wait between each signal read and another by adding delay using HAL_Delay() function found in page 50 or we can solve it via hardware methods like using an RC low-pass + Schmitt trigger or via a software like

State-machine approach:

This means that we continuously read the button but only accept a new state when it reads a set of consecutive reads and they all return the same state

Timer-based debouncing:

Which is basically the same idea as the above but it triggers when there is a change in state and count for how many milliseconds will it stay if it stabilizes then it changes the state to the new stable state

Software low-pass filter:

Lastly software low-pass filter and this is the one used in my code ; it relies on a weighted mean approach to measure if the change is effective and stable or not using and compare the result to a threshold using this formula ($x_k = \alpha \cdot x_{k-1} + (1 - \alpha) \cdot u_k$) : $state = state * 0.7f + currentState * 0.3f$;

Links

Drive : https://drive.google.com/drive/folders/1L80MlBoGXlEvwYfPC8e-d5KvjPAvsK6q?usp=drive_link

Git hub: <https://github.com/Marwan-Negm/Task2-LV.git>