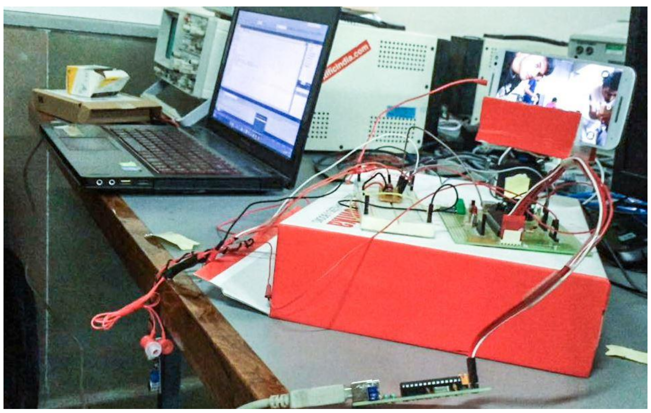

IMPULSE CAPTURE CAMERA

Group- 27

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Embedded System Design

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Chap-2 Introduction

2.1 Objective:

The Android camera platform designed in this project can turn its direction Manually using Button. If a person claps hands, then it will Detect and Impulse and capture the Moment this Device will capture multiple photos if more than one claps detected. It will not only detect clap sound it can detect any kind of noise and starts capturing the photos. The system which we have detected can distinguish between noise and impulse sound.

2.2 Motivation:

2.2.1 Selfie Motive

When we travel alone, it can be inconvenient to take pictures with yourself in it. Often, we have to hold the camera with our hands and capture a close photo with barely background. In a better case, we still need to pre-set a short timer, which requires us rushes back from the camera. Therefore, we came up with platform that uses microphones to detect clap direction and ATmega32 microcontroller with servo motor to control the camera and earpod to shutter. This design makes selfie much more easier and convenient since all you need is to choose your favorite scene and clap the hands. It will also help friends or family in which case no one should be left out of the group photos.

2.2.2 Security Aspect

It is more useful in Security Aspect in ATM machine in which if some surrounding sound are detected then it will capture photo and its easy to find what is happening nearby thus this will save memory.

Chap 3 Project Background

We are Inspire from the Final year project done by the Cornell University Students About Acoustic Impulse Marker in which they designed and build a 2-dimentional Acoustic Impulse Marker system which is capable of detecting a sharp sound anywhere in its vicinity and precisely marking its source vector with a servo based pointer. There system has a full 360-degree range, and is extremely effective at marking the source of sharp sounds to within 5 degrees of accuracy. They are able to accomplish this using a 3-microphone array and an ATmega1284p microcontroller which detects the acoustic delays between the microphones and calculates the sound’s source vector. The microphone signals are passed through an 8 stage analog system in order to convert them to a binary signal, indicating when each of them is triggered by a sound. Those 3 binary signals are analyzed for their time delays and the microcontroller selects the best 2 microphones to calculate the exact angle in which the sound originated from. The servo motor is then controlled so that it turns a pointer exactly in that direction. And we are going to use this particular logic for localizing the camera but our Microcontroller can’t work two Interrupts at a time thus this was the Basic Idea we need to cover in our project thus we have change Project to Impulse Capture Camera in which we Rotate Motor Manually using two Switch one for Anti-Clockwise & Clockwise and Priory set the direction and now when Impulse Sound is Detected It Will Capture the Photo.

Chap-4 Block Diagram

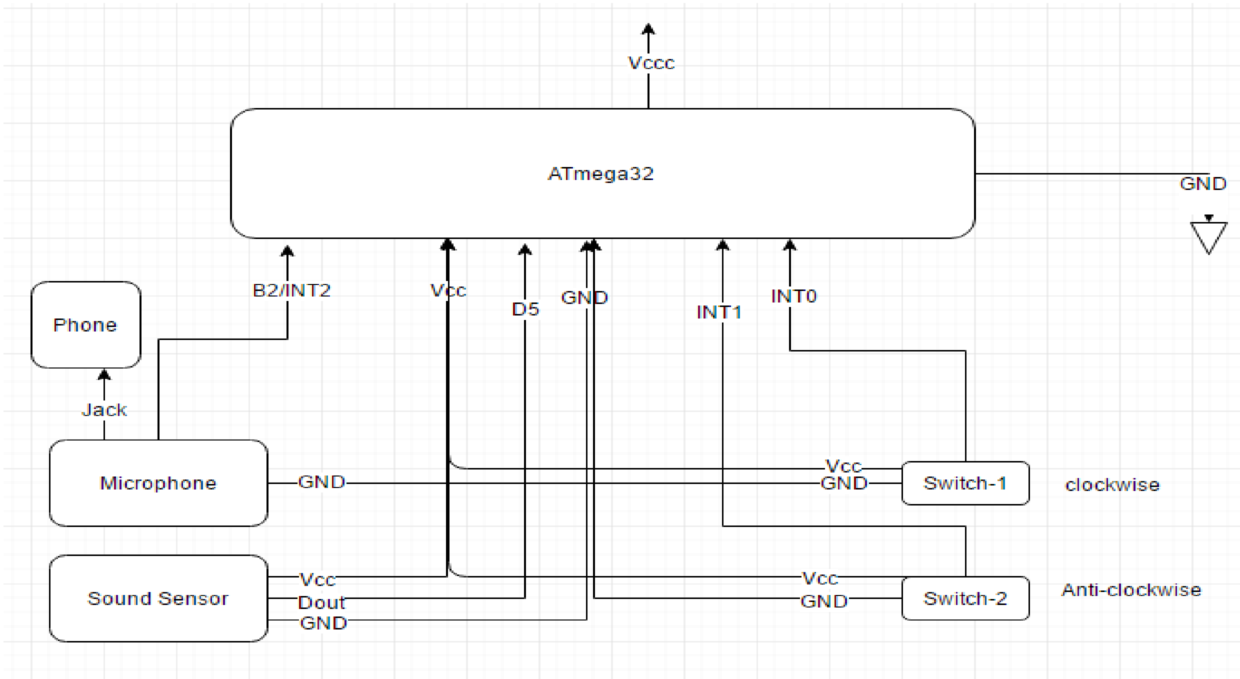

Figure 4.1 Block Diagram of Impulse Capture Camera

4.1 Connection

4.1.1 Microphone: B2

4.1.2 Servo Motor: D5

Chap-5 Selection Criteria for major Component

Components	Specifications
ATmega32	1) High Performance 2) Low Power Consumption 3) Learning in the course 4) Easily Programmable
Servo Motor – Vergo VS-2	1) Accurate rotation 2) Easy mechanism 3) Torque – 2.50kg-cm 4) Speed – 0.10 sec/60°
Op-Amp – LM358	1) Two internally compensate Op-Amps 2) Allows direct sensing around GND and V 3) Power drain suitable for battery operations

Sound Sensor	1) Durable 2) High Perfomance in Peak Detection
Cell phone Mount	1) Cheaper 2) Holds off the smartphone well

Chap-6 Costing table

Component Name	**Price(1 piece)**	**Vendor**
ATmega32	-	Senior
Headphone	120/-	Vijay Store
Sound Sensor	160/-	Lucky Electronics
Servo Motor	550/-	Delta Robokits
Breadboard	-	Lab
Registers	-	Lab
Switch's	-	Lab
Bootloader	-	Senior
Total	**830/-**	

Table 6.1 Costing Table

Chap-7 Circuit Diagram of Modules and Major Circuitry

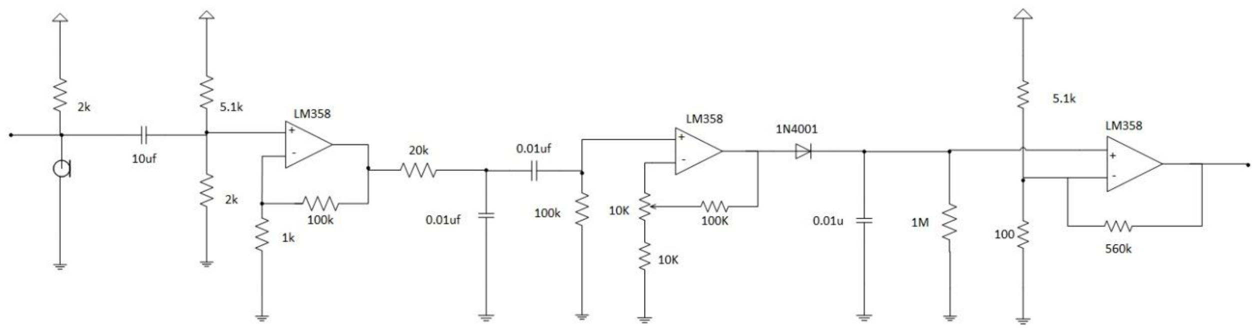

Figure 7.1 Impulse Detector Inside

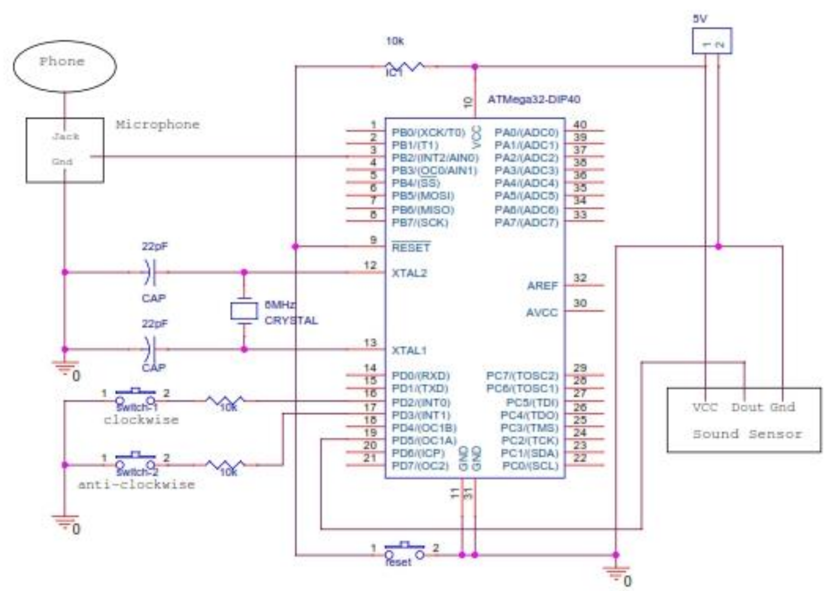

Figure 7.2 ATmega32 Connection

Chap-8 Example of troubleshooting and Debugging

8.1 Hardware Troubleshooting and Debugging

8.1.1 Headphone Connectivity and problem in Capture Image

Use New Earpods Open the Circuitry Connect and follow the steps given below

In order to “hack” headsets, it is important to notice that phone plugs are TRRS connectors with 4 contacts instead of TRS connectors with only 3 contacts. (T stands for “tip”, R stands for “ring” and S stands for “sleeve”). The picture below shows what kind of signal each of the contacts are in charge of. The two contacts which are in use when controlling the camera are the sleeve for microphones and the ring for ground. After breaking into the switch circuit of a headset (the picture is hard to retrieve), we identified the two leads connected to microphone and ground by eliminating two others connecting to the left and right earbuds. We noticed that the buttons are mechanically shorting these two leads and output a zero voltage between microphone and ground.

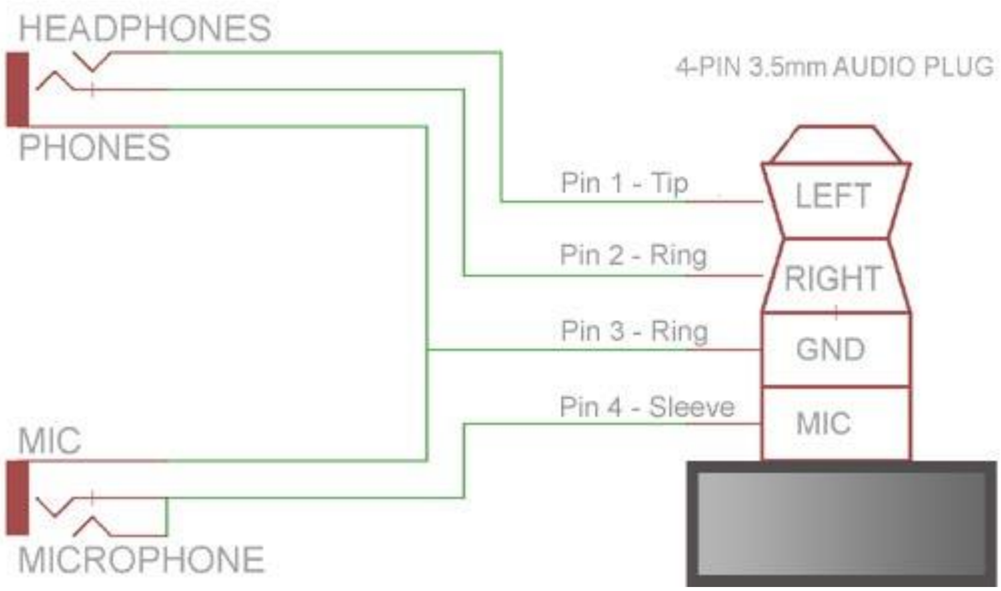

Figure 8.1 Inside of Headset/Earpods

8.1.2 Loose Connection with ATmega Development Board

Use the new Connecter M-M / F-F / M-F as Required and Connect as per Mention on

Chap-4

8.2 Software Troubleshooting and Debugging

8.2.1 Not Define Error

Reffer Chap- 11

Chap-9 Snapshots of your Working Model

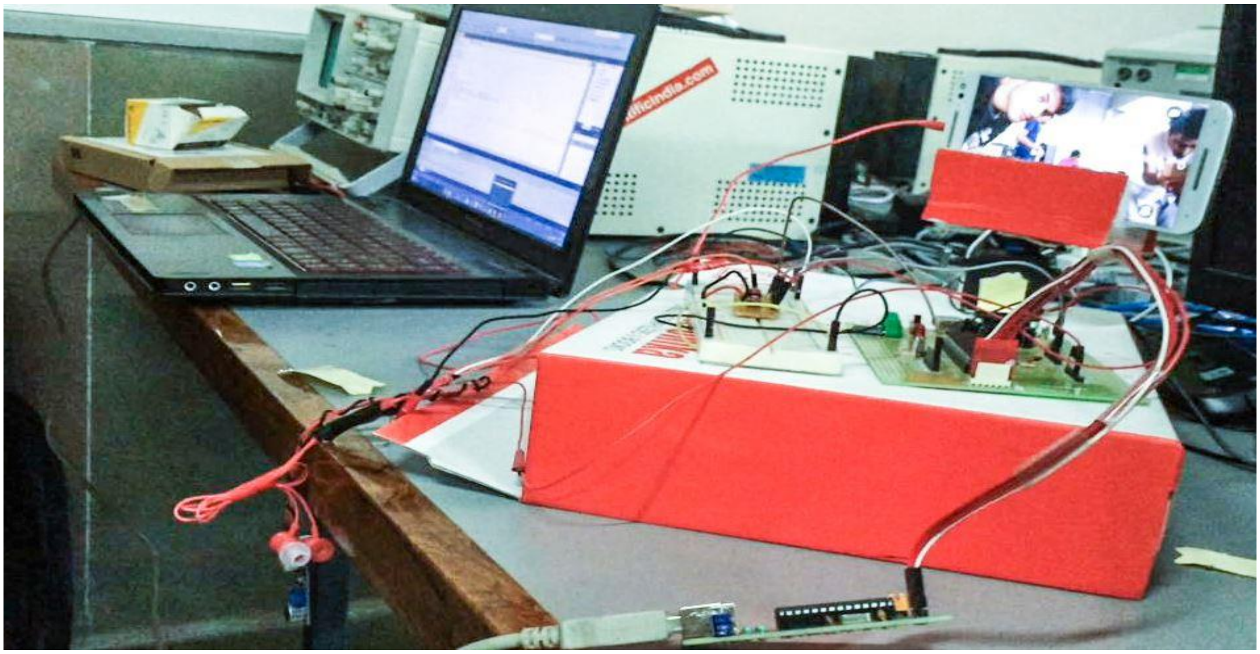

Figure 9.1 Working Model

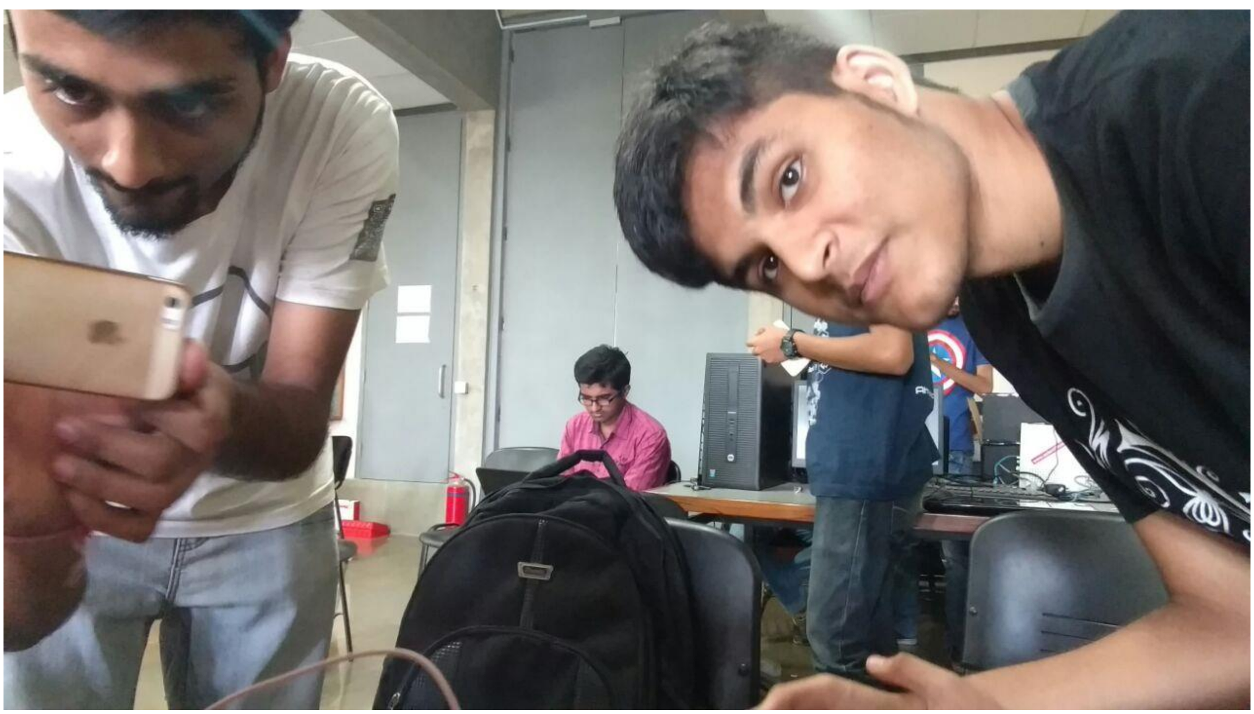

Figure 9.2 Output after Clap

Chap-10 Flow Chart

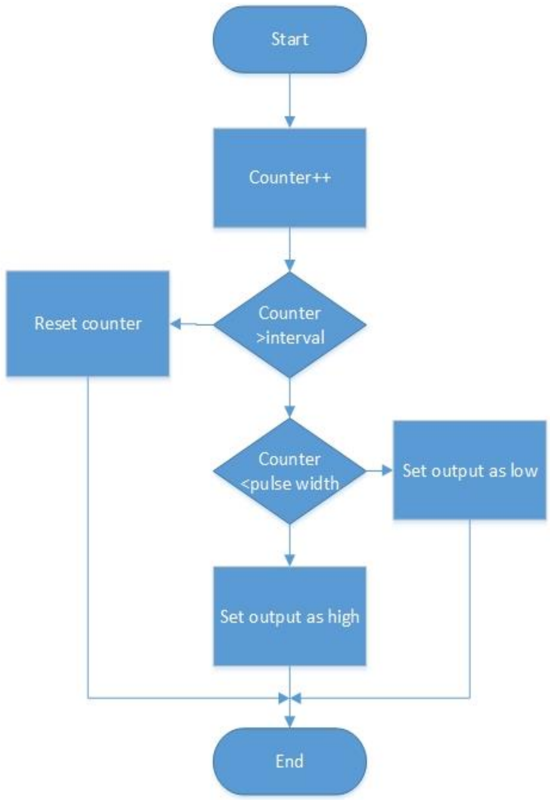

Figure 10.1 Servo Flowchart

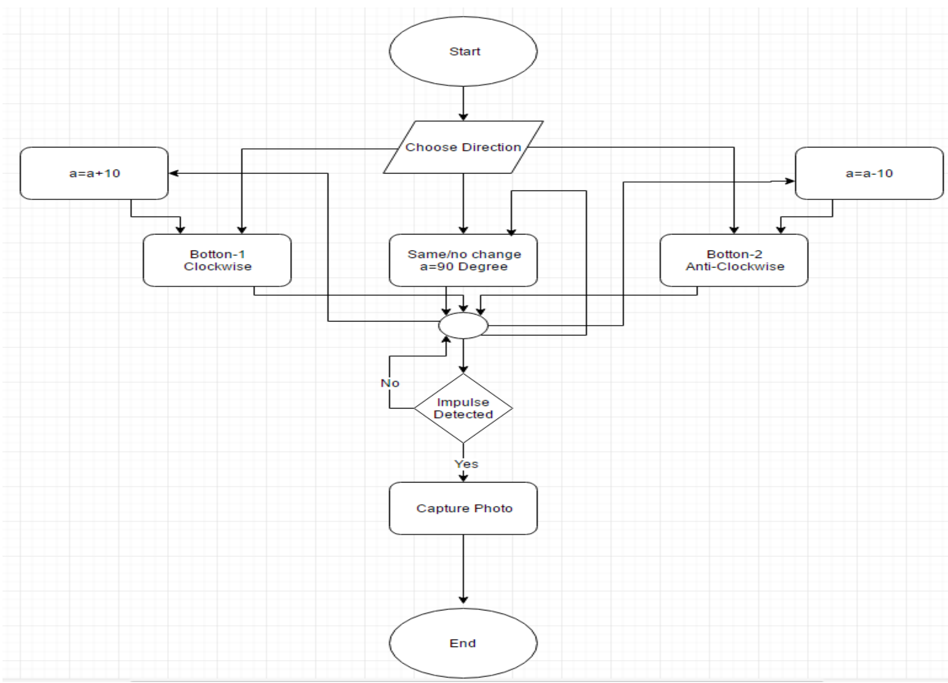

Figure 10.2 Flow Chart of Project / Code

Chap-11 Code with Comment

```
    #define F_CPU 8000000 //Crystal Frequency of Atmega32 = 8 Mz

#include <avr/io.h>

#include <util/delay.h>

#include <avr/interrupt.h>

#define servo_min 0.600          //Minimum Pulse Width Period (0 Degree) fro Servo Motor
                                 //in ms

#define servo_max 2.400          //Maximum Pulse Width Period (180 Degree) fro Servo
                                 //Motor in ms

unsigned char a=90,temp1,temp2;

void servo(float degree) // Function to calculate OCR value from degree

{

    int cmpMatch;

cmpMatch=  (int)(round( ( (float) (degree * (float) (servo_max - servo_min) / (float) 180.0) +
servo_min) * 125) );

    OCR1A= cmpMatch;

}


ISR (INT0_vect) //external interrupt-0 (Servo Motor Rotation Clockwise)

{


    a=a+10;

    if(a>180)

    a=180;

    servo(a);


}


ISR(INT1_vect) //external interrupt-1 (Servo Motor Rotation Anti-Clockwise)
```

```
{

    a=a-10;
    if(a<0)
    a=0;
    servo(a);

}



ISR (INT2_vect) // external interrupt-2 (Pull down voltage at headphone)
{
    PORTA=0x01;
    _delay_ms(50);
    PORTA=0x00;
}

int main(void)
{
    DDRD=0x00;
    DDRB=0x00;

   GICR=(1<<INT2)|(1<<INT0) | (1<<INT1);
    MCUCR=(1<<ISC01)|(1<<ISC11); // Enabling interrupt at falling edge
    TCCR1A|=(1<<COM1A1)|(1<<COM1B1)|(1<<WGM11);        //NON Inverted PWM
    TCCR1B|=(1<<WGM13)|(1<<WGM12)|(1<<CS11)|(1<<CS10); //PRESCALER=64
MODE 14(FAST PWM)
    ICR1=4999;  //fPWM=50Hz
```

```
    DDRD|=(1<<PD5);   //PWM Pins as Output
    DDRA=0x01;
    PORTB=0x04; //Pulling UP B2
    PORTD=0X06; //Pulling UP D2 & D3
    servo(a);
    sei(); //  Enabling interrupt
    while(1);// star here forever
}
```

Chap-12 Conclusions

Our Expectation:

Our goal of the design is a Phone camera platform which can turn its direction to face wherever a nearby hand-clapping or other similar sharp impulse comes from. And when a person claps hands for more than once in the same direction in reference with the mobile phone, this platform will instruct the camera to take a picture for each claps detected. We achieve most of our goal in the end, our current system could detect the sound source even in a noisy environment, and we could control phone taking a picture if we clap twice in the same direction it will take a Photo.

What we Do?

We created a System in Which we need to set a Direction manually and when the sound detected Phone will capture Photo.

Future Works

We will try to localize the Camera in the direction from where sound is detected and We will Set the Direction of Camera Manually by wireless Communication.

Chap-13 Project Timeline

Tasks	18/3	23/3	4/4	11/4	18/4	25/4	10/5
Assignment 2		Done					
Stimulator Circuit	X Done						
MATLAB code for Impulse Detection		X Try Failed					
Impulse detection Circuit building			X Try Failed	X Try Failed			
Pseudo code				Done			
Flowchart				Done			
Interface of Servo Motor					X Done		
Microphone and Camera Connections					X Done		
Coding						X Done	
Testing and Demo							X Done

Chap-14 References

[1] M.A Mazidi, Sarmad Naimi, Sepehr Naimi,” The AVR Microcontroller and Embedded Systems using Assembly and C”, Ed. India: PEARSON

[2] Adam Wrobel & Michael Grisanti (2013). Acoustic Impulse Marker [Online]. Available: https://people.ece.cornell.edu/land/courses/ece4760/FinalProjects/f2013/agw39_mag338/agw39_mag338/agw39_mag338/agw39_mag338.html