

Smart visitor Counter

Hardware Software Interface Document

Version 1.0 [Proposed]

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1. Introduction

This project aims to design a system where the number of persons entering or leaving a room is tracked and displayed on screen.

This System must have a 5V supply and A common ground in order to make sure everything is connected together and stabilized at 5V.

1.1 Overview

The project provides supports the following feature:

- Display the number of visitors
- Alarm when place is full of capacity
- Increase the count when someone enters the room
- Decrease the count when someone leaver the room

2. Assumptions/Constraints/Risks

2.1 Assumptions

The system is supposed to deal with a limited resource such as the power supply and there is no need for an OS to handle any upcoming issues; The interfacing between the Hardware and the Software is simple and will be demonstrated in this document.

2.2 Constraints

The next constraints must be taken into consideration when combining the Software and the Hardware together

- Temperature is between 0 and 50 C
- Common ground is a must
- This system voltage level must be stable in order not to damage any hardware
- The LCD must be used using a 4 Bit mode

2.3 Risks

If any of the modules is not connected with the other ones with the ground this module **will not work**.

If the system has been given more than a 5V supply it will **damage the modules**

3. Interface Overview

3.1 Interface Overview

The LCD is to demonstrate the number of visitors, and the buzzer will get on when the number of visitors had exceeded the maximum number of visitors.

3.2 Interface Modules

Module type	Module Name
ECU	AVR ATmega32
Sensor	Door Sensor
UI component	LCD
UI component	Buzzer
Device	Motor Driver
Device	Motors

4. Detailed Interface Specs.

4.1 ECU Specifications

Key Features:

Some general features of ATmega32 microcontroller is: -

- 2 Kilo bytes of internal Static RAM
- 32 X 8 general working purpose registers
- 32 Kilo bytes of in system self-programmable flash program memory.
- 1024 bytes EEPROM
- Programmable serial USART
- 8 Channel, 10-bit ADC
- One 16-bit timer/counter with separate prescaler, compare mode and capture mode.
- Available in 40 pin DIP, 44-pad QFN/MLF and 44-lead QTFP
- Two 8-bit timers/counters with separate prescalers and compare modes
- 32 programmable I/O lines
- In system programming by on-chip boot program
- Master/slave SPI serial interface
- 4 PWM channels
- Programmable watch dog timer with separate on-chip oscillator

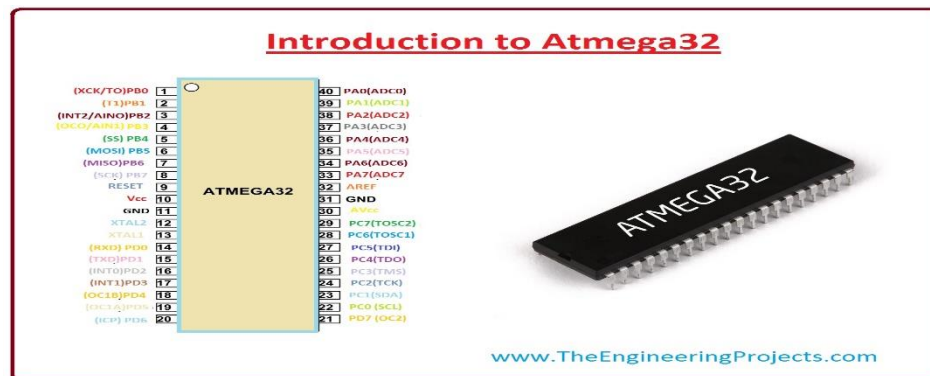


Figure 1 :ATmega32

4.2 Door Sensor Specifications

PRODUCT	NUKI DOOR SENSOR
COLOR	White
POWER SUPPLY	3.6V lithium battery (½ AA ER14250) (included)
COMMUNICATION	Bluetooth 5.0
PRODUCT DIMENSIONS	40 x 21 x 18,7 mm (incl. adhesive pad)
OPERATING TEMPERATURE	10-40°C
BATTERY SERVICE LIFE	app. 2 years
BLUETOOTH-RANGE	≤10m, depending on your facility
DELIVERY CONTENTS	1x Nuki Door Sensor 1x Magnet 1x 3.6V lithium battery (½ AA ER14250) 1x Door Sensor Manual

4.3 LCD Specifications

- Operating Voltage: 4.7V to 5.3V
- Operating Current 1mA (without backlight)
- Can display (16x2) 32 Alphanumeric Characters
- Custom Characters Support
- Works in both 8-bit and 4-bit Mode

4.4 Buzzer Specifications

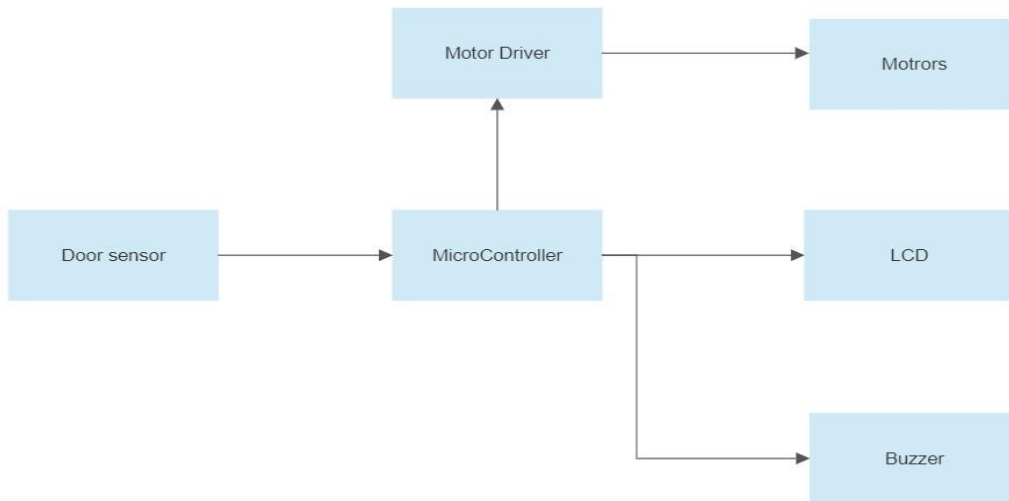
RATED VOLTAGE

5V

OPERATING VOLTAGE	4 ~ 8 V
MAX RATED CURRENT	<= 32 mA
MIN. SOUND OUTPUT AT 10CM	85Db
RESONANT FREQUENCY	2300(+/-)300 Hz
OPERATING TEMPERATURE	-20° C to 45°
HEIGHT	9.16mm
WEIGHT	1.6g

NOTE: Longer pin is the positive one

4.5 Technical Interface Requirements



A graph demonstrates the whole system

The system will interface using wires ... the next table will demonstrate what PORTs/PINs will be used for each component

4.5.1 LCD & MICROCONTROLLER

Module PIN	Connected to	PINx
LCD_VSS	POWER	_____
LCD_VDD	Ground	_____
LCD_RS	PORTB	PIN0
LCD_R/W	PORTB	PIN1
LCD_E	PORTB	PIN2
LCD_D0	PORTB	PIN3
LCD_D1	PORTB	PIN4
LCD_D2	PORTB	PIN5
LCD_D3	PORTB	PIN6
LCD_D4	PORTB	PIN7

4.5.2 Buzzer & MICROCONTROLLER

Module PIN	Connected to	PINx
VCC(the long pin)	PORTC	PIN
Ground(the short pin)	GROUND	_____

4.5.3 Door Sensor & MICROCONTROLLER

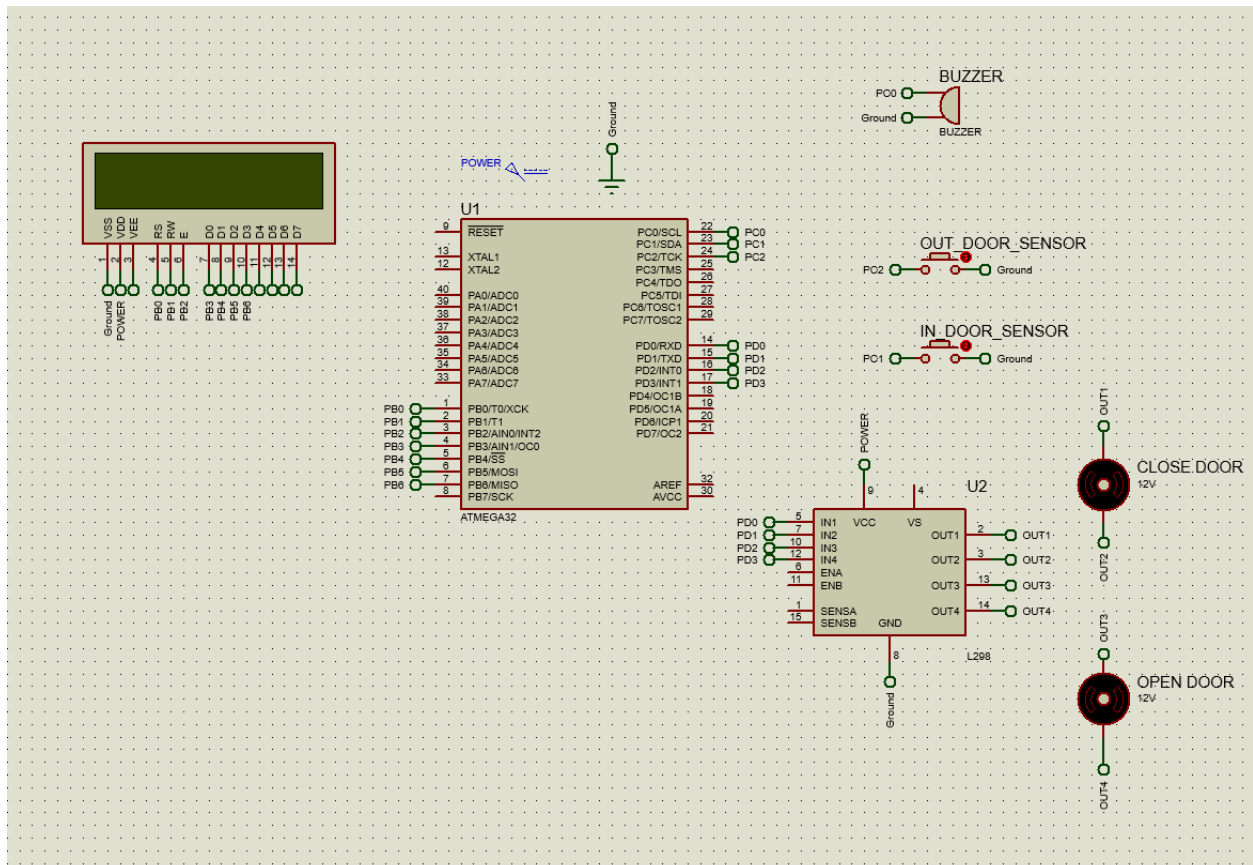
Module PIN	Connected to	PINx
PIN0	PORTC	PIN0
PIN1	PORTC	PIN1

4.5.3 Motor Driver & MICROCONTROLLER

Module PIN	Connected to	PINx
VCC	Power	_____
GND	Ground	_____
IN0	PORTD	PIN0
IN1	PORTD	PIN1
IN2	PORTD	PIN2
IN3	PORTD	PIN3

4.5.3.1 Motor Driver & DC Motors

Module PIN	Connected to
PIN0	OUT0
PIN1	OUT1



A figure illustrates the HW connections