Electronics
Serial Communication-I2C

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Wilfrid Laurier University

February 13, 2019

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- Synchronous, so master controls clock rate

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On the Raspberry Pi board, there are 1.8kΩ pull-up resistors to 3.3V, so external ones are not normally required.

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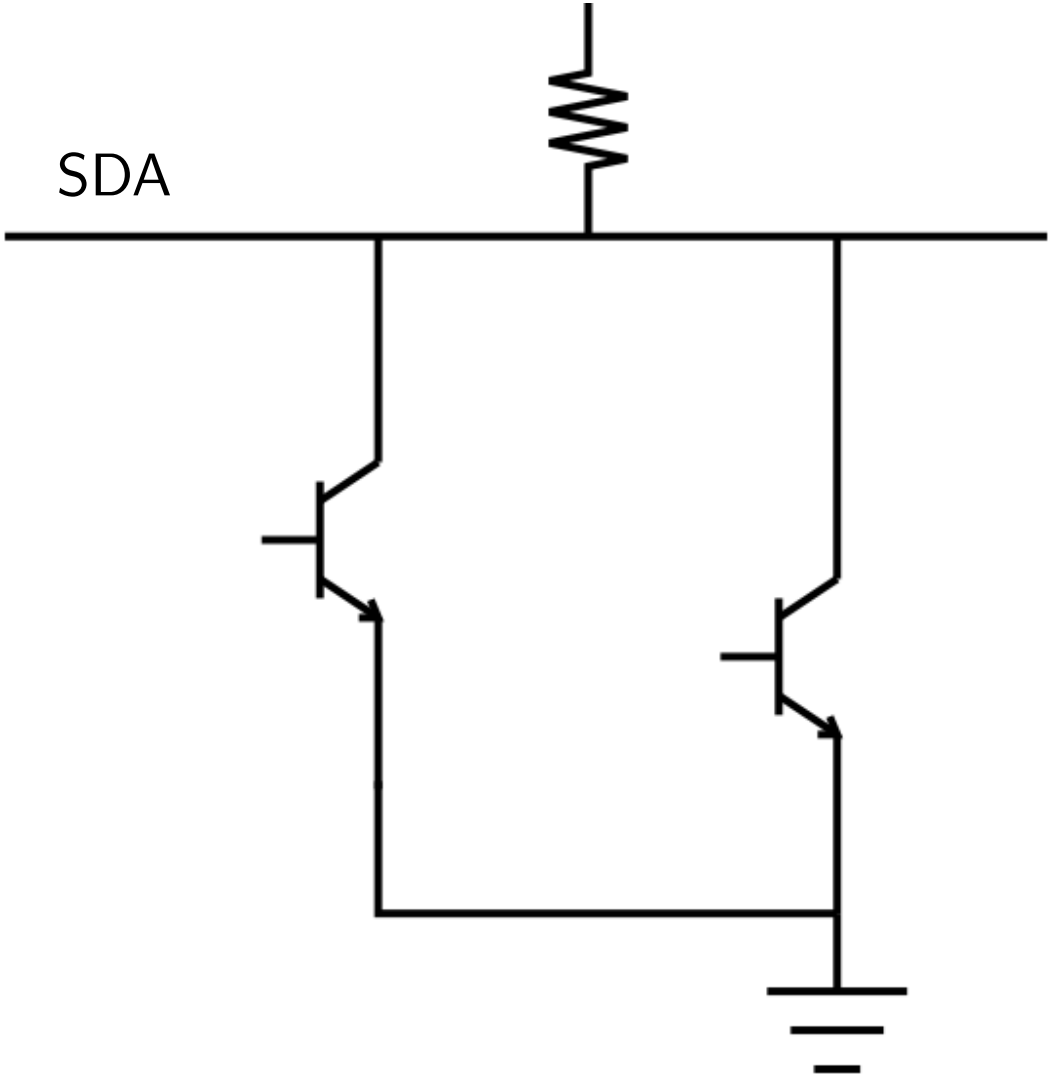
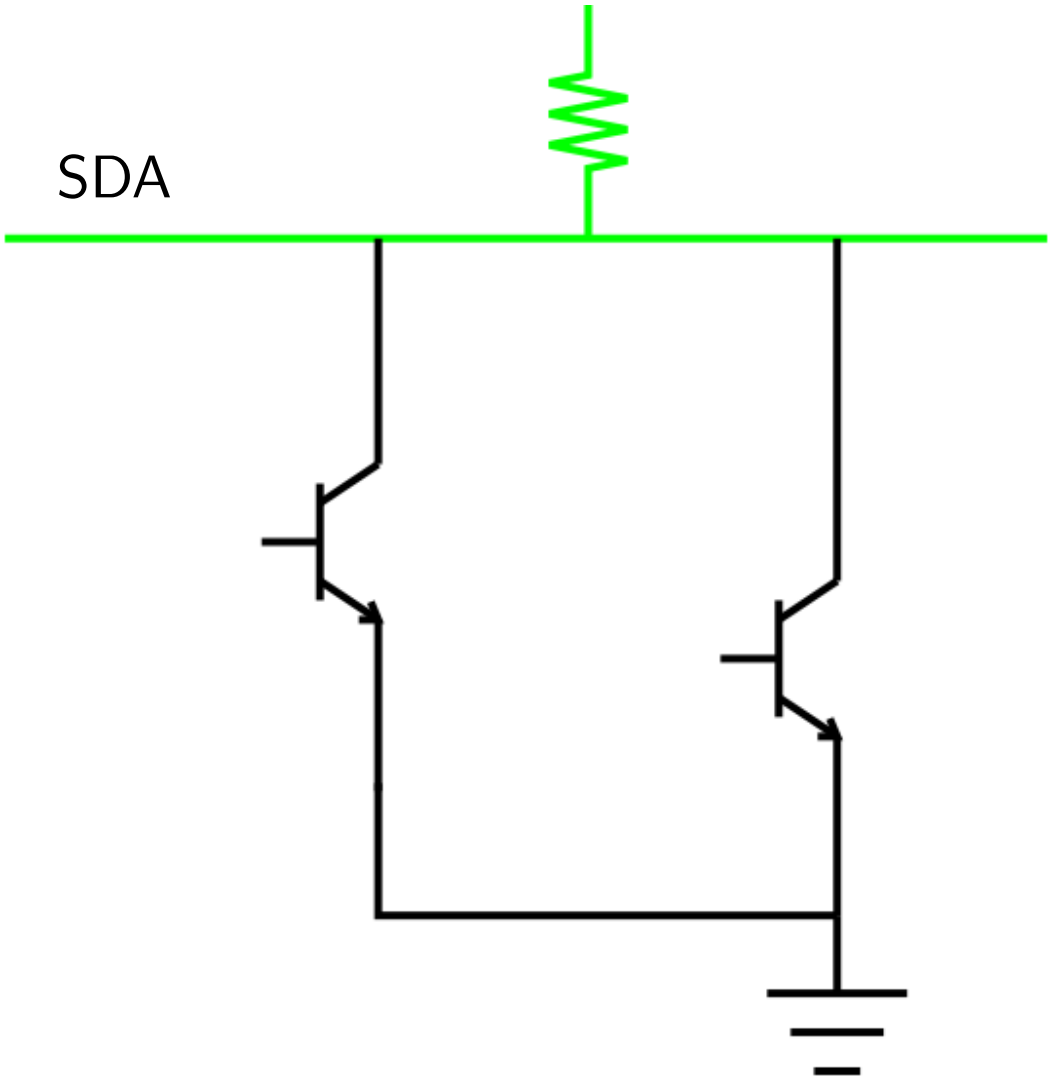
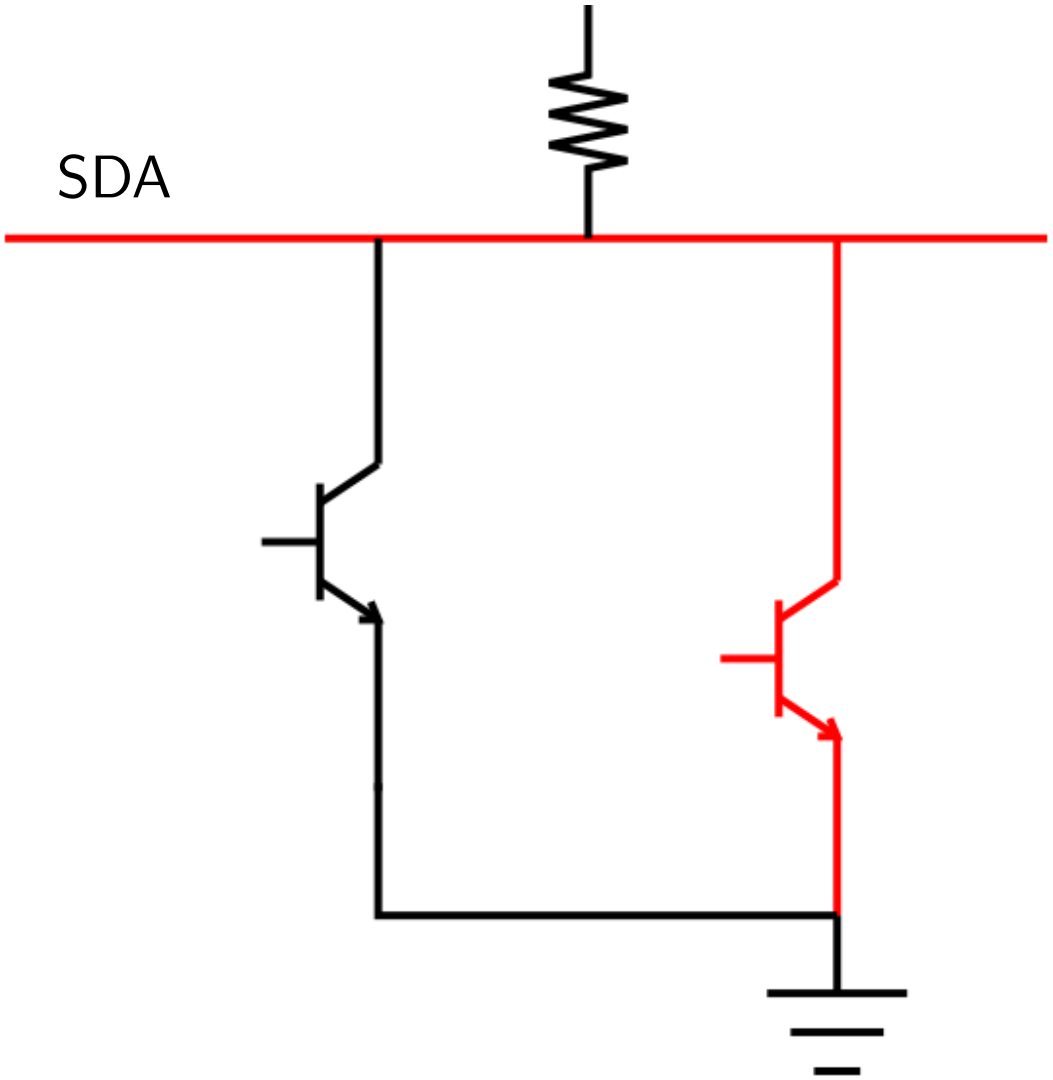
Since the Raspberry Pi has 1.8kΩ pull-up resistors to 3.3V, connecting to an I^2C device with a 5V supply will not cause a problem for the Pi.

Note, however, if 3.3V inputs are not high enough *for the device*, then it might not operate correctly.

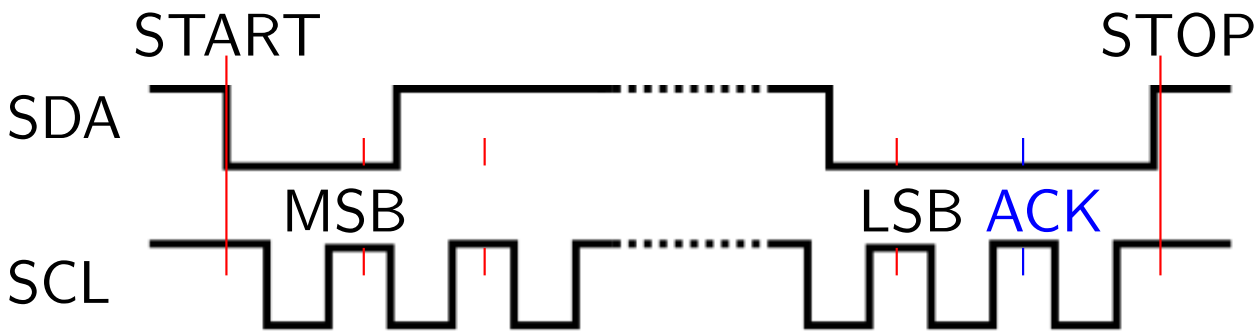

SDA



All floating; SDA is HIGH.

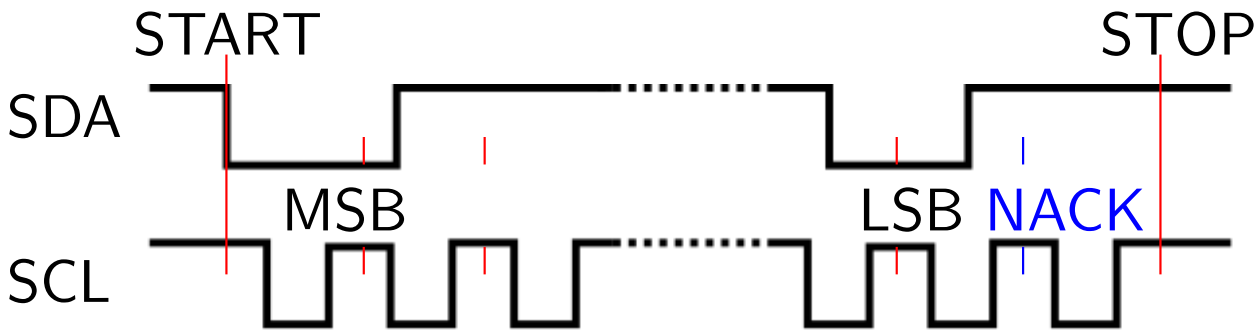


One output LOW; SDA is LOW.



- I^2C ; bits are read when SCL is HIGH
- ACK is sent by receiver if OK

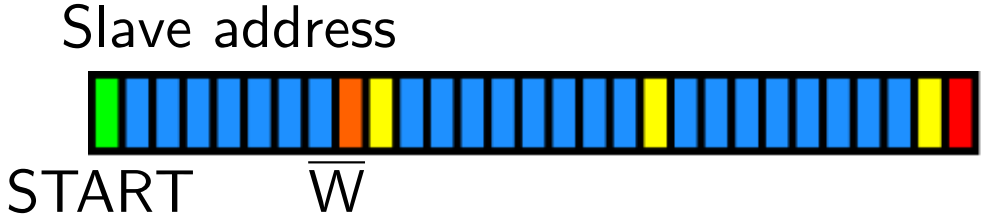
  sender must release SDA after LSB



- I^2C ; bits are read when SCL is HIGH
- NACK is sent by master-receiver if OK

  sender must release SDA after LSB

- I^2C write to slave register



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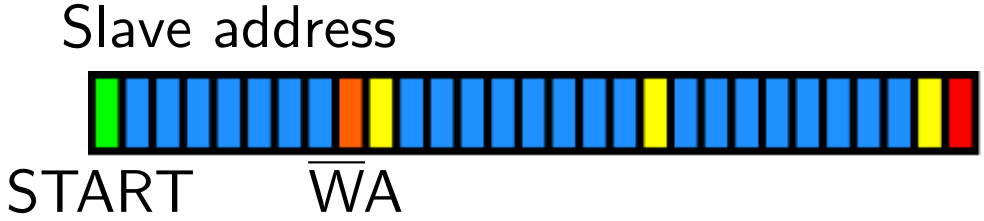

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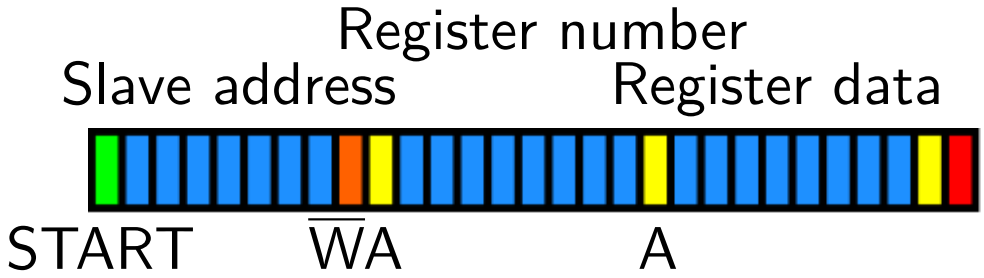

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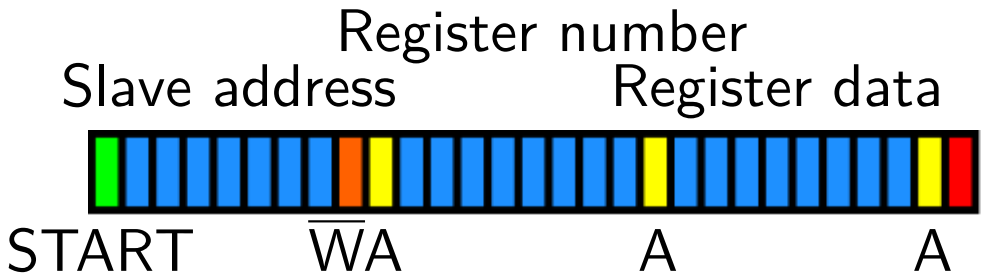

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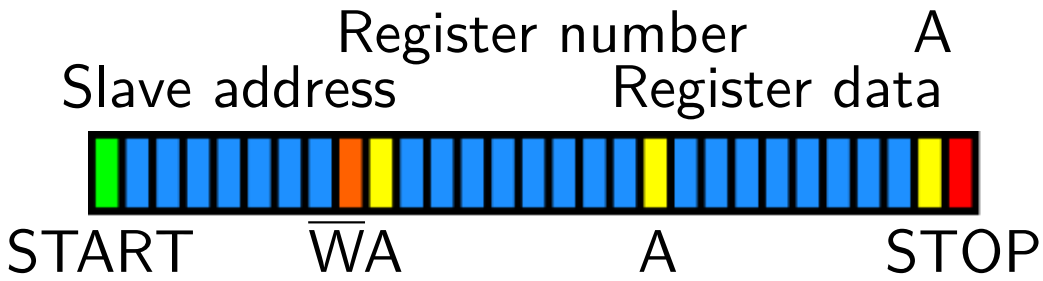

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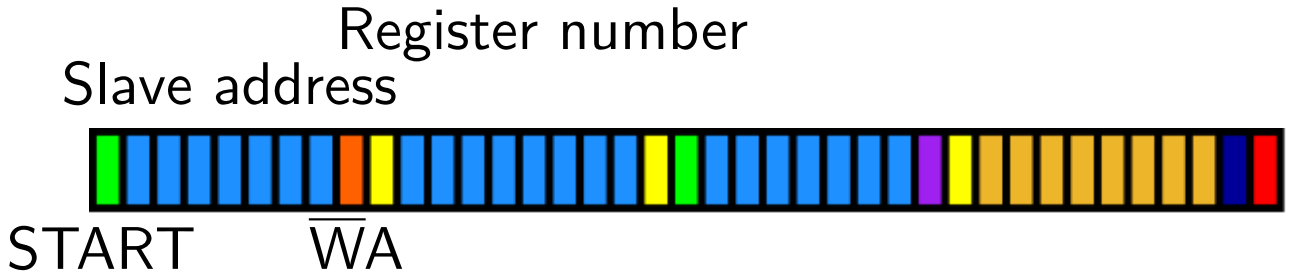

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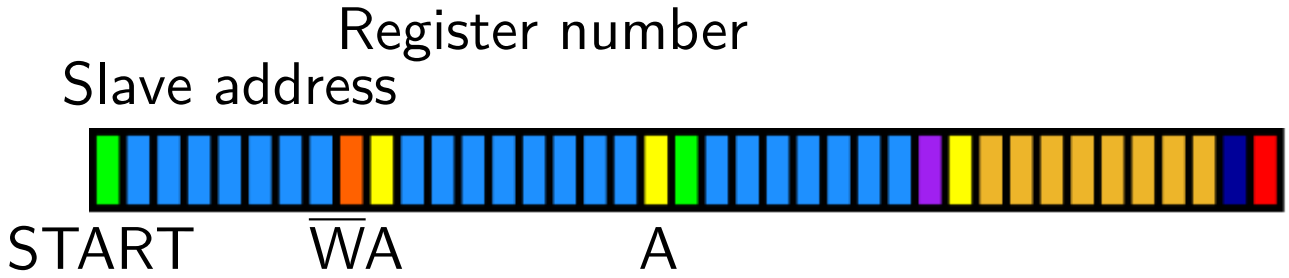

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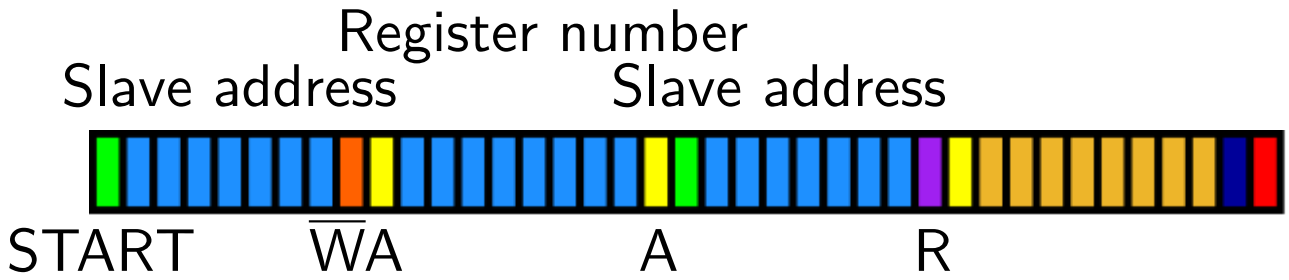

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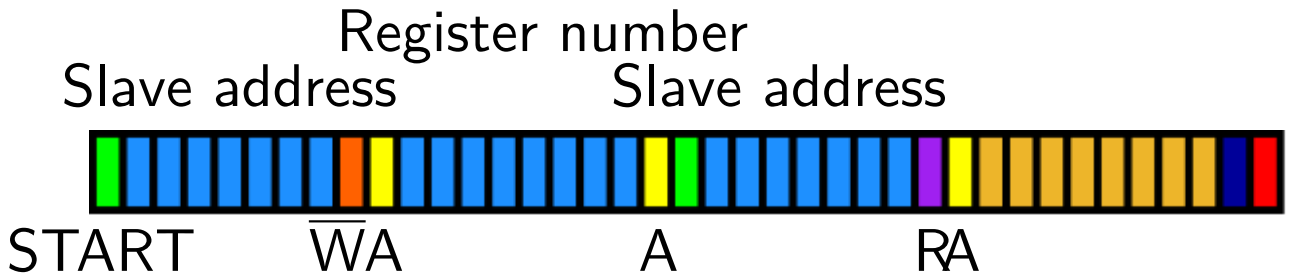

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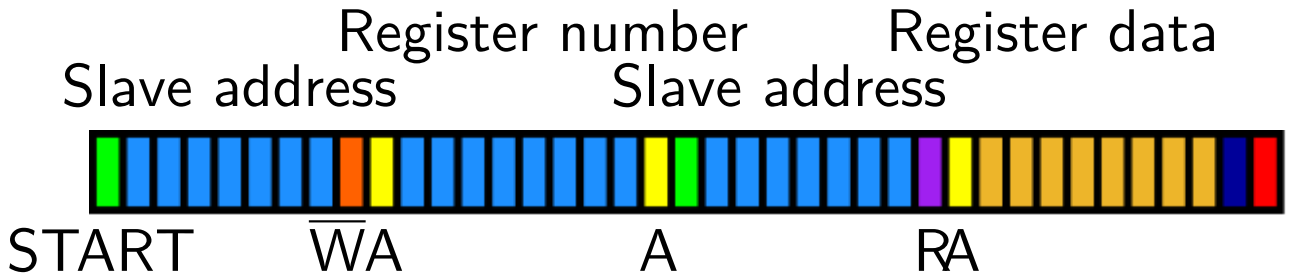

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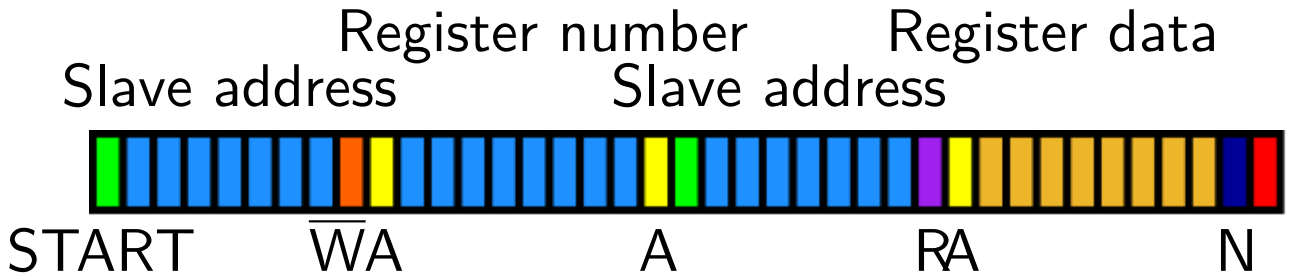

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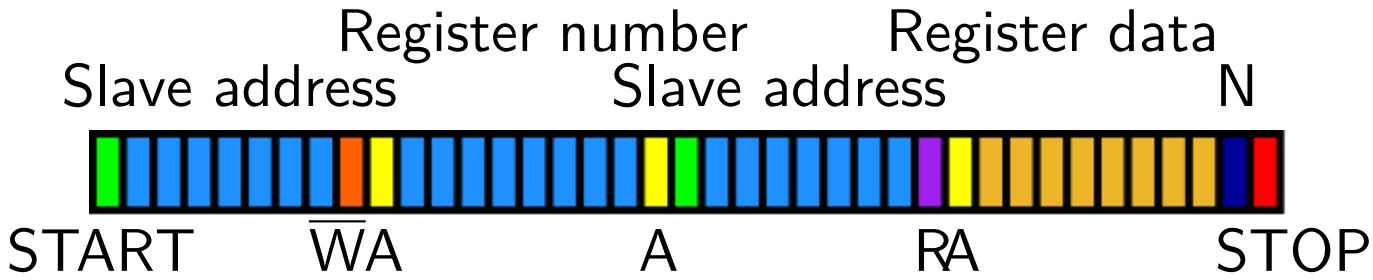

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- **bus.write_i2c_block_data(addr,cmd,vals)**

  write to device

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```
#!/usr/bin/python
import smbus
bus = smbus.SMBus(1)
DEVICE_ADDRESS = 0x15
DEVICE_REG_MODE1 = 0x00
DEVICE_REG_LEDOUT0 = 0x1d
#Write a single register
bus.write_byte_data(DEVICE_ADDRESS,
  DEVICE_REG_MODE1, 0x80)

#Write an array of registers
ledout_values = [0xff, 0xff,
  0xff, 0xff, 0xff, 0xff]
bus.write_i2c_block_data(DEVICE_ADDRESS,
  DEVICE_REG_LEDOUT0, ledout_values)
```