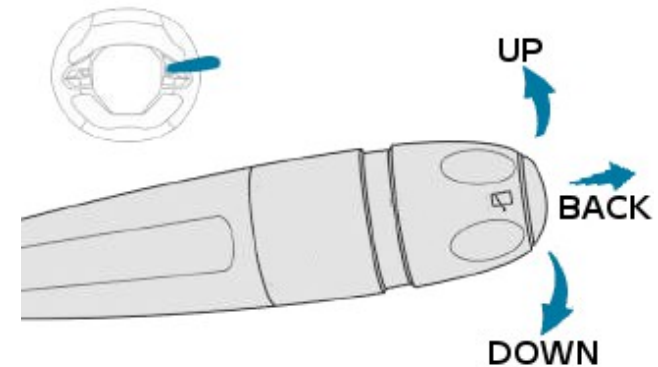


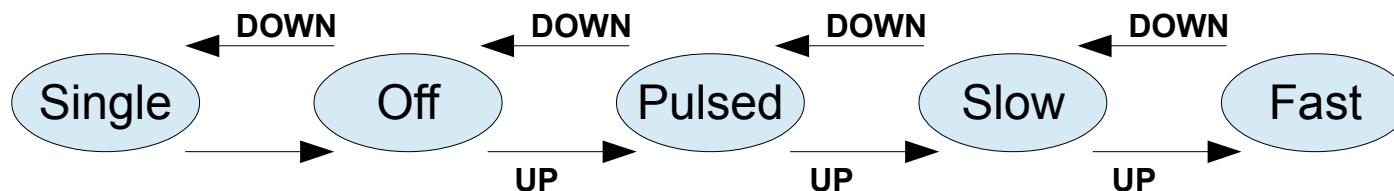
# C4μC - Examination

- A manager from an automotive industry has asked you to create a prototype for a smart wipers:

- The main goal is to have a variable pulse of the wipers depending on the rain.
- The lever on the dashboard has three "button positions": UP, DOWN, BACK  
(*"button"* means that the lever moves to close contact and, when released, goes back to its normal position)



- The wipers have 4 mode of working: Single-pulse, Pulsed, Slow, Fast
- The working modes have to be switched according to the following chart:

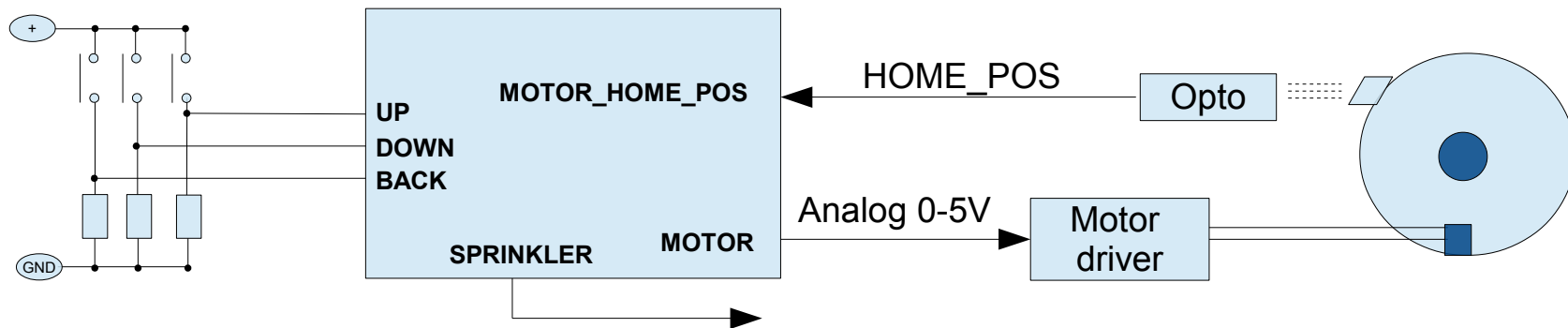


- Buttons UP and DOWN are used to change working modes
- Button BACK is used for the sprinkler

# C4μC - Examination



- The schematic of the system is as in the following diagram:



- Three buttons are pulled-down (HIGH level when pressed)
- Motor is driven by a voltage of 3V (slow mode) or 5V (fast mode)
- A sensor gives the feedback when motor (wipers) are in "home position"; the signal is LOW when in "home position"
- The Single-pulse is one round of the motor in fast mode.
- The Pulsed mode is the "smart" one, since the period is normally one single pulse every 6 seconds, but if the time X since the last Single-pulse is less than 6 seconds, the time X becomes the interval between pulses.

# C4μC - Examination



- Exercise tasks:
  - 1) Define inputs and outputs for the reference μC 328p
  - 2) Draw the state-chart for the system
  - 3) Write down the code for the init function (e.g. *setup()*), the main function (or *loop()*) and other functions, if any, declaring all the needed variables
  - 4) Add the functionality to control the sprinkler: it can be activated only in Off-mode and gives an output HIGH to the sprinkler, while making 6 rounds of the motor in fast mode.
- General note:
  - Write any comment to justify a choice when the system requirements leave a degree of uncertainty