SMART MONITORING SYSTEM (MOTORIZED CAMERA BASED)

[1]Abhishek Dey, [2]Rohit Singh, [3]Ratul Mazumder, [4]Tamal Taru Ghosh, [5]Souvik Kundu

[1]Lecturer, [2,3,4,5]Project Fellow

[1]Department of Electronics & Telecommunication Engineering

[1]Technique Polytechnic Institute, Hooghly, India

Abstract: The project "Smart Monitoring System (Motorized Camera Based) " is mainly done by us due to the security system in our country .It is basically a low graded to medium graded system. Now when we think about a different scenario where the security cameras or CCTV cameras are not so high quality in ATM, banks, shops and more over that they are pointing over some particular direction. When we concerned about this kind of scenario, we decide this project idea that helps security camera's to detect the object within range they moved according to the object moved in 180 degree angle.

By this it can observe everyone's movement within ATM, shop, bank etc. In security locations every track of an object is in under surveillance. So it can give minimum risk and taking help to prevent or loss for a company or any organization.

Index Terms - Smart monitoring system, Motorized camera based security system, Surveillance

I. INTRODUCTION

The project "Smart Monitoring System (Motorized Camera Based)" is mainly done by us due to the security system in our country. It is basically a low graded to medium graded. When we think like a different scenario the security cameras or CCTV cameras are not so high quality in ATM, banks, shops and more over that they pointing over some particular direction. When this scenario is in concerned we come with a project idea that helps security cameras to detect the object within range they moved according to the object moved in 180° angle. By this it can observed everyone's movement within ATM, shop, bank etc. security locations, also every track of an object is in under surveillance. So it can give minimum risk and tracking help to prevent or loss for a company or Govt.

The story behind this project is that the security cameras are always tie and set up in a particular direction to tracking some corner or space in a particular direction, however we know that if we need to change position of camera we need to do it with manual overriding and changing the live feed position of a camera and its angle. But if their two doors in a room and we don't know from where anyone come may be door 1 or door 2 and every time we need to manual override the things is so bogus and security, so we came with a solution to change the things and by this we start this project.

II. COMPONENTS REQUIRED

To make this project we used different components among which the following components are the major part of this project. In this paper we discussed about the basics of the major parts following:

(A) Arduino UNO R3

Arduino is a single-board microcontroller meant to make the application more accessible which are interactive objects and its surroundings. The hardware features with an open-source hardware board designed around an 8-bit Atmel AVR microcontroller or a 32-bit Atmel ARM. Current models consists a USB interface, 6 analog input pins and 14 digital I/O pins that allows the user to attach various extension boards.

The Arduino Uno board is a microcontroller based on the ATmega328. It has 14 digital input/output pins in which 6 can be used as PWM outputs, a 16 MHz ceramic resonator, an ICSP header, a USB connection, 6 analog inputs, a power jack and a reset button. This contains all the required support needed for microcontroller.

Features –
- ➢ Microcontroller   ATmega328
- ➢ Operating Voltage   5V
- ➢ Input Voltage (recommended)   7-12V
- ➢ Input Voltage (limits)   6-20V
- ➢ Digital I/O Pins   14 (of which 6 provide PWM output)

- ➢ Analog Input Pins   6
- ➢ DC Current per I/O Pin   40 mA
- ➢ DC Current for 3.3V Pin   50 mA
- ➢ Flash Memory   32 KB (ATmega328) of which 0.5 KB used by bootloader
- ➢ SRAM   2 KB (ATmega328)
- ➢ EEPROM   1 KB (ATmega328)
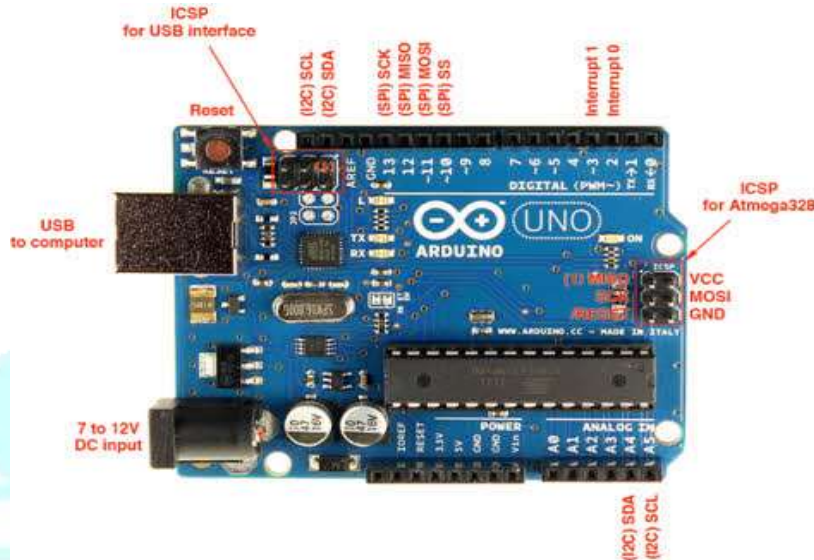- ➢ Clock Speed   16 MHz

Fig.1 physical snapshot of Arduino UNO R3

(B) PIR Motion Sensor

PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and don't wear out. For that reason, they are commonly found in appliances and gadgets used in homes or businesses.

They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors. PIRs are basically made of which you can see above as the round metal can with a rectangular crystal in the centre), which can detect levels of infrared radiation. Everything emits some low level radiation, and the hotter something is, the more radiation is emitted. The sensor in a motion detector is actually split in two halves. The reason for that is that we are looking to detect motion (change) not average IR levels. The two halves are wired up so that they cancel each other out. If one half sees more or less IR radiation than the other, the output will swing high or low. For many basic projects or products that need to detect when a person has left or entered the area, or has approached, PIR sensors are great. They are low power and low cost, pretty rugged, have a wide lens range, and are easy to interface with.
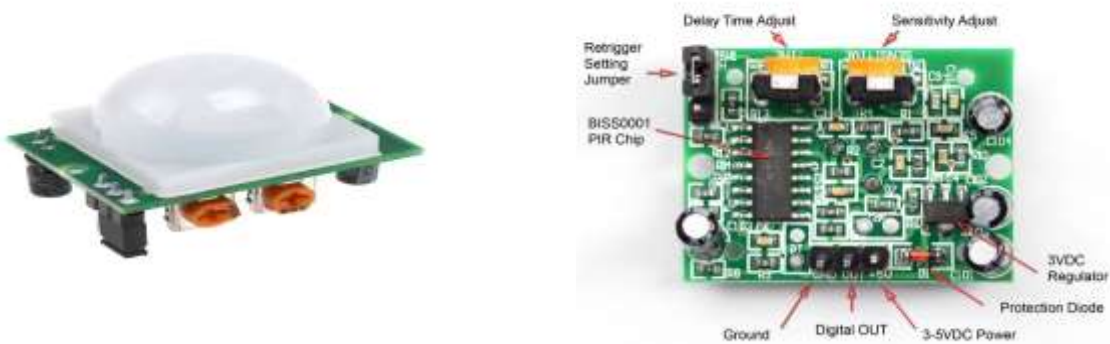

Fig.2 PIR motion sensor

(C) Servo Motor

A servo motor is an electrical device which can push or rotate an object with great precision. If you want to rotate and object at some specific angles or distance, then you use servo motor. It is just made up of simple motor which run through servo mechanism. If motor is used is DC powered then it is called DC servo motor, and if it is AC powered motor then it is called AC servo motor. Servo motors have been around for a long time and are utilized in many applications.

They are small in size but pack a big punch and are very energy-efficient. The motor is controlled with an electric signal which determines the amount of movement of the shaft.

Fig.3 physical snapshot of servo motor

(D) LED

We used a mini breadboard to keep the LED lights separate from the rest of the circuitry in order to allow for easier removal if needed. Each LED responds to a different PIR sensor and will light up a anytime it detects motion. Simply connect each LED to a separate digital input (9-13) on the Arduino and ground them through a 220-ohm resistor.

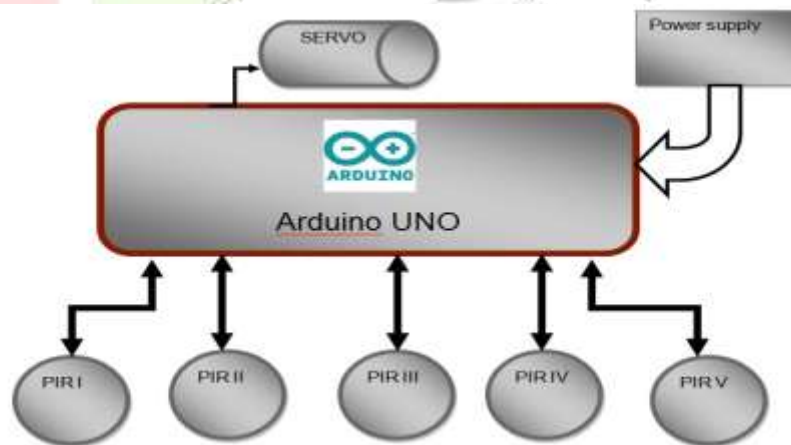Fig.4 physical snapshot of LED

III. BLOCK DIAGRAM

Fig.4 block diagram of the project

At the very beginning we switch on the power supply to the arduino board and all PIR motion sensor and servo motor. Now the microcontroller (arduino UNO) starts to calibrate the entire PIR motion sensor for 15 seconds. In these 15 seconds all the PIR motion sensor takes a picture off the room or where it is place and the entire data store into the memory. Here the sensor transmits the

Infrared Rays and form the wall it reflect back and that reflect IR is sense by the PIR motion sensor. Now the intensity of those reflects back IR is store into the arduino. Those stored data into arduino take as a reference. Now if any movement happen by human or by animal then intensity of IR is changes and corresponding PIR sensor detect that and send it to the arduino, now the arduino check by which PIR sensor it is detected and check for that particular PIR motion sensor what is the angle and then it send a PWM pulse to the servo motor and it change the location of the servo motor.

IV. CIRCUIT DESIGN AND OPERATION

This device uses 5 PIR motion sensors to detect any movement within a 180º radius. Once motion is detected, a servo motor rotates the camera base to point in that direction. There are also 5 LED "status" lights positioned inside the base that will light up anytime one of the PIR sensors detects motion.

So, we do this with using several advanced technologies that we categorized into two basic parts Hardware and Software implementations.
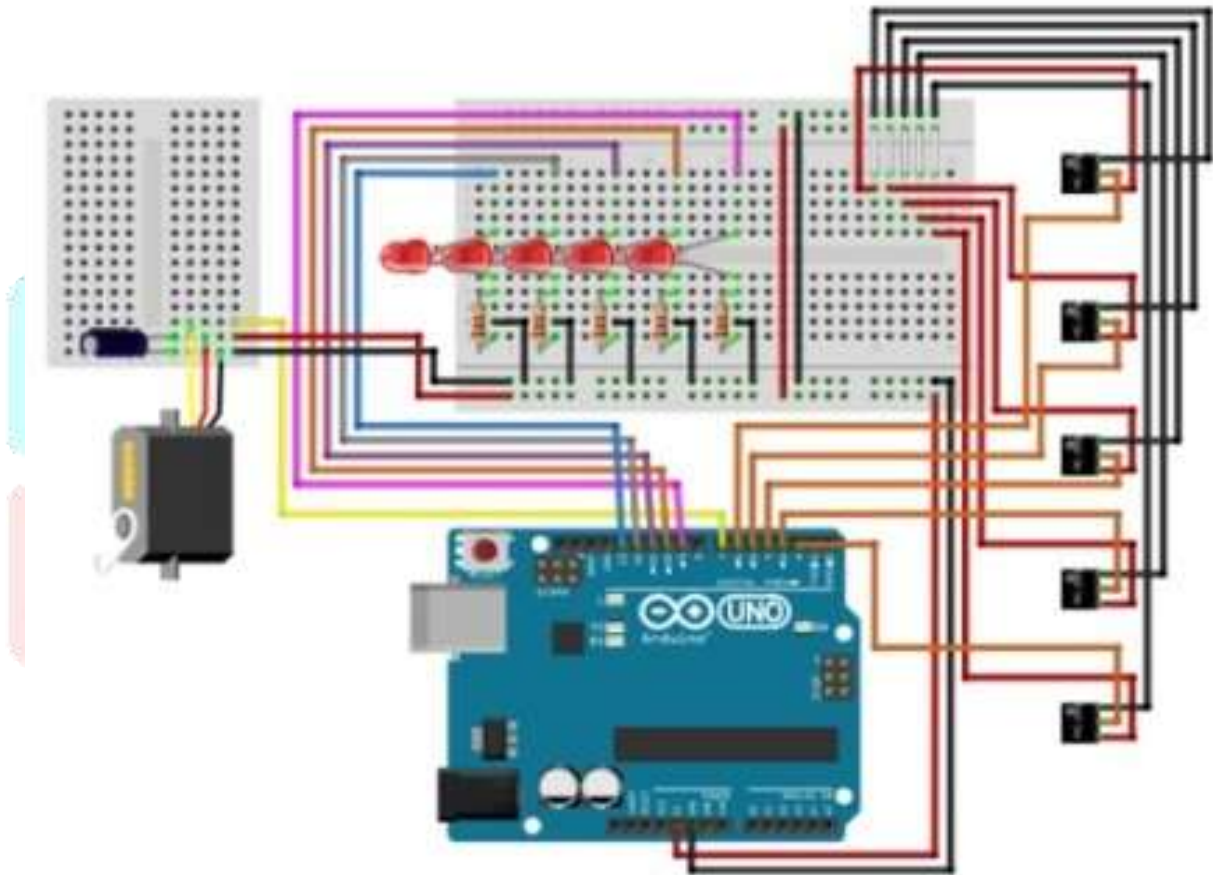

Fig5: schematic diagram of the project

V. PROGRAMME CODE

Arduino Code

```
*************************************************
*** The Motion Following Motorized Camera Base ***
*************************************************
```

// Servo motor //
```
#include<Servo.h>

ServocamServo;    //name the servo motor controlling the camera base

intcurrentPIRposition=0;   // set current angle of servo
```

```
intLEDpin[]={9,10,11,12,13};// LED pin numbers

intcurrentLEDpin=9;// the current LED pin; begin with the first in the sequence above
intPIRpin[]={2,3,4,5,6};// PIR pin numbers

intcurrentPIRpin=2; // the current PIR pin; begin with the first in the sequence above
intPIRprevState[]={1,1,1,1,1};   // the previous state of the PIR   (0 = LOW, 1 = HIGH)
intPIRposition[]={157,117.75,78.5,39.25,0};  // assign angles for servo motor (0-157 distributed equally between 5 PIR sensors)

booleanPIRstatus;          // Set status of PIR sensor as either true or false

///// SETUP /////
voidsetup()
{
          Serial.begin(9600);
          camServo.attach(7);// assign servo pin

for(intp=0;p<5;p++)
    {
          pinMode(PIRpin[p],INPUT); // set all PIR sensors as INPUTS
    }// end 'p' for

          for(intl=0;l<5;l++)
    {
          pinMode(LEDpin[l],OUTPUT); // set all LEDs as OUTPUTS
          }// end 'l' for

//////// CALIBRATE PIR SENSORS ////////
Serial.print("Calibrating PIR Sensors ");
for(intc=0;c<15;c++)
    {
          Serial.print(".");        // calibrate PIR sensors for 15 seconds (change from 10-60 sec
depending on your sensors)
          delay(1000);      // wait 1 second
    }                // end calibration for
Serial.println("PIR Sensors Ready");

camServo.write(78.5);       // move the servo to the center position to begin

}//end setup

///// MAIN LOOP /////
voidloop()
{
for(intPIR=0;PIR<5;PIR++)  // start this loop for each PIR
    {
          currentPIRpin=PIRpin[PIR];// set current PIR pin to current number in 'for' loop
currentLEDpin=LEDpin[PIR];// set current LED pin to current number in 'for' loop
PIRstatus=digitalRead(currentPIRpin);

if(PIRstatus==HIGH)      // if motion is detected on current PIR sensor
    {
digitalWrite(currentLEDpin,HIGH);// turn
corresponding LED on

if(PIRprevState[PIR]==0)    // if PIR sensor's

  {                 previous state is LOW

if(currentPIRposition!=currentPIRpin&&PIRprevState[PIR]==0)
        {          // if high PIR is different than current
```

```
position PIR then move to new position
camServo.write(PIRposition[PIR]);
Serial.print("Current angle : ");
Serial.println(PIRposition[PIR]);
delay(50);
currentPIRposition=currentPIRpin;// reset current
PIR position to active [PIR] pin
PIRprevState[PIR]=1;//set previous PIR state to high


          }


PIRprevState[PIR]=1;// set previous PIR state to HIGH If The current position is the
same as the current PIR pin
       } // end PIRprevState if
      }// end PIRstatus if

else
   {
digitalWrite(currentLEDpin,LOW);//the led visualizes the
sensors output pin state
PIRprevState[PIR]=0;// set previous PIR state to LOW
    } // end else

  } // end [PIR] for loop
}//  end main loop
```

VI. HARDWARE SETUP
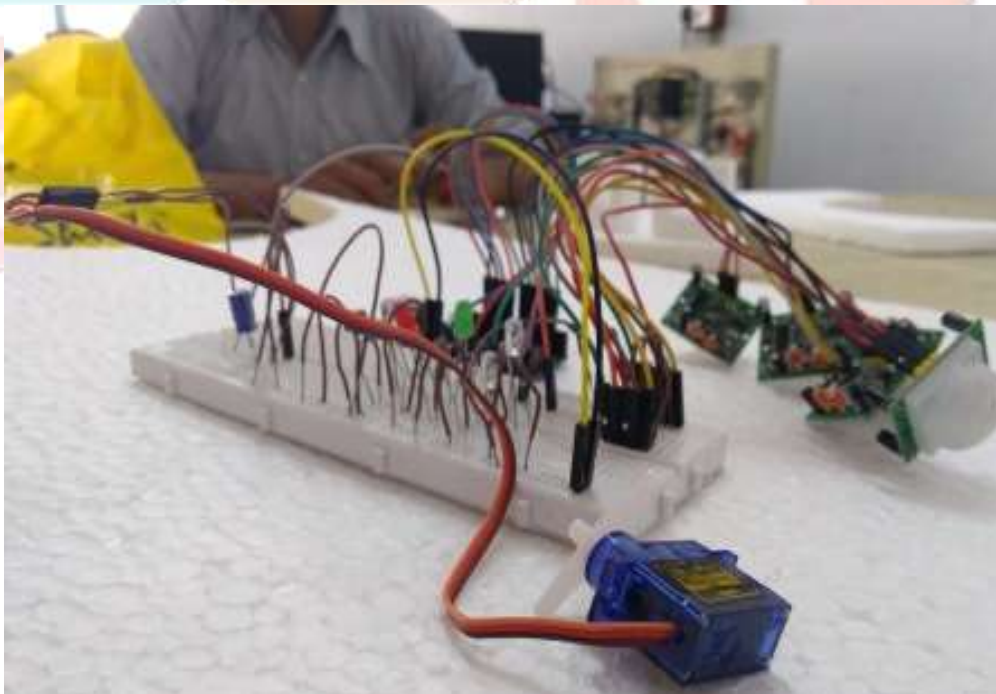
Fig.6 physical snapshot of the project

VII. APPLICATION

Basically that particular project is done for security propose where you need to capture each and every moment but you have single camera but you need to capture two side image in that case that project may helpful for you.

- ➢ For Home security propose
- ➢ For ATM security propose
- ➢ Any costly material observe from remote distance
- ➢ In Bank locker room at night

VIII. CONCLUSION

This project discusses the hardware and software description along with the schematic. The paper puts light on such a device which has great application since it eliminates the use of two cameras for monitoring an area where usually need two cameras for monitoring. The goal of monitoring an area using a single camera where usually need two or more is successfully achieved and the project is works on the principle described in this project. The problems faced now will leave future work on the project with great possibilities. Further research on this project can lead to the solution for the problems faced.

IX. ACKNOWLEDGMENT

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