

# 電子工作 DOOR LOCKER

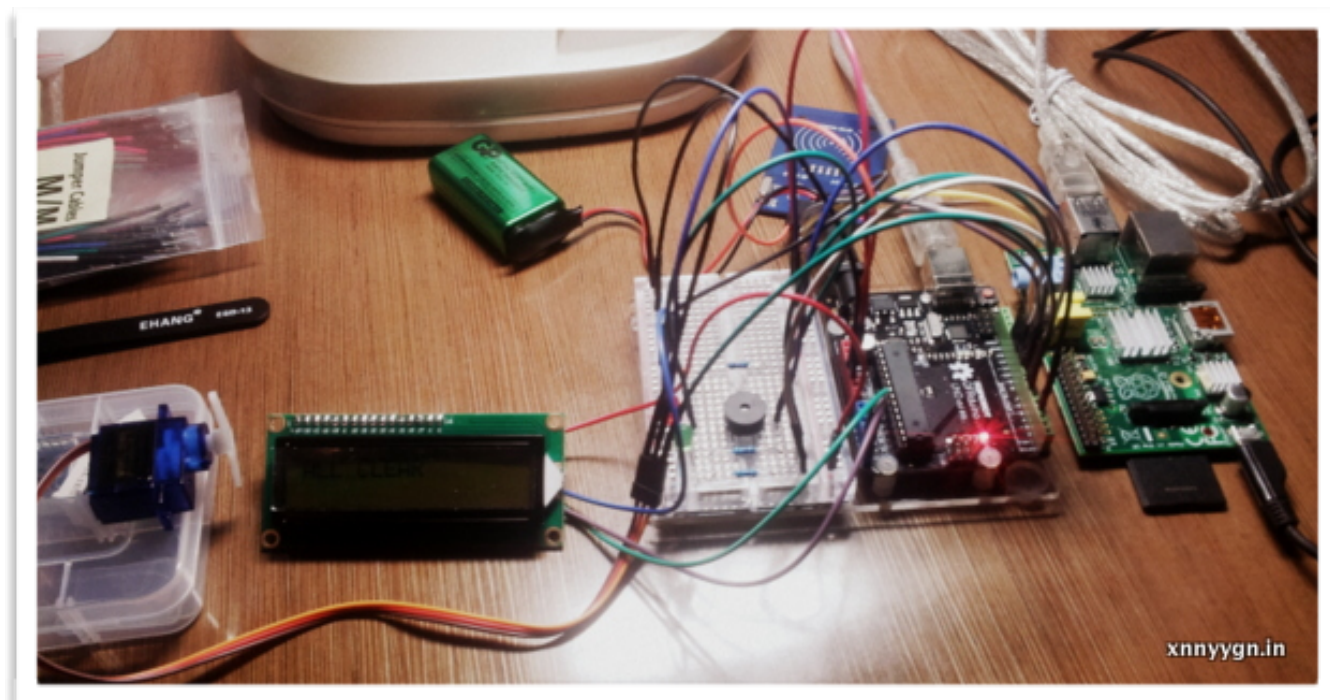
XnnYygn 2014-11-01

## 1. overview

### 1.1 keyword

電子工作, Arduino, Raspberry Pi, RFID, LCD I2C, serial communication

### 1.2 presentation

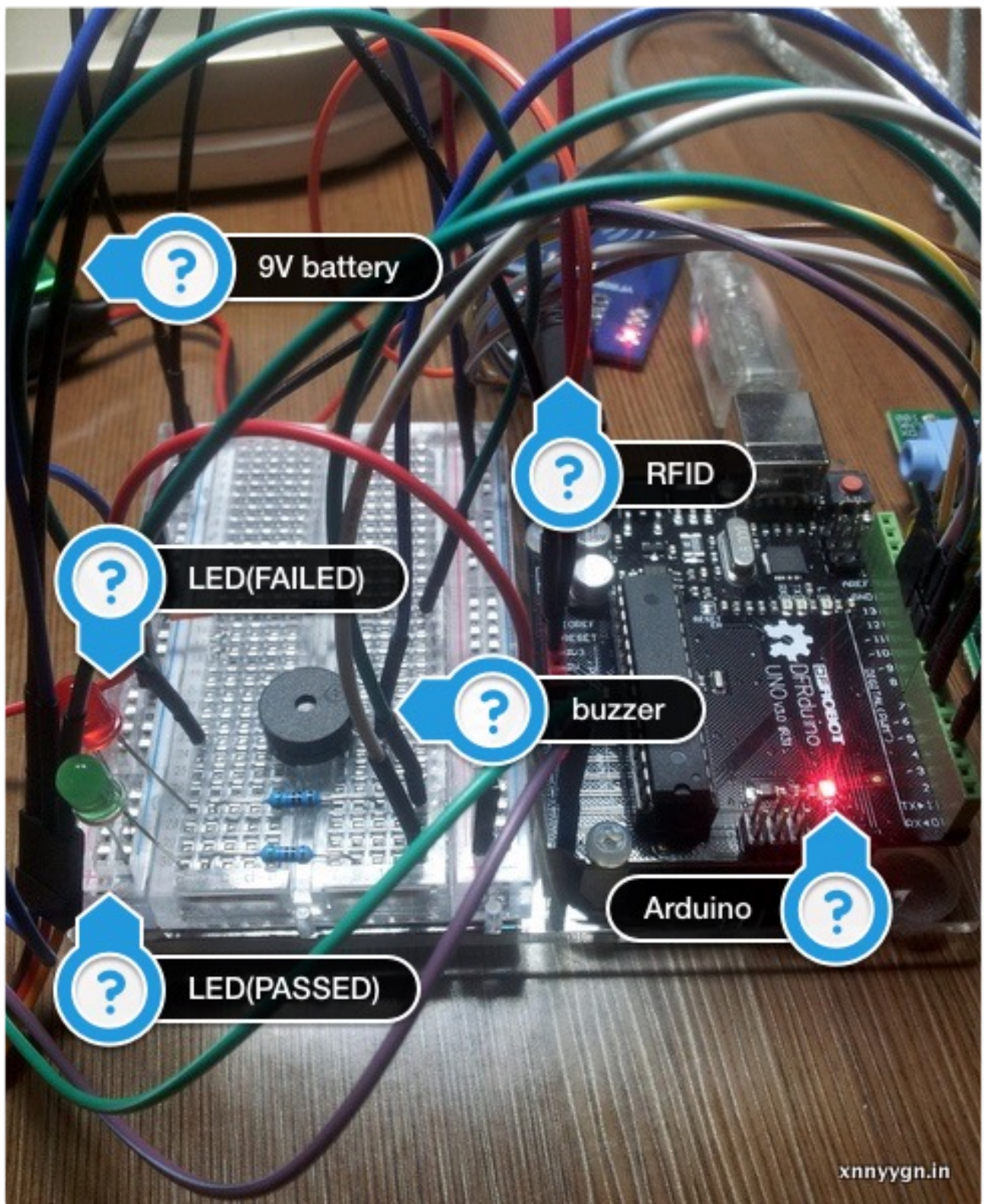


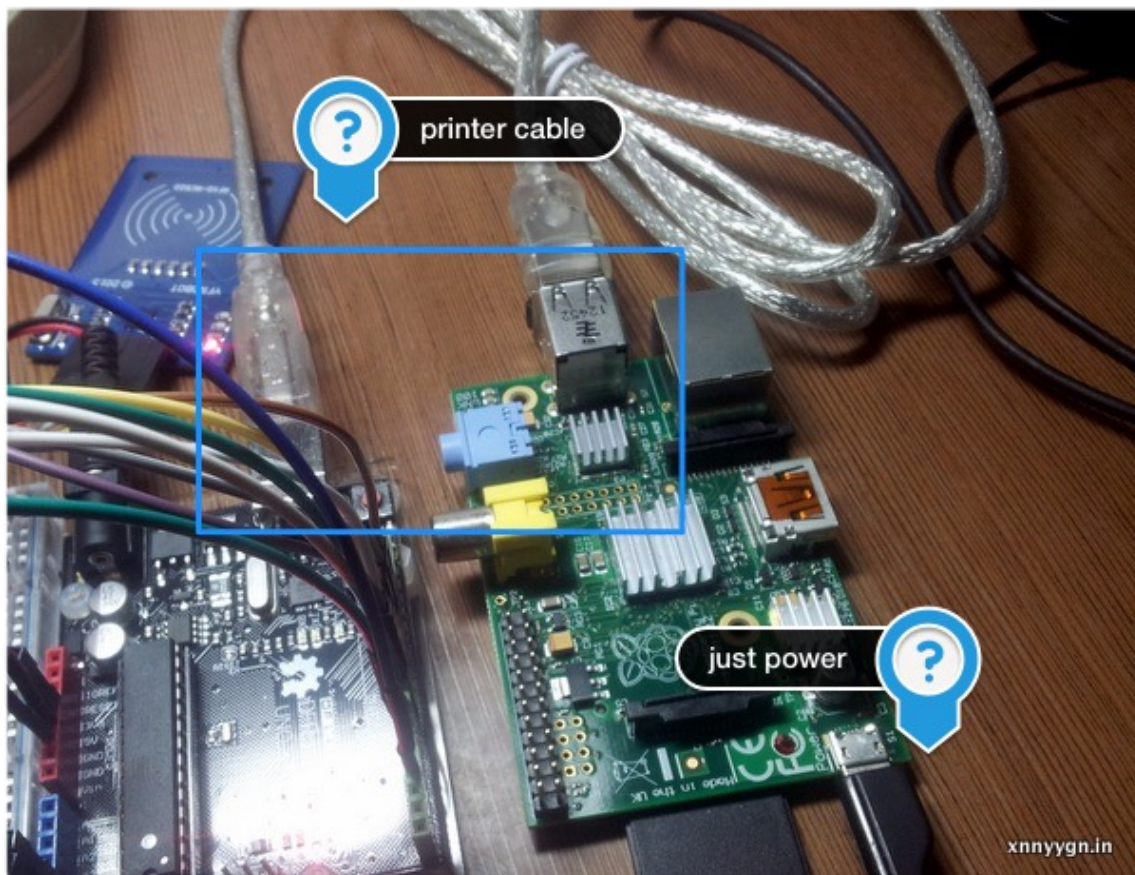
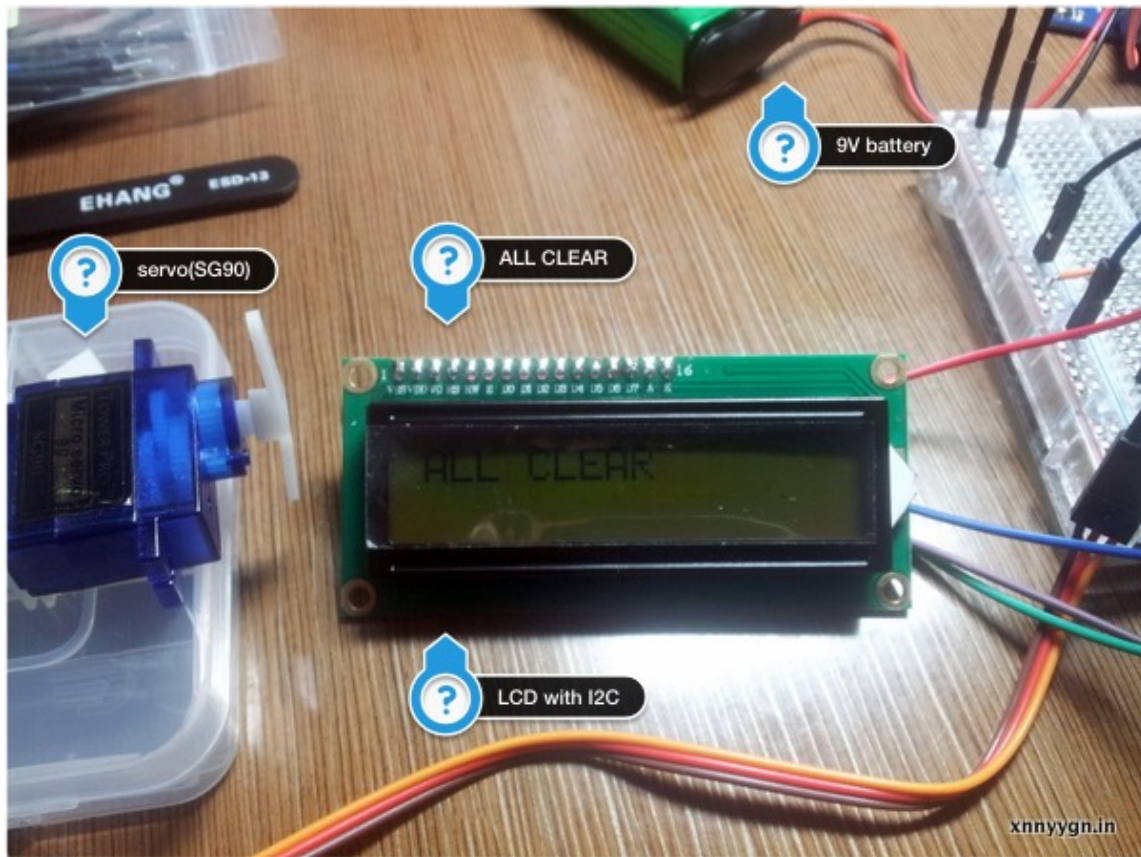
### 1.3 how to play

部品	最初の状態	認定されたカード	別のカード
servo	detached	turn 180 turn 0	
LCD	ALL CLEAR!	#{CARD_ID} PASSED	#{CARD_ID} FAILED
buzzer		PWM 500ms	PWM 500ms
LED green (PASSED)	OFF	ON	
LED red (FAILED)	OFF		ON

認定されたカードと別のカード各一枚を用意し、RFID Readerに近づくと、動きがある。

1.4 pictures





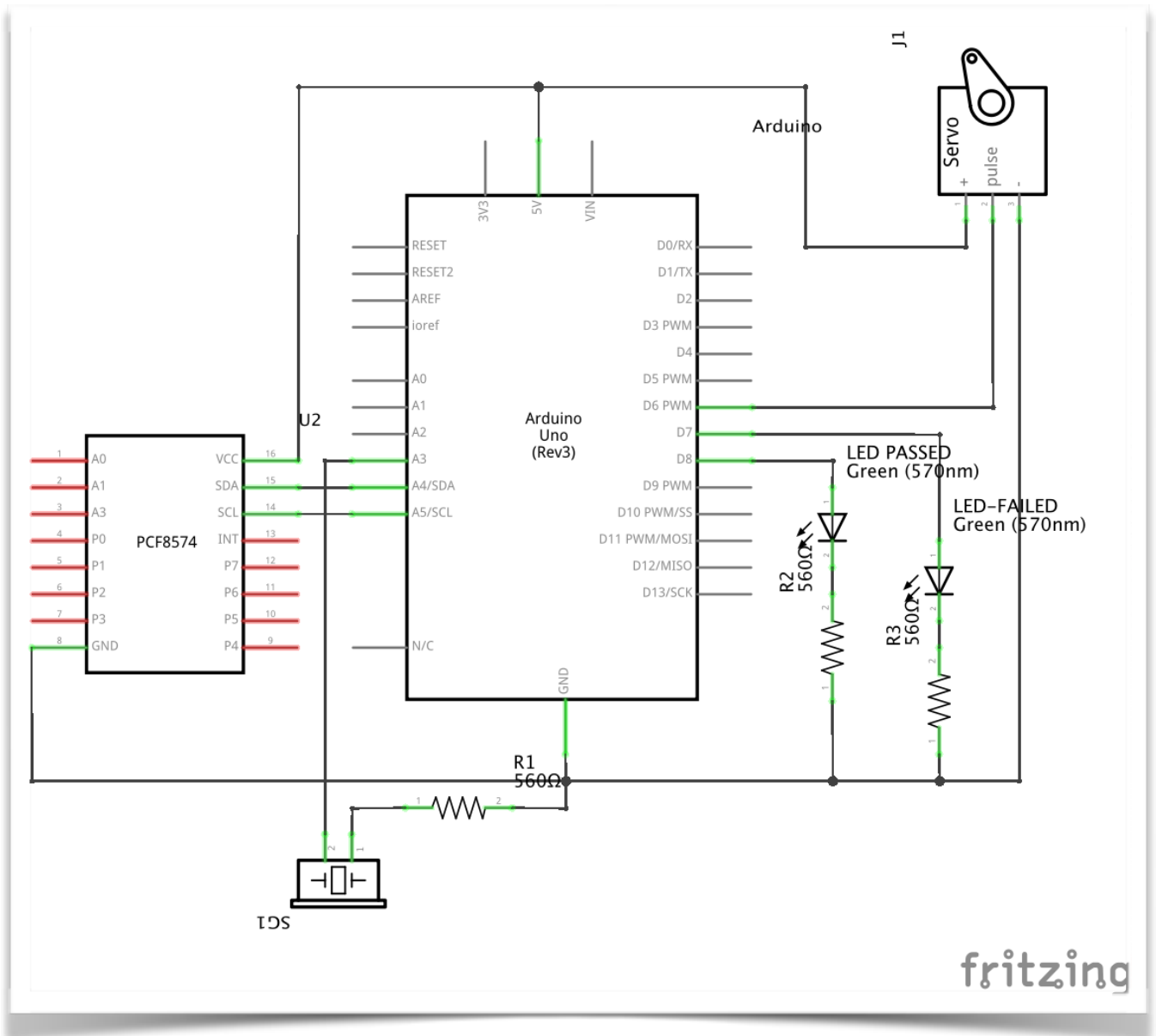
## 2. design

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### 2.1 parts

Name	Description
Arduino Uno R3 x 1	main controller
Raspberry Pi x 1	card validator
servo (SG90) x 1	
LCD1602 with I2C x 1	display
RFID MFRC522 x 1	RFID reader
breadboard x 1	
buzzer x 1	
LED (Red) x 1	turn on when validation passed
LED (Green) x 1	turn on when validation failed
resistance 560 $\Omega$ x2	connect with LED
resistance 1k $\Omega$ x2	connect with buzzer
9V battery	power for Arduino
USB wireless card	for development on Raspberry Pi
jumper wire pack	
printer cable	cable between Arduino and Raspberry Pi
mini-USB to USB cable	power cable for Raspberry Pi

## 2.2 schematic



Raspberry PiとRFID moduleはこの図に表示されていない。  
LCD 1602 with I2CはI2C module (PCF8574) だけで表示される。

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## 2.3 pin data sheet and connection

Part	Pin From	To Arduino
MFRC522(RFID)	RST	D9
	SS	D10
	MOSI	D11
	MISO	D12
	SCK	D13
	3V3	3V3
	GND	GND
servo	VCC	5V
	GND	GND
	DATA	D6(PWM)
LED(Green)	(+)	D7
	(-)	GND
LED(Red)	(+)	D8
	(-)	GND
buzzer	(+)	D3(PWM)
	(-)	GND
LCD I2C	SDA	A4
	SCL	A5
	VCC	5V
	GND	GND

ArduinoとRaspberry Piはprinter cableで通信する。いわゆるUSB (serial) での通信モード。

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## 2.4 simple card validation protocol(based on serial)

**Arduino -> Raspberry**  
*CARD\_ID: XXXXXXXX*

e.g  
CARD\_ID: 00E1F2A4

**Raspberry Reply**  
when passed:  
*T*

when failed:  
*F*

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## 2.5 program

### Arduino

Please refer to [“rfid-door-lock.no”](#) for complete source.

```
79 void setup() {
80     // set serial to 9600, same to raspberry pi pySerial
81     Serial.begin(9600);
82
83     // initialize MFRC522
84     SPI.begin();
85     mfrc522.PCD_Init();
86
87     // initialize servo
88     // myServo.attach(SERVO_DATA_PIN);
89
90     // set pin for LEDs
91     pinMode(LED_PASSED_PIN, OUTPUT);
92     pinMode(LED_FAILED_PIN, OUTPUT);
93
94     // set pin for buzz
95     pinMode(BUZZ_PIN, OUTPUT);
96
97     // initialize the lcd
98     lcd.init();
99     lcd.print("ALL CLEAR!");
100 }
101
102 void loop() {
103     switch(workingStatus) {
104         case SWF_CARD:
105             waitingForCard();
106             break;
107         case SWF_RESULT:
108             waitingForResult();
109             break;
110     }
111 }
```

## Raspberry Pi

Please refer to [“validate\\_card.py”](#) for source.

```
1  import sys
2  import serial
3
4  CARD_IDS = set(['00E1F2A4'])
5
6  def determine_device():
7      '''
8      determine device with command line arguments
9      '''
10     args = sys.argv
11     if len(args) > 1:
12         return args[1]
13     else:
14         return '/dev/ttyACM0'
15
16 def loop(s):
17     '''
18     loop
19     '''
20     line = s.readline()
21     if line and line.startswith('CARD_ID: '):
22         card_id = line[9:-1].strip()
23         print 'card: [' + card_id + ']'
24
25         if card_id in CARD_IDS:
26             print 'passed'
27             s.writelines(['T'])
28         else:
29             print 'failed'
30             s.writelines(['F'])
31
32 # main function
33 if __name__ == '__main__':
34     # wait 1 second
35     s = serial.Serial(determine_device(), 9600, timeout = 1)
36     s.open()
37     try:
38         while True:
39             loop(s)
40     except KeyboardInterrupt:
41         s.close()
42
```



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## 2.6 special

### **9V Battery**について

ArduinoとRaspberry Piはprinter cableで連携するが、Raspberry PiのUSBポートでの電力はArduinoにとって不足するかもしれない。だから、9V Batteryを用意した。