FACULTAD DE INGENIERIA
Universidad de Buenos Aires

Implementación de manejadores de dispositivos

Maestría en Sistemas Embebidos

Manejo de periférico I2C con Beaglebone black

Esp. Ing. Lucas Dórdolo

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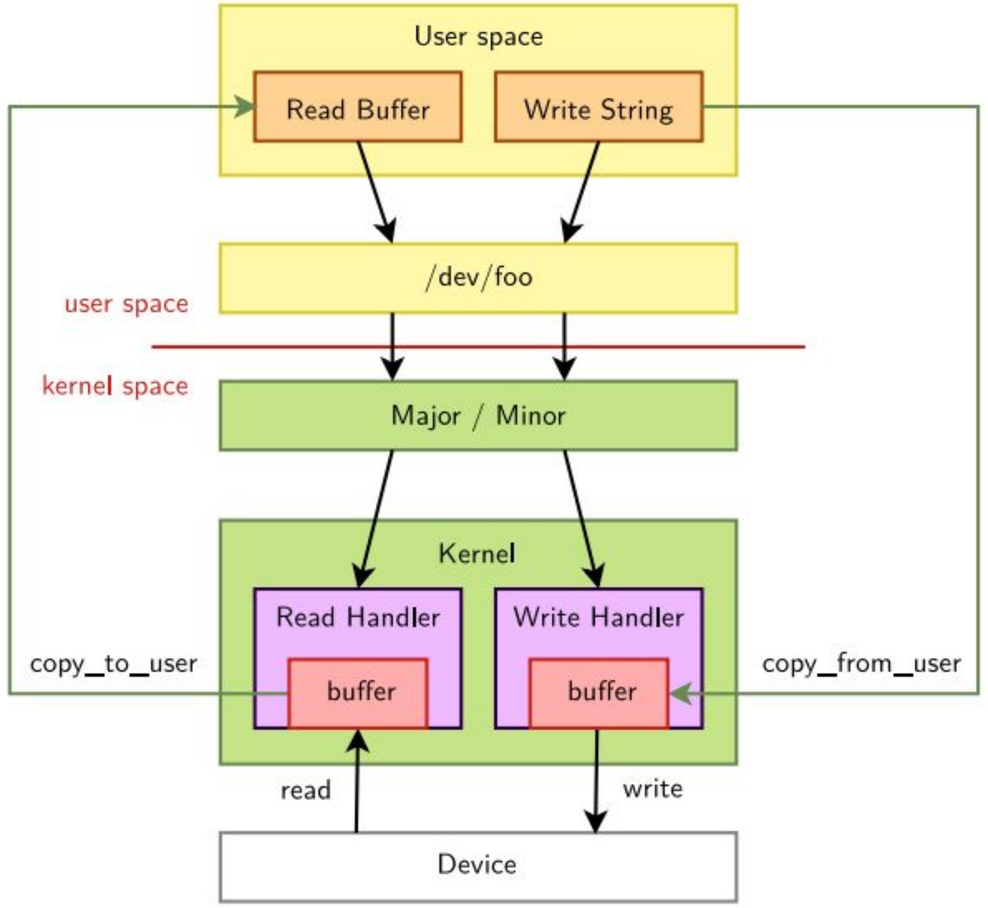
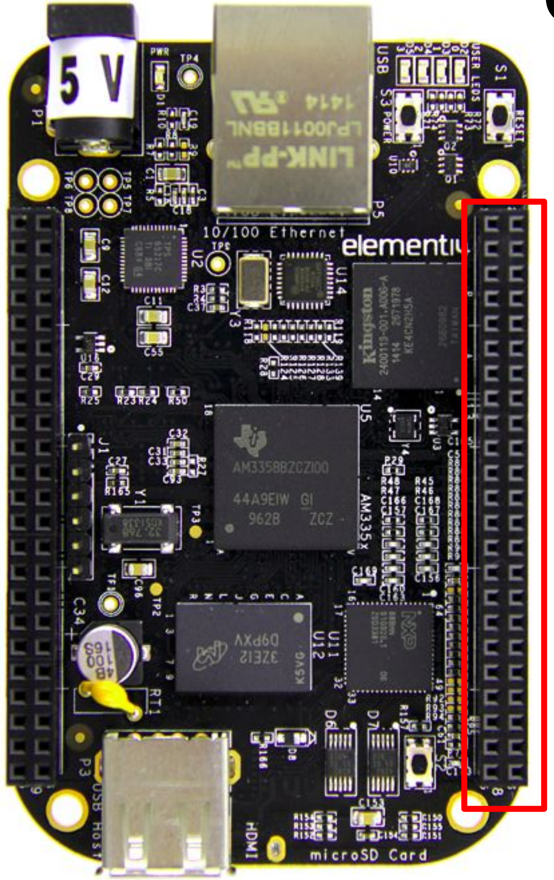
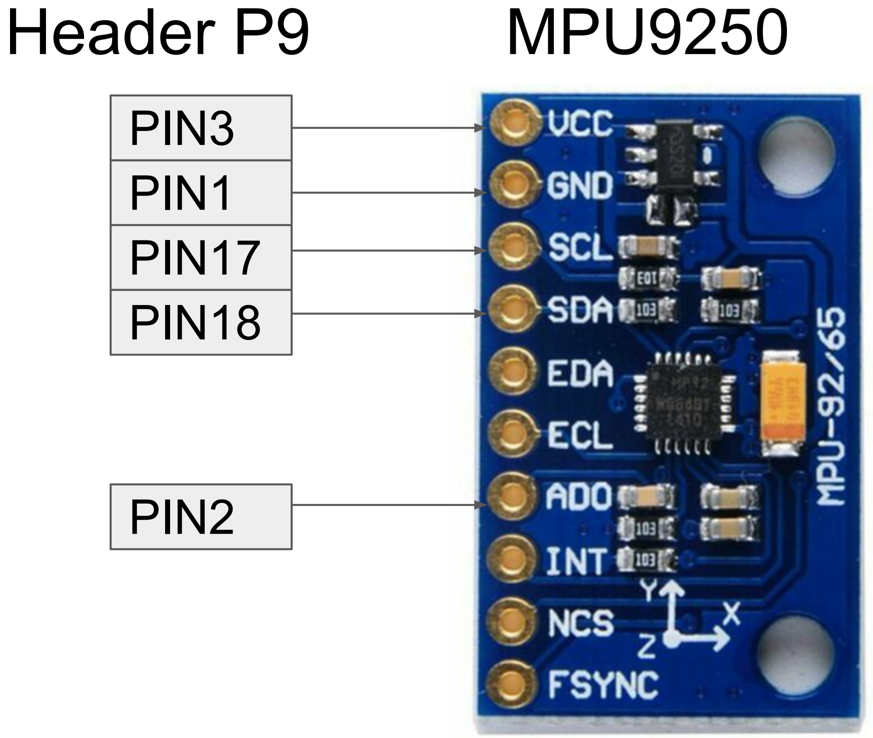
Manejo de periférico: Interfaz de hardware

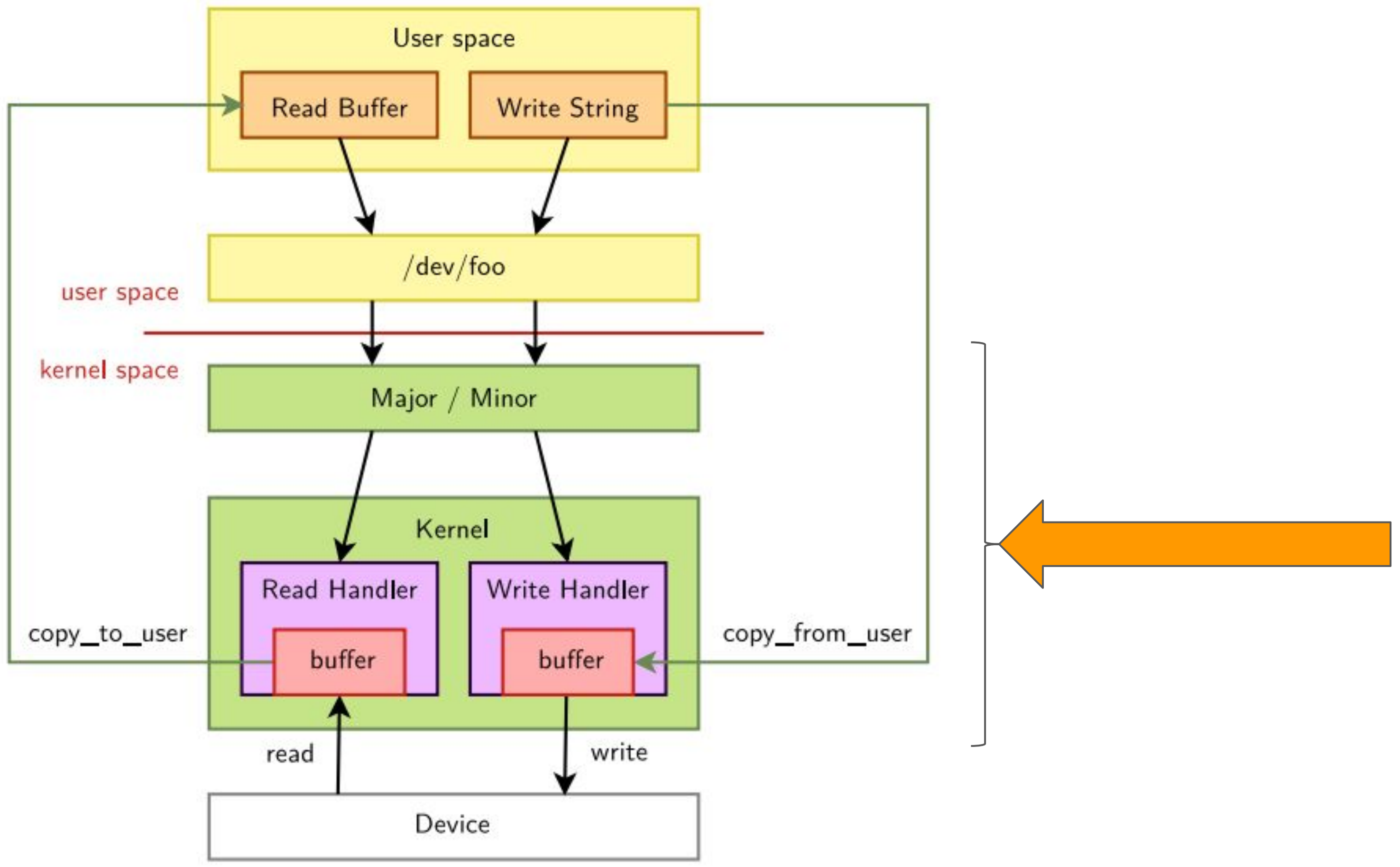


Conexión por I2C





Manejo de periférico: Módulo de kernel



Device tree: am335x-boneblack.dts

```
&am33xx_pinmux {
    i2c1_pins: pinmux_i2c1_pins {
        pinctrl-single,pins = <
            AM33XX_IOPAD(0x958, PIN_INPUT_PULLUP |
MUX_MODE2) /* spi0_d1.i2c1_sda */
            AM33XX_IOPAD(0x95c, PIN_INPUT_PULLUP |
MUX_MODE2) /* spi0_cs0.i2c1_scl */
        >;
    };
};
```

Device tree: am335x-boneblack.dts

```
&i2c1 {
    status = "okay";
    pinctrl-names = "default";
    clock-frequency = <400000>;
    pinctrl-0 = <&i2c1_pins>;

    my_mpu9250: my_mpu9250@68 {
        compatible = "mse,my_mpu9250";
        reg = <0x68>;
    };
};
```

Módulo de kernel: mympu9250.c

```
static ssize_t dev_read(struct file *filep, char *buffer, size_t len, loff_t *offset){

      int error_count = 0;
      int Ret;
      pr_info("Leyendo registros de MPU9250\n");

      Ret = i2c_master_recv(modClient, message, len);
      error_count = copy_to_user(buffer, message, len);


  ...
}
```

Módulo de kernel: mympu9250.c

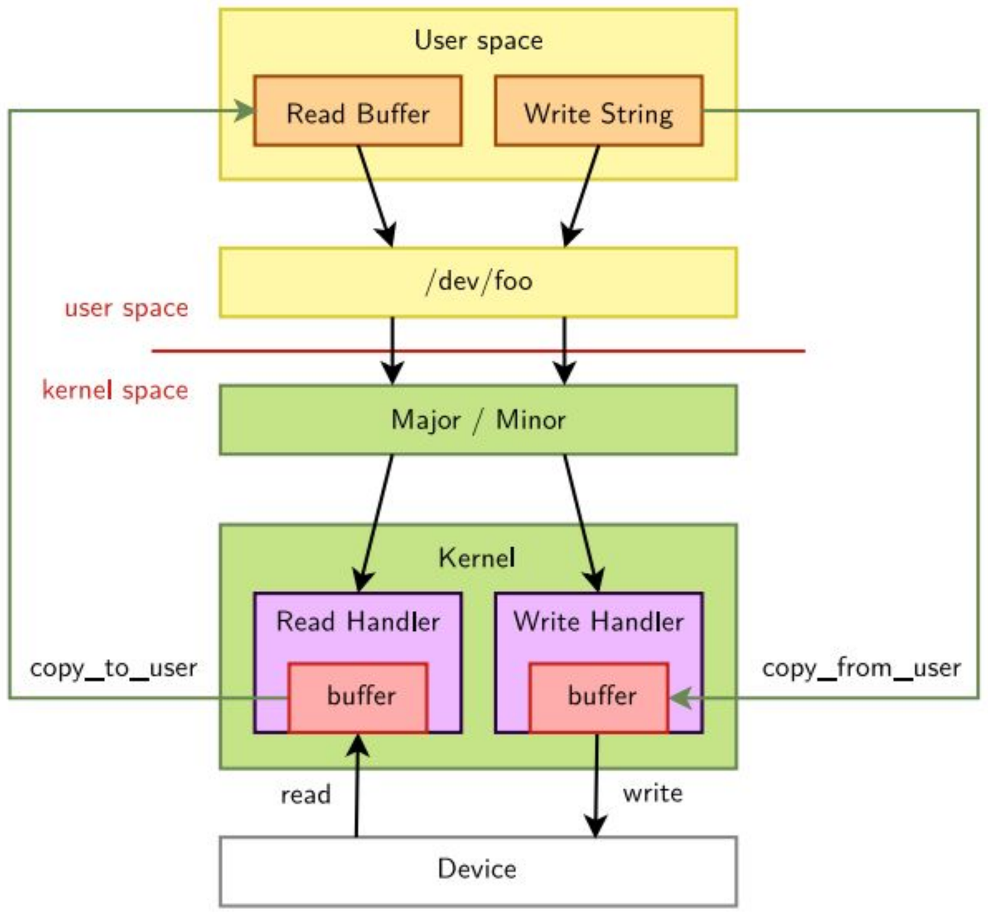
```
static ssize_t dev_write(struct file *filep, const char *buffer, size_t len, loff_t
*offset){
       int error_count = 0;

       error_count = copy_from_user(message ,buffer, len);
       error_count = i2c_master_send(modClient,message,len);

   return len;

}
```

Manejo de periférico: espacio de usuario



Aplicación de usuario: test.c

```
static int8_t mpu9250WriteRegister( uint8_t subAddress, uint8_t
data )
{
     int8_t ret = 0;
     uint8_t Buffer[2];
     Buffer[0] = subAddress; Buffer[1] = data;
     ret = write(fd, Buffer, 2);

     …
 }
```

Aplicación de usuario: test.c

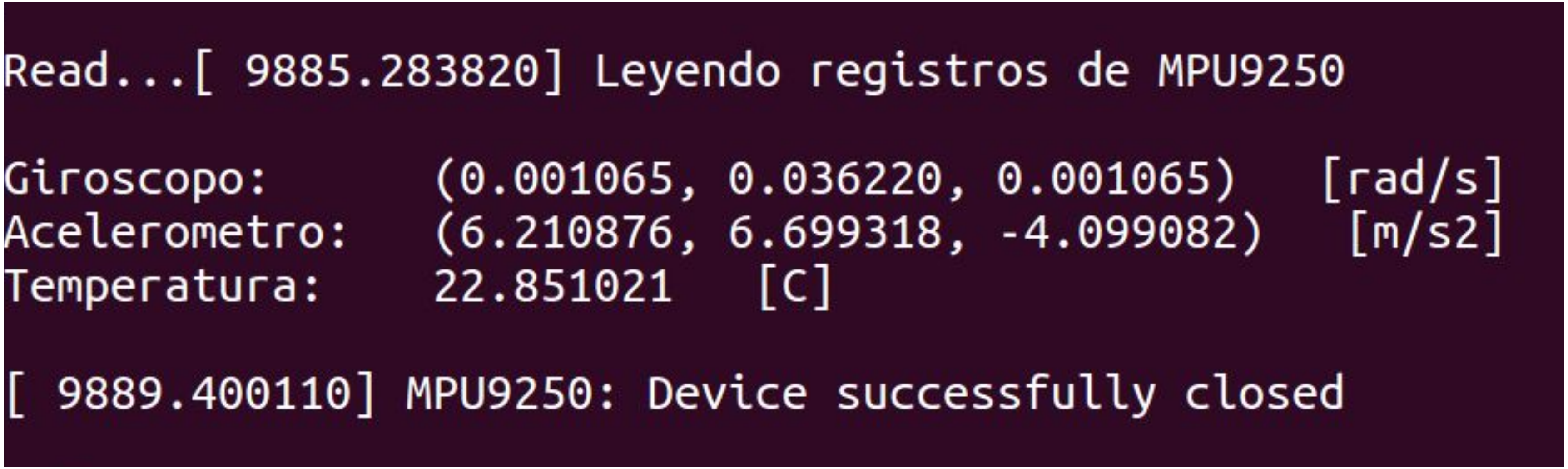
```
static int8_t mpu9250ReadRegisters( uint8_t subAddress, uint8_t
count )
{
      int ret = -1;
      uint8_t transmitDataBuffer[1] = {subAddress};
      write(fd, transmitDataBuffer, 1);
      printf("Read...\n");
    ret = read(fd, control._buffer, count);

      return 0;
}
```

Aplicación de usuario: test.c

```
int main(){
   fd = open("/dev/i2c_mse", O_RDWR);
    mpu9250Init( MPU9250_ADDRESS_0 );
    while(1){
       mpu9250Read();
               printf( "Giroscopo:   (%f, %f, %f)   [rad/s]\r\n", ...
                  );
         usleep(5000000);
    }
   printf("End of the program\n");
   return 0;
}
```

Salida en consola



```
Read...[ 9885.283820] Leyendo registros de MPU9250

Giroscopo:      (0.001065, 0.036220, 0.001065)   [rad/s]
Acelerometro:   (6.210876, 6.699318, -4.099082)   [m/s2]
Temperatura:    22.851021   [C]

[ 9889.400110] MPU9250: Device successfully closed
```

¿Preguntas?

¡Gracias!