Detection of Doorbell Using ARDUINO

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***Abstract*-Doorbells are usual signalling devices used to alert the person inside the building to open the door as someone has arrived. Classic doorbells can be seen in every house now a days, which uses simple button and when that button is pressed the bell rings. The doorbell which we are going to make is different from that. We will make a doorbell which not only gives an output of sound, but also light and vibration. We will be using a very simple circuit to implement this project. This project can be really beneficial because it's not always the case that a person can reach the doorbell or the person inside can hear it, so it would be nice if it not only ring but give them some more way to make them realize the bell. Also, there is a flexibility that you can adjust the distance according to you by doing some changes in the code you are using to drive the doorbell.We will be using ultrasonic sensor to detect the person and then give the alert using an LED and a vibration sensor. As we know that ultrasonic sensors are used for distance measurement without physical contact for small distances. So it's the best thing to use ultrasonic sensor for detecting object. Renewable energy sources are spreading due to environmental and energetic shortcomings. These systems are usually grid connected, and a power converter is the key item to connect the renewable energy sources to the grid. The power converter must be accurately designed in order to comply with grid requirements in terms of power quality and safety. This work focuses on the design, modelling and control of power converters for power quality improvement in a grid connected distributed generators system. Control action of power converters are designed such that they can figure out with a transformer coupled grid connected system with different voltage levels 0f the grid. The Grid connected photovoltaic system in which a low voltage based PV generation system ted to grid 0f 25 k V and 125 k V along with the effect of irradiance on active power ted to grid is demonstrated.All the simulations are carried out in MATLAB/ Simulink environment and the results with priggish analysis are exhibited.**

Keywords - Signalling, Doorbell, Arduino, alter system.

1. INTRODUCTION

An embedded system combines mechanical, electrical, and chemical components along with a computer, hidden inside, to perform a single dedicated purpose. There are more computers on this planet than there are people, and most of these computers are single-chip microcontrollers that are the brains of an embedded system. Embedded systems are a ubiquitous component of our everyday lives. We interact with hundreds of tiny computers every day that are embedded into our houses, our cars, our bridges, our toys, and our work. As our world has

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become more complex, so have the capabilities of the microcontrollers embedded into our devices. Therefore the world needs a trained workforce to develop and manage products based on embedded microcontrollers.

Nowadays, we have remote controls for our television sets and other electronic systems, which have made our lives real easy. Have you ever wondered about a more simple way of detecting the doorbell. Ofcourse, Yes! But, are the available options cost – effective? If the answer is No, we have found a solution to it. We have come up with a new system called Arduino based detection of doorbell using Bluetooth. This system is super – cost effective and can give the user, the ability to detect person at the doorstep. This project mainly helps the deaf people who can't afford a hearing aid. Time is very valuable thing. Everybody wants to save time as much as they can. New technologies are being introduced to save our time. To save people's time we are introducing detection of doorbell using a simple and efficient way of the process. Embedded systems are a combination of hardware and software where software is usually known as firmware that is embedded into the hardware. One of its most important characteristics of these systems is, it gives the o/p within the time limits. Embedded systems support to make the work more perfect and convenient. So, we frequently use embedded systems in simple and complex devices too. The applications of embedded systems mainly involve in our real life for several devices like microwave, calculators, TV remote control, home security and neighborhood traffic control systems, etc.

2. PROPOSED SYSTEM

Our project aims to provide the most easy and efficient way of detecting the doorbell by those who have got hearing impairment. This project can be really beneficial because it's not always the case that a person can reach the doorbell or the person inside can hear it, so it would be nice if it not only ring but give them some more way to make them realize the bell. Also, there is a flexibility that you can adjust the distance according to you by doing some changes in the code you are using to drive the doorbell. We will be using ultrasonic sensor to detect the person and then give the alert using an LED and a vibration sensor. As we know that ultrasonic sensors are used for distance measurement without physical contact for small distances. So it's the best thing to use ultrasonic sensor for detecting object.

In today's scenario of covid, using of ultrasonic sensor is very useful as it is touchless.

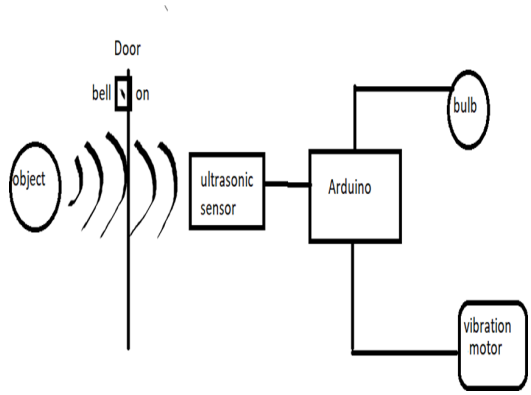

FIGURE 1. BLOCK DIAGRAM OF PROPOSED SYSTEM

3 HARDWARE USED FOR THE PROPOSED METHODOLOGY

- Arduino UNO
- Bluetooth device
- Ultrasonic sensor
- Vibration motor

3.1 ARDUINO UNO

The Arduino Mega is a microcontroller board based on the ATmega1280 datasheet. It has 54 digital input/ output pins (of which 14 can be used as PWM

Figure 2 Arduino micro controller

outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It

contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Arduino Mega can be powered via the

USB connection or with an external power supply. The power source is selected automatically.

SPECIFICATIONS:

Microcontroller	ATmega1280
Operating Voltage	5V Input Voltage (recommended) 7 - 12V Input Voltage (limits) 6-20V
Digital I/O Pins	54 (of which 15 provide PWM output)
Analog Input Pins	16
DC Current per I/O Pin	40 Ma
DC Current for 3.3V Pin	50 Ma
Flash Memory	128 KB of which 4 KB used by boot loader
SRAM	8 KB
EEPROM	4 KB
Clock Speed	16 MHz

External (non-USB) power can come with either from an AC to DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm centre- positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and VIN pin headers of the POWER connector.

The board can operate on an external supply of 6 to 20 Volts. If supplied with less than 7V, however, the 5V pin may supply less than 5 Volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 Volts.

1.VIN: The input voltage to the Arduino board when it is using an external source (as opposed to 5 Volts from the USB connection or other regulated power source). You can supply voltage through this pin or if supplying voltage via the power jack, access it through this pin.

2.5V: The regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5V supply.

3.3V: A 3.3 Volt supply generated by the on-board FTDI chip. Maximum current draw is 50 mA.

4.GND: Ground pins.The Atmega280 has 128 KB of flash memory for storing code (of which 4 KB is used for the boot loader), 8 KB of SRAM and 4 KB of EEPROM (which can be read and written with the EEPROM library).

5.Each of the 54 digital pins on the Mega can be used as an input or output, using pinMode (), digitalWrite () and digitalRead () functions.

They operate at 5 Volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50k Ohms.The Arduino Mega has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega1280 provides four hardware UARTs for TTL (5V) serial communication. An FTDI FT232RLon the board channels one of these over USB and the FTDI drivers (included with the Arduino software) provide a virtual com port to software on the computer. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the FTDI chip and USB connection to the computer (but not for serial communication on pins 0 and 1).

The ATmega1280 also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus; see the documentation on the Wiring website for details. To use the SPI communication, please see the ATmega1280 datasheet.

3.2 BLUETOOTH DEVICE

The HC-05 is a very cool module which can add two-way (full-duplex) wireless functionality to your projects. You can use this module to communicate between two microcontrollers like Arduino or

communicate with any device with Bluetooth functionality like a Phone or Laptop. There are many android applications that are already available which makes this process a lot easier. The module communicates with the help of USART at 9600 baud rate hence it is easy to interface with any microcontroller that supports USART. We can also configure the default values of the module by using the command mode. So if you looking for a Wireless module that could transfer data from your computer or mobile phone to microcontroller or vice versa then this module might be the right choice for you.

However do not expect this module to transfer multimedia like photos or songs; you might have to look into the CSR8645 module for that

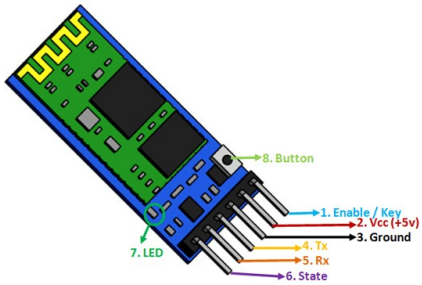

FIGURE 3. BLUETOOTH DEVICE

3.3 ULTRASONIC SENSOR

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).In order to calculate the distance between the sensor and the object, the sensor measures the time it takes between the emission of the sound by the transmitter to its contact with the receiver. The formula for this calculation isD = ½ T x C (where D is the distance, T is the time, and C is the speed of sound ~ 343 meters/second). For example, if a scientist set up an ultrasonic sensor aimed at a box and it took 0.025 seconds for the sound to bounce back, the distance between the ultrasonic sensor and the box would be:or about 4.2875 meters.

FIGURE 4. ULTRASONIC SENSOR

3.4 VIBRATION MOTOR

The working principle of vibration sensor is a sensor which operates based on different optical otherwise mechanical principles for detecting observed system vibrations.

The sensitivity of these sensors normally ranges from 10 mV/g to 100 mV/g, and there are lower and higher sensitivities are also accessible. The sensitivity of the sensor can be selected based on the application. So it is essential to know the levels of vibration amplitude range to which the sensor will be exposed throughout measurements.

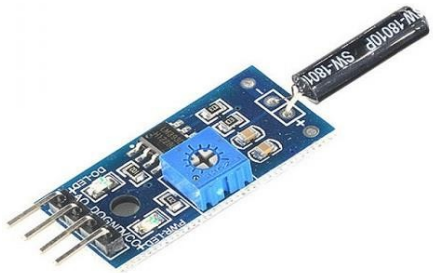

FIGURE 5. VIBRATION MOTOR

4. SOFTWARE IMPLEMENTATION

The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino board. The source code for the IDE is

released under the GNU Public License; version The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures.

User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main ()into an executable cyclic executive program with the GNU tool chain, also included with the IDE distribution. The Arduino IDE employs the program argued to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

The programming of the system is done by using Arduino IDE software using C programming language**.**

FIGURE 6. ARDUINO IDE SOFTWARE

5. PROGRAM IMPLEMENTATION

ULTRASONIC SENSOR

```
int const trigPin = 13; int const echoPin = 5; void setup()
{Serial.begin(9600); pinMode(trigPin, OUTPUT); pinMode(echoPin, INPUT);
}
void loop()
{
int duration, distance; digitalWrite(trigPin, LOW); delayMicroseconds(2); digitalWrite(trigPin, HIGH); delayMicroseconds(10); digitalWrite(trigPin,LOW); duration = pulseIn(echoPin, HIGH); distance = (duration*0.034) / 2;
Serial.println(distance); delay(3000);
}

void setup()
{
pinMode(2,INPUT); pinMode(3,OUTPUT);
Serial.begin(9600);
}
void loop()
{
digitalWrite(2,1); delayMicroseconds(1);
digitalWrite(2,0);

long duration=pulseIn(3,1);
long distance = (duration/2) / 29.1;
Serial.println(duration); Serial.println(distance);
}
```

BLUETOOTH-MASTER

```
#include<SoftwareSerial.h> #define BT_SERIAL_RX 11
#define BT_SERIAL_TX 10
SoftwareSerial BluetoothSerial(BT_SERIAL_RX,BT_SERIAL_TX);
void setup()
{
Serial.begin(9600);
BluetoothSerial.begin(38400); pinMode(2,INPUT);
pinMode(3,OUTPUT);
}
void loop()
{
if(BluetoothSerial.available())
{
Serial.write(BluetoothSerial.read()); delay(1000);
}
{
if(Serial.available()) Serial.write("test");
BluetoothSerial.write(Serial.read()); delay(1000);
}
}
```

BLUETOOTH-SLAVE

```
#include<SoftwareSerial.h>

SoftwareSerial mySerial(10,11);//Rx,Tx #define BTserial
mySerial
int state=0; void setup()

{
Serial.begin(9600);
Serial.println("Slave"); BTserial.begin(38400);
pinMode(7,OUTPUT);
}

void loop()
{
if(BTserial.available())
{
state=BTserial.read(); if(state==1);
digitalWrite(7,HIGH); if(state==0); digitalWrite(7,LOW);
}
} LED
void setup()
{
pinMode(LED_BUILTIN,OUTPUT);
}
void loop()
{
digitalWrite(LED_BUILTIN,1);

delay(10000);

digitalWrite(LED_BUILTIN,0); delay(10000);

}
VIBRATION-SENSOR

void setup()
{
pinMode(MOT_BUILTIN,OUTPUT);
}
void loop()
{
digitalWrite(MOT_BUILTIN,1); delay(10000);
digitalWrite(MOT_BUILTIN,0); delay(10000);
}
```

6. RESULT AND DISCUSSIONS

The proposed project undertakes a solution to help the physically challenged people. Though , we have so many technologies to help the normal people to lead their life easily.This project helps the physically challenged people to lead their life normally. The components used in the project is low cost and thus, affordable to all scale people. The program used in the modules are easy and can be easily modified depending upon the need. The components used are easily available and can be replaced easily, if needed.

The system is further simplified and can be worn like a watch ,thus can carried with the person. The project aims on physically challenged people(blind and deaf) to let them know, person standing in the front of their door. Calling bell are used in our home to let us know that someone has come/standing in front of the door, where it is difficult for physically challenged people with hearing loss.

In this project, the user have to do nothing but to wear/carry the system, if the person is standing in front of the door, the ultrasonic sensors senses and transmit the signal.The last component vibration motor will vibrate if it receives the signal from sensor. The vibration is the signal to be aware that a person is standing in front of the door.

7. CONCLUSION AND FUTURE SCOPE

7.1 CONCLUSION

Arduino is very user friendly and allowing user to understand its functionality in very less time . Ultrasonic sensor is widely used to detect the obstacles/object/person. Bluetooth module is used in the project to receive and transmit the signals for communication. Usage of bluetooth modules makes it easy to carry the device but within the limited area. Nowadays, all our technologies uses the internet but elderly people with less knowledge of internet can also

use the system, thus, the user need not have to train themselves for using this. The system is user friendly and needs very less maintenance . Hence, the use of arduino application in this system allows a user to easily learn the process and get accustomed to the functions. Moreover, the entire system is very flexible and scalable. Any number of appliances can be added as and when required. Hence, the systems finds use not only in houses but also in many offices

7.2 FUTURE SCOPE

This project work is complete on its own in remotely and is very simple. In the upcoming days, image processing can be included to the person inside the house. And voice data can be sent through Bluetooth from the person waiting outside so that the person inside the house can easily identify.

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