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Trinetra – The Security Robot

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Abstract: ***The project instigates a service robot which performs the monotonous task of greeting people graciously by a sweet recorded message and hand gesture, it is used for monitoring data of visitors in any organization for security purpose. Arduino UNO is a kind of tool based on a simple microcontroller board used to control and sense the physical world than a desktop computer. An US-module (HC-SR04 ultrasonic trans receiver module) is used which can identify people in its vicinity and a dc motor is handed-on for hand moment. OV7670 camera module is cast-off for capturing images of the person and storing it for security purpose. An ISD1820 and APR33A3 voice recorder and playback module is cast-off for giving the direction according to the input given by the person. Hence this project can be owned at places like colleges, offices, or any organisations where the people need certain information.***

Keywords: Arduino UNO, HC-SR04 US Module, DC Motor, OV7670 camera module, ISD1820 and APR33A3 voice recorder and playback module.

I. INTRODUCTION TO ARDUINO

A. Technical Specifications

1) Microcontroller: Microchip ATmega328P [7]
2) Operating Voltage: 5 Volts
3) Input Voltage: 7 to 20 Volts
4) Digital I/O Pins: 14 (of which 6 provide PWM output)
5) Analog Input Pins: 6
6) DC Current per I/O Pin: 20 mA
7) DC Current for 3.3V Pin: 50 mA
8) Flash Memory: 32 KB of which 0.5 KB used by boot loader
9) SRAM: 2 KB
10) EEPROM: 1 KB
11) Clock Speed: 16 MHz
12) Length: 68.6 mm
13) Width: 53.4 mm
14) Weight: 25 g



Fig I (ARDUINO UNO)

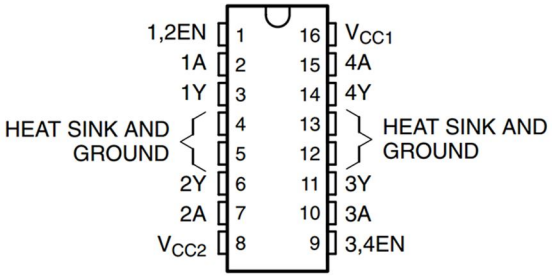
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II. INTERFACING MOTOR WITH ARDUINO:

To interface motor with Arduino we are using H-driver L293D. The voltage range of this IC is from 4.5V to 36V. Motor is interfaced with Arduino for hand gesture.

A. Pin Description



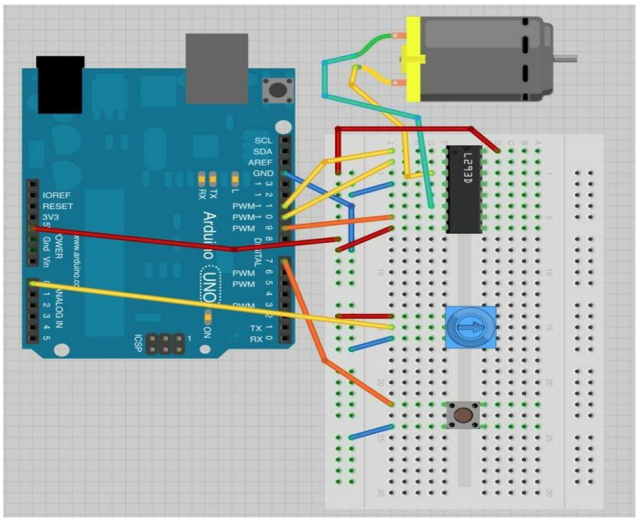


Fig II (Schematic wiring)

III. INTERFACING OV7670 CAMERA MODULE WITH ARDUINO

A. Specifications

1) It is used for embedded applications
2) It is suitable for low voltage applications
3) Pixel capacity of this camera module is 0.3MP
4) Due to the high sensitivity of this camera module it is suitable for low light operations.

Pin	Type	Description
VDD**	Supply	Power supply
GND	Supply	Ground level
SDIOC	Input	SCCB clock
SDIOD	Input/Output	SCCB data
VSYNC	Output	Vertical synchronization
HREF	Output	Horizontal synchronization
PCLK	Output	Pixel clock
XCLK	Input	System clock
D0-D7	Output	Video parallel output
RESET	Input	Reset (Active low)
PWDN	Input	Power down (Active high)

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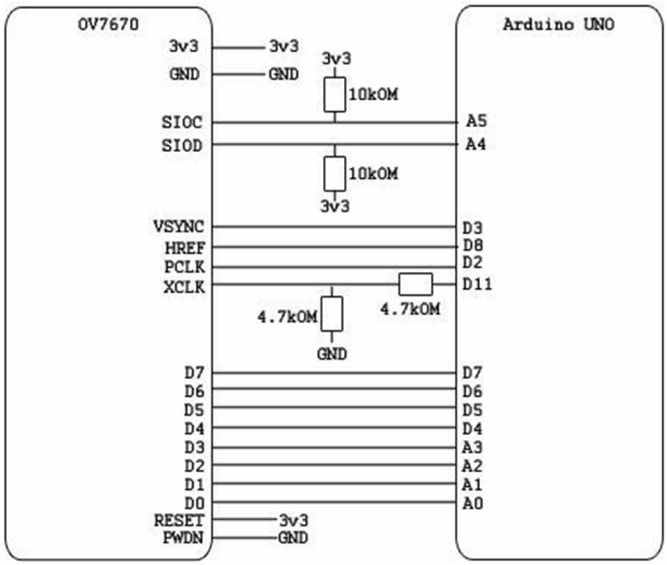


Fig III (Pin connection representation)

IV. INTERFACING ISD1820 VOICE RECORDING AND PLAYBACK MODULE WITH ARDUINO

Using this voice module multiple messages can be recorder and play-backed. The maximum duration for recording is 20seconds. Depending on the resistor values recording duration varies.

ROSC	Duration	Sample Rate	Bandwidth
80K Ω	8 secs	8. 0KHz	3. 4KHz
100K Ω	10 secs	6. 4KHz	2. 6KHz
120K Ω	12 secs	5. 3KHz	2. 3KHz
160K Ω	16 secs	4. 0KHz	1. 7KHz
200K Ω	20 secs	3. 2KHz	1. 3KHz

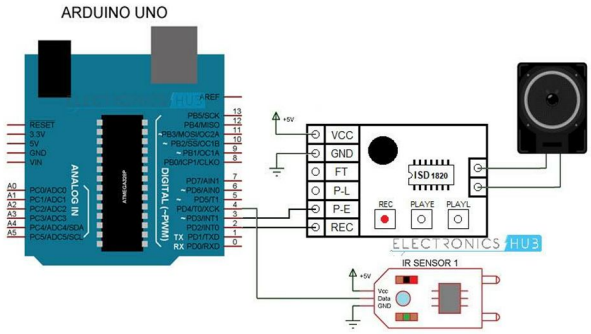


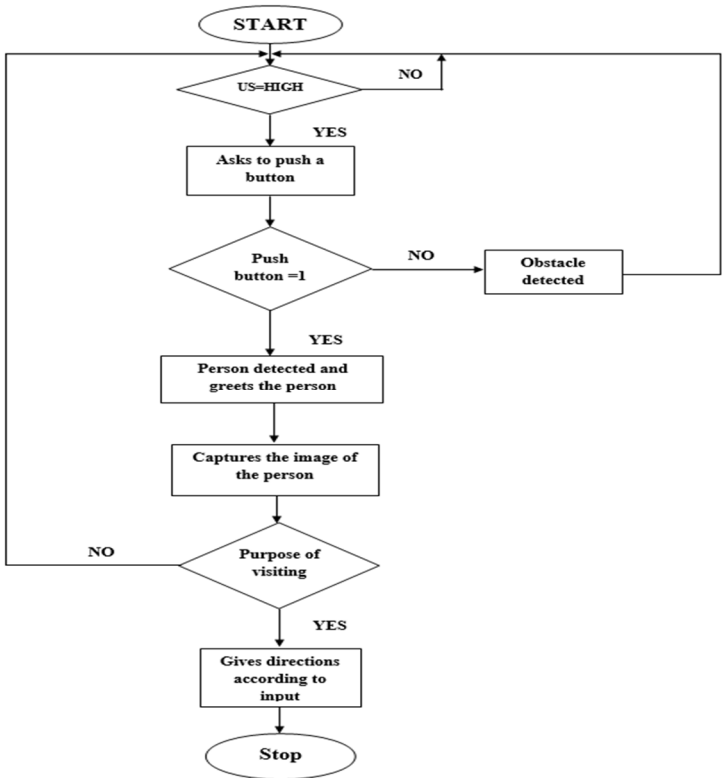
Fig IV (Voice recording wiring)

V. ALGORITHM

1) *Step1:* Start the process.
2) *Step 2:* If US module = HIGH, robot asks to push the button Else go to Step1
3) *Step3:* If push button =1, person is detected and robot greets the person with a hand movement. Else obstacle is detected and robot waits for 2mins and goes to Step1
4) *Step4:* Robot captures the image of person & stores it.
5) *Step5:* Robot asks for purpose of visiting. If push button is pressed, robot gives directions according to the input. Else go to Step1
6) *Step6:* Stop the process

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VI. WORKING OF TRINETRA

This robot detects an object in its vicinity and asks for a conformation whether it is a human being or an obstacle. After getting the confirmation the robot will greet the person with hand gesture and a pre-recorded voice message. Then it captures the image of the person, stores it for security purpose and ask the him/her about destiny point. Depending on the input given by the person the robot will give the directions to their destination.

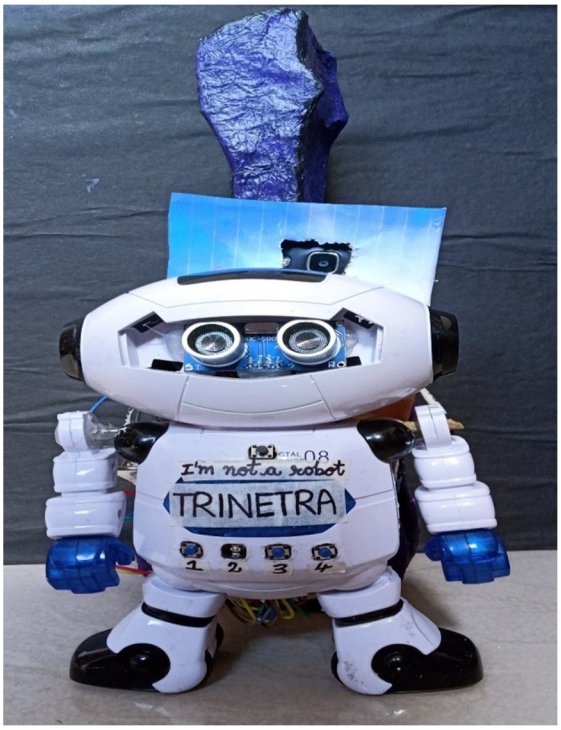


Fig V TRINETRA (The Service Robot)

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VII. TESTING AND DEBUGGING

A. Steps To Install Arduino Ide Software

1) Choose your Operating System

a) Windows

b) Mac OS X

c) Linux

2) Install Arduino (Windows*)*

a) If you haven't already, install 7-Zip*, a free archive utility that can be downloaded at: www.7zip.org.

b) Download the Arduino IDE from the Arduino Software page. Be sure to download the version for your operating system.

c) Navigate to the folder where you downloaded the Arduino IDE .zip file.

d) Right-click on the .zip file, point to 7-Zip, and select Extract to "Arduino-…"

e) Open the extracted folder. You can move this folder to a different location, if desired. A common place is to create a C:\Arduino folder. For this example, we will stick with the Downloads folder where it was extracted.

VIII. SAMPLE SOURCE CODE

```
// Dev-C++ 4.9.9.2
// Project Type: Win32 GUI
// Window: Window Header
#include <Windows.h>
#include "resource.h"
// Window: Window Name
#ifdef NULL
#undef NULL
#define NULL 0
#endif
#define Wnd_Class "WIN_CHK"
#define Wnd_Title "預設視窗"
// Window: Window Parameters
static UINT WndPos_X = 0, WndPos_Y = 0;
// 400 x 300
static UINT WndPos_Width = 400, WndPos_Height = 300;
static HWND hwndWnd = 0;
static HINSTANCE hinstWnd = 0;
LRESULT CALLBACK WndProc(HWND, UINT, WPARAM, LPARAM);
BOOL ProcMsg(void);
BOOL BuildWnd( const char*, const char*);
void InitWindow_PositionCenter( UINT&, UINT&, UINT, UINT, BOOL);
// Window: Window Entry
int WINAPI WinMain(HINSTANCE hInstance, HINSTANCE hPrevInstance,
                   LPSTR lpCmdLine, int nShowCmd)
{
    //==START of WinMain==//
    if ( (hwndWnd = ::FindWindow( Wnd_Class, Wnd_Title)) != NULL )
    {
        ::SetForegroundWindow(hwndWnd);
        return NULL;
    }
    if ( BuildWnd( Wnd_Class, Wnd_Title) == TRUE )
    {
        while ( ProcMsg() == TRUE );
    }
    //==END of WinMain==//
    return NULL;
```

Fig VI (Sample code)

IX. BENIFITS OF TRINETRA

A. Low cost

B. Smart functioning

C. Ease of operation

X. CONCLUSION

Using this robot continuous monitoring in any organisation is possible. The robots can work 24/7, they are not late and risk to human's life is minimised.

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1) Mrs. G. Rajitha, Assistant Professor EEE Department ACE Engineering College, India. She was born in the year 1987, having +2 years of experience as AST. Professor in ACE Engineering College and having 3 years of Industrial experience as a PLC programmer & Trainer, received "MONDIALOGO ENGINEERING BRONZE INTERNATIONAL AWARD 2008/09* from an initiative by DAIMLER & UNESCO selected among 932 Project ideas submitted during the award ceremony held in Stuttgart, GERMANY on 9 November 2009. She did her B. TECH EEE and M. TECH Power electronics from JNTUH affiliated college. Her areas of interest are Control systems, Power electronics and PLC & SCADA systems.



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3) Mr. J. Surya Manideep, Student, EEE Department, ACE Engineering College, Ghatkesar, India.

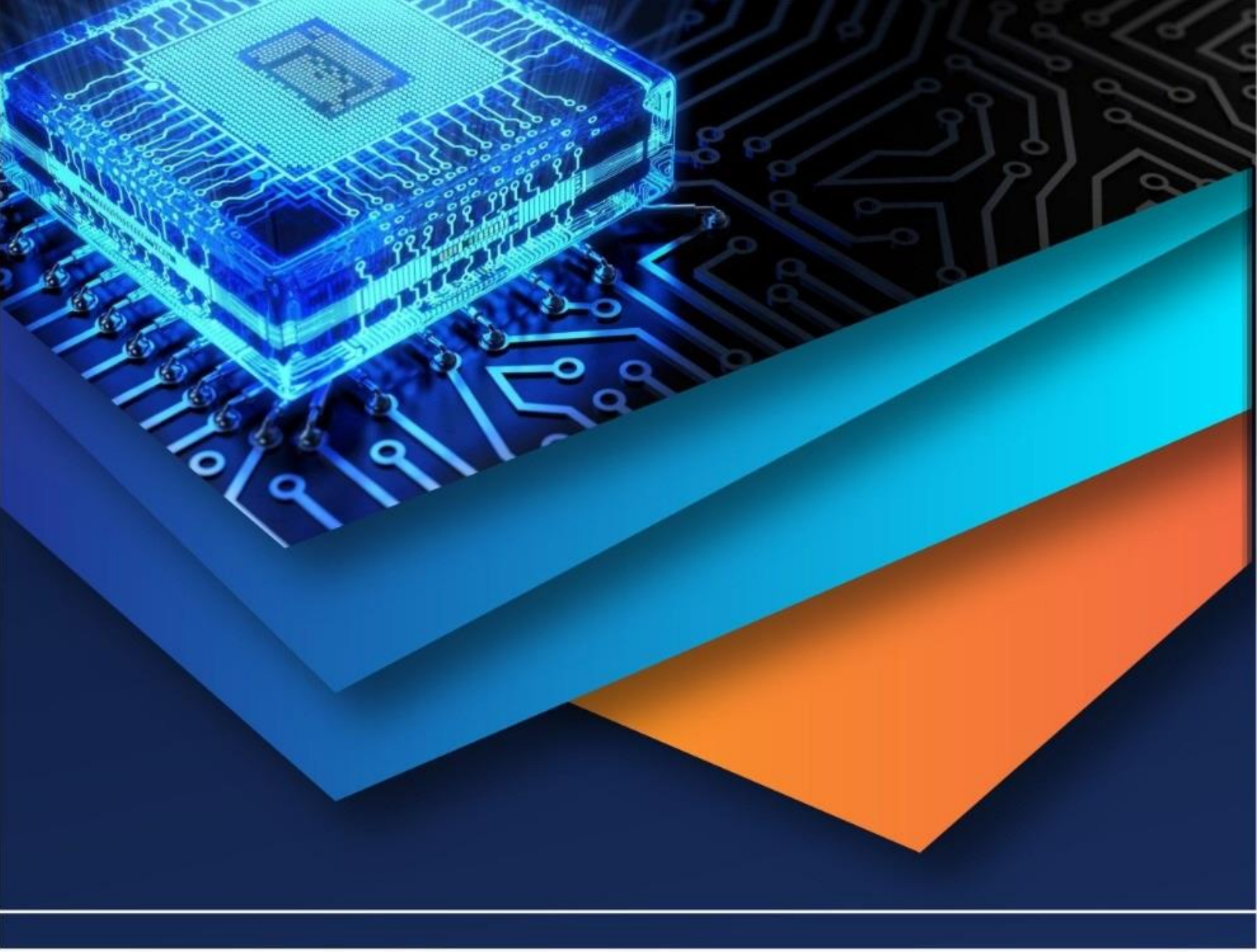


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