

SMART SURVEILLANCE NETWORK FOR INTRUDER DETECTION

Ramesh Yalamala¹ Hemalatha V²

¹SRM University, M.Tech (Embedded Systems Technology), Chennai, India

¹yalamalaramesh_y@srmuniv.edu.in

²SRM University, Assistant Professor, Department of ECE, Chennai, India

²hemalatha.v@ktr.srmuniv.ac.in

Abstract: Smart surveillance network has acknowledged significant interest since it can provide various intellectual services to combat various issues. An essential method for building such a smart network is interior object localization. One major application is a flooring-centric intruder identifying system, wherever our smart floor can be used to monitor the secured places of an environment in an efficient way. So, we are designing a smart floor by using Optical fiber cables which are placed under the glass type fiber floor, is used to track the human movement. Whenever the force is applied on Fiber cable, due to the deformation that is happened in the cable denotes that the intruder has crossed the surveillance area. The location will be tracked and it will be update in the IOT. The floor is suitable for all private and public environments. Applications like secure places in banks, offices, military applications, server room *etc.*

Keywords: fiber floor, fiber optics, floor-centric intruder, IoT.

1. Introduction

In this project, we are providing a security for different commercial areas. Many corporations do not have effective security systems and intruder preventions then there comes the scope for intruder detection. Presently offices, Banks, Shopping Malls and Server Rooms *etc.* are using CCTV camera. The intruder is tracked by CCTV camera. In that places using RSSI we can find the distance of the movable object. But it gives the distance of the object in a certain range in the circular path [1] so we can't track the exact position of the [1], object and even the intruder can break the CCTV camera.

We consider intelligent intruders, which seem at random times and places, are aware of the cameras arrangement, and try to escape from detection as long as possible [2]. Here the intruder can break the cameras easily. This is the major drawback in the existing system. So here we are going to design smart floor by using optical fiber cables. Fiber cables are used to track the path of human movement placed under the floor. Whenever the force applied on fiber cables there will be a deformation in the light transmission from the transmitter to the receiver, and it determines that some object is moving on the floor.

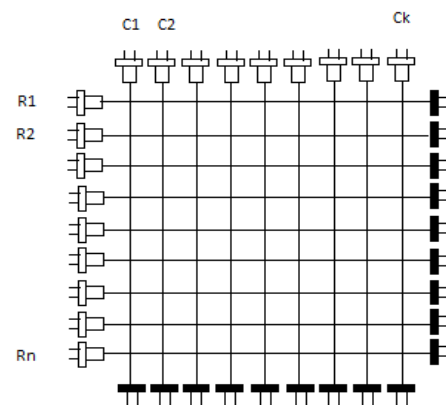


Figure 1. Square type floor model.

Here we are creating a fiber optic floor by the principle of matrix keypad, in the matrix keypad when we press the key it can detect the location if the key through rows and columns (e.g.: when we press the key 1 the location is R1C1). Here there are R1 to Rn rows and C1 to Ck columns are connected in square type floor model.

Same as above the fiber optics are also placed as keypad format when the person walks on that floor it can detect the location and send it to the authorized people through wireless communication.

2. Literature survey

Our general public is confronting a maturing issue, with all the more elderly individuals living alone and requiring help and human services. Brilliant home innovation has gotten extensive intrigue since it can give different shrewd administrations to help aged people living alone. For instance, an elderly individual living alone with a robot in a savvy home, wherever the robot gives help and suggest camaraderie [1].

Security frameworks incorporate closed circuit TV cameras, which constitute ever-present, concealed eyes in spots, for example, the city centre areas, underground and railroad stations, banks and healing centres, basic generation plants which persistently record and transmit, in microseconds, data on current advancements to ceaselessly kept an eye on law requirement and security posts [3]. Different indoor limitation methods have been projected, including camera-based strategies. In any case, such techniques are touchy to natural changes, show computational many-sided quality, raise security concerns, and experience issues in partner information for various targets, in this manner limiting their utilization in numerous applications. The System graphics and virtual reality advances are quickly displaying reasonable other options to this present reality for creating vision frameworks [4]. In a reconnaissance domain with different cameras observing a scene, the principal undertaking is to position the cameras at the area of an identified protest. gives insights about projective revolutions, which is characterized to be the homography that compares to immaculate Euclidean rotation [5-6].

Fiber optics correspondence has turned into an important research issue in late decades on account of its wide data transmission and rapid interchanges administrations [7-9]. A 10 Gb/s per channel data rate more than 75 km fiber cross is used to check the system execution.

At the point when an inhabitant enters one of the detecting zones, the framework chooses whether he or she has a place with any detecting region by coordinating the detecting data gathered from the greater part of the PIR sensors in the room [10]. Once a sensor notices a value greater than a predefined threshold value, it is in a true condition that means it notices some object.

3. System description

As of now for the security applications, CCTV cameras are used and that can be damaged by the intruders. We cannot protect those CCTV cameras. Our project will eliminate these disadvantages present in existing works.

In our project, we are designing a fiber floor instead of CCTV cameras. Here the intruder is unaware of the fiber cables present below the mat in the secure places and that cannot be damaged by them since it is fully packed to have a real view of mat. Once the fiber floor is created, it is connected to the micro controller to have an interface with outer environment. The microcontroller will send the control to IOT environment and alarm circuit.

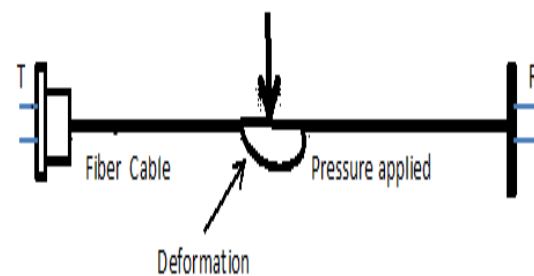


Figure 2. The smart floor model: (a) principle of fiber sensor.

The Smart floor Model and the Principal of fiber sensor is shown in figure2. Once the intruder enters into the secure area, the fiber floor will detect the presence of an intruder by the changes in the analog voltage. That change will be converted to a digital value in the controller and the control is given to IOT. In IOT environment, we can connect the magnetic door and the communication module. Once the intruder comes, the motor is driven to close the magnetic door to catch him. Meanwhile, the communication module will have the mobile number of authorized person and the message will be communicated as a voice message as well as an alarm will ring to alert the security people.

4. Implementation

The fiber optical floor is interfaced to the optical signal conditioning circuit for sensing the change of optical voltage by using ADC. ADC internally contains the analog to digital converter to convert the optical signals to machine understandable signals.

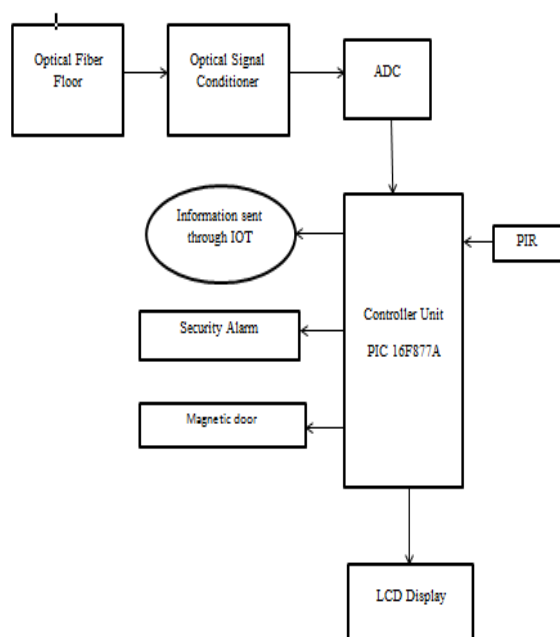


Figure 3. Block Diagram

As well as for the human detection here we are using the PIR sensor. PIR sensor internally contains a radiation detection circuit this PIR will detect only living organism.

Once the digital output is generated, the interface unit will be activated. Thus the door will be locked, alarm will be given and information will be communicated to the authorized person.

5. Process Flow

Step 1: Initialize the PIR Sensor, Optical Sensor & Controller Unit.

Step 2: Convert Analog voltage values to Digital voltage values.

Step 3: Check the PIR Sensor Value.

Step 4: If PIR Sensor value is greater than one, Then Check the digital values range.

Step 5: If the Digital Values are not in normal range, find the position in the matrix.

Step 6: Close the magnetic door and activate the security alarm.

Step 7: Send this Information to the authorized person.

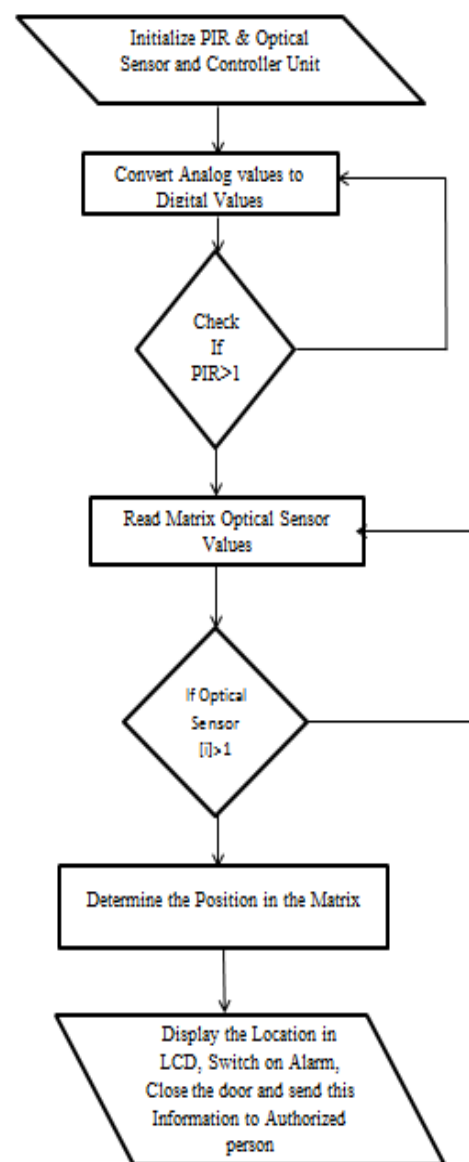


Figure 4. Flow chart

6. Simulation results

Here we process the simulation in the proteus software. In this Simulation instead of fiber floor, we connected the variable resistor to the microcontroller. When the resistance value is in the normal range. It will display the normal values and the text "normal" on the LCD display shown in figure 7.

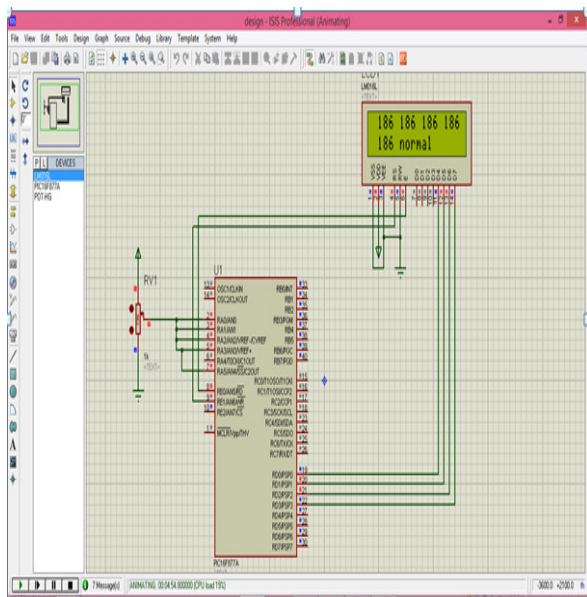


Figure 5. Output for resistance values are within the Threshold range.

Here we are considering the change of Variable resistance is like pressure applied on the fiber cables and it will display the changed values in LCD display. And it will display the position of pressure applied. The change in the received voltage level is also displayed. For example for 160 -168 range given as R1C1 Shown in figure 8.

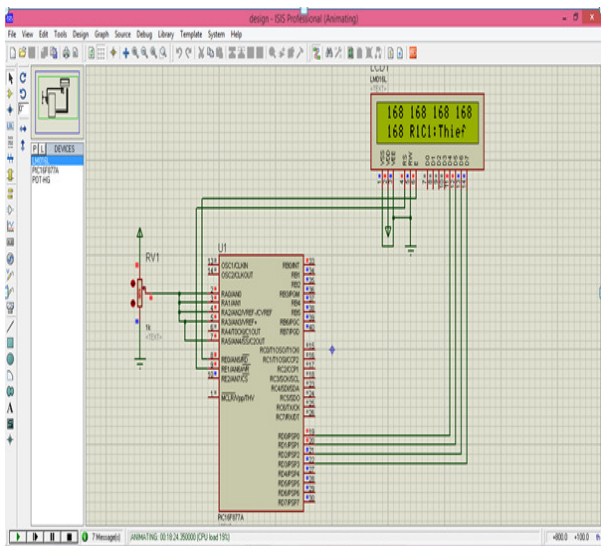


Figure 6. Output for change in resistance values.

7. Hardware Results

Here we connected five fiber cables in 2 rows and 3 columns. Those are named as R1, R2, and

C1, C2, C3. One end of the each fiber cable taken one LED and the other end fiber receiver sensor for each cable. The LED will send the light through the fiber cable and it will be received by the optical receiver sensor. And if there is pressure applied to the cable, it will display the normal values on the LCD. The normal values of each and every cable may not be same. Because the length of the each and every cable was not exactly same. Here we identified the normal values are from R1 to C3 are 135, 189, 186, 186, 151 respectively.

When no pressure applied on the floor it will show "normal" in LCD Display. And it will display normal light intensity values in LCD Display Shown in Figure 9.

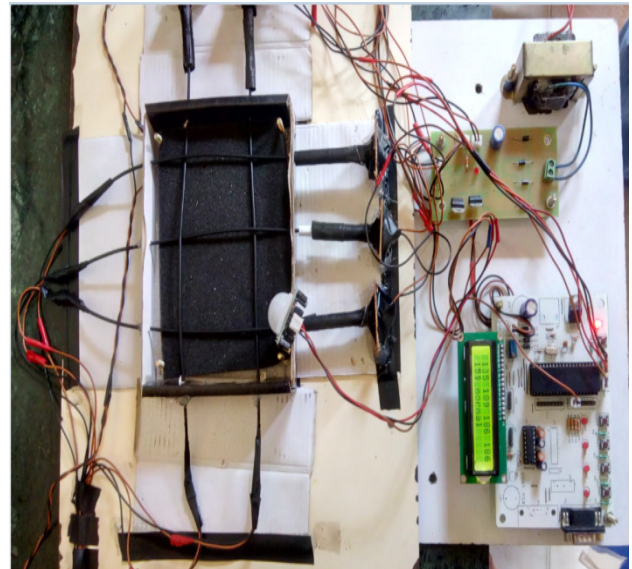


Figure 7. When no pressure applied on the floor.

When the pressure applied on row 1 & column 1 it will show "R1C1 Theft" in LCD Display. And it will display Deformation values of optical cables Shown in Figure 10. Here we observed the deformation values are from R1 to C3 are 136, 190, 178, 178, 178. These values are varying depending on the pressure we applied.

When the pressure applied on row 2 & column 2 it will show R2C2 Theft in LCD Display. And it will display Deformation values of optical cables.

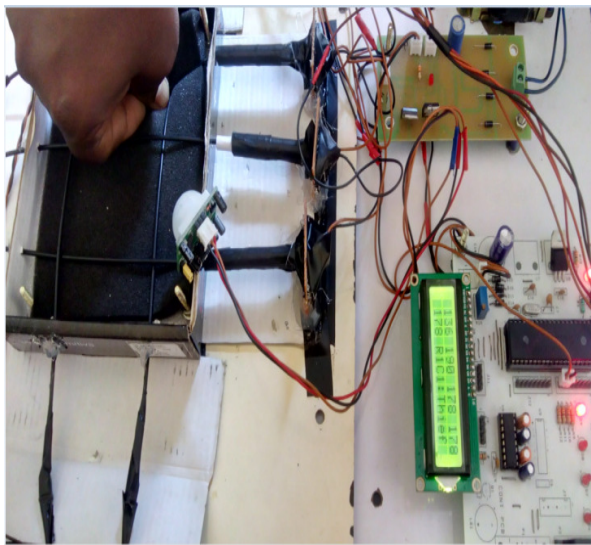


Figure 8. When the Pressure applied on Row1 & Column1.

Like this, it will show the location of pressure applied and the information will be sent through IOT to the authorized person.

8. Conclusion

In this, Paper we have designed smart floor by using Fiber cables. The light intensity will transfer from transmitter to the receiver. In case any pressure applied on the cable deformation will occur, the light intensity changes. It means some intruder stepped on the fiber cable. This information will be sent to the authorized person through IOT.

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