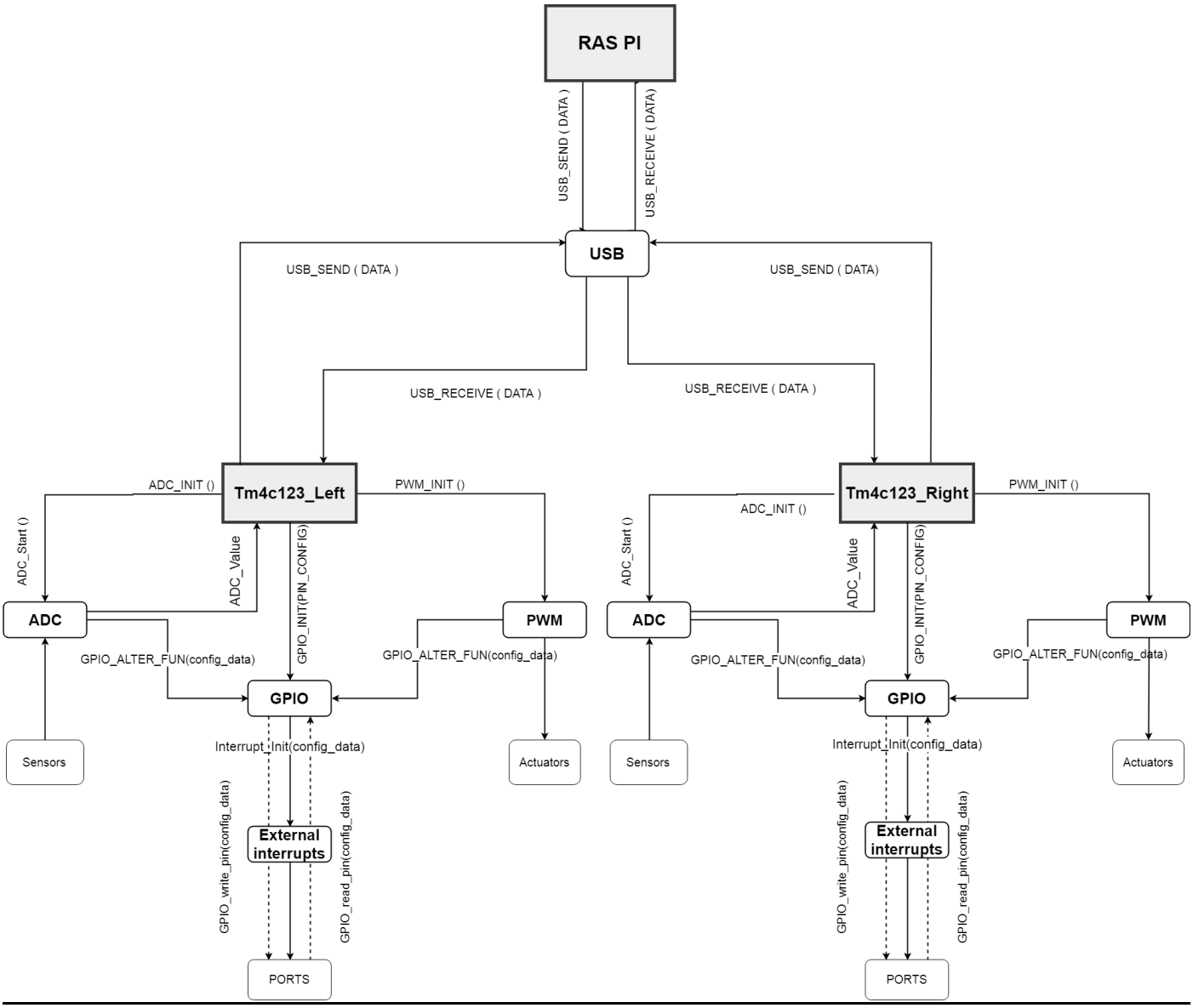

FIGURE 1 : GLOBAL LAYOUT

As shown :

- For now , we estimate 2 MCUs .
- MCU is connected to ROS through USB protocol .
- Sensors (like potentiometers , force sensor ,etc ..) are read by ADC modules .
- Actuators (like servos , DC motors ..) is controlled by PWM signals generated through PWM modules .

Drivers Description

GPIO Driver :

this driver is to **initialize and configure the GPIO Pins** of MCU (tm4c123gh6pm) and it contains **4** functions :

- **GPIO_init_pin** : this function takes port , pin number , structure containing the configuration requirements as arguments and returns error type if happened .
- **GPIO_write_pin** : this function takes port , pin number , digital date (High or low) to be written on the pin as arguments . and returns error type if happened .
- **GPIO_read_pin** : this function takes port , pin number and address of a variable that will store the value to be accessed by the function as argument . and returns error type if happened .
- **GPIO_alternative_fun** : this function write a value " corresponding to the alternative function that pin will perform " in GPIOPCTL register , this function is called by other modules and takes the alternative function value , port and pin no. as argument .

PWM Driver :

This driver is to **initialize and configure the PWM** signal that can be generated by specified 16 pins , and it contains **1** function :

- **PWM_init :** this function takes (port , pin number , prescalar value , load value , the compare value)
  Port and pin no. specifies the pin to be used to generate PWM **. prescalar value** specifies the frequency of clock on which PWM module will work . **load value** specifies the frequency of PWM signal . **compare value** specifies the duty cycle of PWM signal .

ADC Driver :

This driver is to **initialize and configure the ADC** , it contain **2** functions :

- **void ADC_INIT()** : this function is to initialize and configures 8 ADC pins using ADC0 and Sequencer 0 , the trigger is a software trigger .
- **uint32_t ADC_Value ADC_start()** : this function is triggered by a **software trigger** to start ADC conversion and Return ADC value number between 0-4095 .

External interrupt :

This driver is to **enable and configure external interrupt** , and contains **2** functions :

- **Arm_Port()** : this function takes Port name and Enable its interrupt .
- **Interrupt_Init()** : initializes interrupt given port name and pin number and configure the interrupt (edge sensitive , falling edge event).