

Python API for Mobile Robot Control

Progress Presentation-1

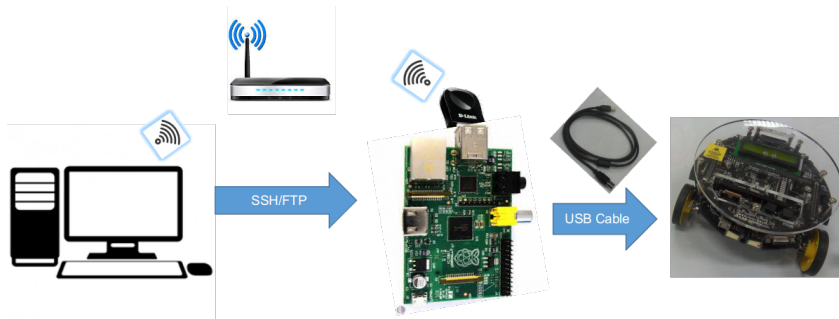
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Objective

- 1 A Python API to control the different peripherals of the μ controller
- 2 Provide the user with a option of register level access of the μ controller
- 3 Allow the user to design an application without learning a new language and thoroughly knowing the architecture of the controller.

System Architecture



Milestone Achieved

- 1 Robot-end firmware - written in embedded C
- 2 Serial Communication between Raspberry Pi and Robot
- 3 Function for configuring all IO Ports and Pins of microcontroller
- 4 Implemented and tested code for Buzzer and BarLED.
- 5 Test code for Port and Pin configuration function

User code snippet

```
from set_register import *
import time
import serial_connection as sc
sc.serial_open()

###Configure ports###
#set port pin direction
config_register(DDRJ, PIN1 | PIN2 | PIN3, set_pins)
#initial value logic 0
config_register(PORTJ, PIN1 | PIN2 | PIN3, reset_pins)

for i in range(0,5):
    #turn on Leds
    config_register(PORTJ, PIN1 | PIN2 | PIN3, set_pins)
    time.sleep(0.5)
    #turn off leds
    config_register(PORTJ, PIN1 | PIN2 | PIN3, reset_pins)
    time.sleep(0.5)

sc.serial_close()
```

Implementation

Data Packet Format

| set/rest | Function id | Register id | Pin value |
|----------|-------------|-------------|-----------|
| 1-bit | 7-bit | 8-bit | 8-bit |

set/reset (1-bit): This bit decides whether value a register bit is set high or reset to low

Function id (7-bit): These bits select various μ controller peripherals
Example: IO, ADC, Timers, I2C etc

Register id (8-bit): These bits select registers present to access μ controller peripherals. Example: DDRA, PORTA, ADCSRA, ADMUX etc

Pin Value (8-bit): These bits select value to be written on 8-bit registers

Future Work

- Develop and test object-oriented implementation
- Access following peripherals for μ controller
 - Timers
 - ADC
 - Interrupt
 - I2C
- Improve data packet by incorporating checksum, end of packet payload to existing system.
- Design PyQT GUI for making SFTP connection to Raspberry Pi from PC
- Provide higher level abstraction for peripheral devices