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Internet of Things based Embedded-Security E-Mailing System using MATLAB

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Abstract— **This paper illustrates the design of effective monitoring and theft control system for security lockers, industries, homes, bank lockers, jewellery outlets, etc. The security system detects the illegal entrance in the lokcer room that commonly happens in the case of the robberies. The major issue with current manually supervised security system is that if the robbery occurs then the locker rooms are unable to identify the robbers due to the lack of proof. This system will focus on the safety of the locker rooms in an effective way by detecting theft. In today's world the automation plays a very important role and the Security plays even a step ahead. As we heard a lot of security alerting systems(such as GSM, Biometric, etc...) at present and often hearing that MATLAB is just a Image / Video related Simulink and Signal Communication Tool, Here We try to communicate MATLAB with a stand alone Embedded Security System and Automated Mailing-IoT Monitoring with Spot Image Acquisition Technique.**

Index Terms— **AVR microcontroller, MATLAB M-IoT tools, LDR, PIR, bump sensor.**

I. INTRODUCTION

Now a days,the security of assets is the main concern of all the human beings. This paper aims at providing a confidential security system. To secure our expensive jewellery, important documents or cash, we used to have locker rooms.To survive in this competitive world and for a continuous growth, home lockers, ATM lockers, banking industries and other industries need to provide a high degree of security. Over the years, many engineering fields use the sensors together inorder to get better products and benefits. Obviously, it is a credible fact that inter disciplinary efforts would lead to success because each field would overcome the limitations of the other. So, by taking this as a motivation, an effort is made here to develop an alternative method to provide security. Here comes an assurances theft control design for bank locker systems and many other applications by using LDR, Switch, PIR, IoT with Spot Image Acquisition technology to send Email, etc.

Most of the recent developments in the field of security incorporate technologies like sensor networks[1], RFID [2], bar code [3], etc. Apart from these technologies, broad varieties of sensors like proximity sensor [4], SHT 11 (Temperature and Humidity sensor) [1], etc are also being implemented.However, most of the recent theft control schemes are relying on the face recognition [5] and TDMA. This provides low efficiency and requires algorithms using image processing techniques. This has greatly increased the complexity and the cost of enforcement. The CCTV cameras are used to monitor the unauthorized activities in security locker rooms. It needs to be monitored continuously by a person which is a very difficult work. Hence, in the view of more economical and a compact system for security, this design is put forward.

A prototype of this security system has been designed in the ascertainment to increase the level of security in the locker room effectively. The motion detection will be done by the use of PIR sensor which helps in identifying the person entering into the locker room and LDR detects the change in the light intensity. Mostly locker rooms are always dark and it helps to identify the person entering with light into the locker room.In this method, the bump sensor

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is used to detect the locker opening and it powers the AVR micro controller board. This indicates that the locker is open. The bump sensor circuit that is attached to the inner side of the locker, immediately detects any brisement or key entering from outside. The remaining circuit (AVR micro controller, and other hardware's) comes outside the locker and is invisible to the burglar as it lies behind the locker case. [6] discussed about Positioning Of a Vehicle in a Combined Indoor-Outdoor Scenario, The development in technology has given us all sophistications but equal amounts of threats too. This has brought us an urge to bring a complete security system that monitors an object continuously.

II. PROPOSED SYSTEM

The following section will tell us about the approach to the design to the required goals. The design of the security system has been shown in figure 1.

The figure shows that the system design contains various hardware modules. The primary module includes a camera for visual surveillance, a PIR sensor for motion detection, an LDR for light intensity detection, a bump sensor for theft detection and a CPU for sending the theft detection image through the email. The CPU is also connected to the microcontroller via serial port. Micro controller ATMEGA8 is connected to the chloroform filled solenoid valve to helps in making the burglar to an unconscious stage, alarming system to warning nearby security officials, and load is nothing but a bulb to light up the dark space. All the hardwares are properly interconnected with each other and insulated well to avoid short circuit issues.

III. SYSTEM IMPLEMENTATION

This section will illustrate about the workflow of the system and different program codes used for the implementation of the system.

A. LDR (Light Dependent Resistor):

The LDR is a resistor whose resistance varies inversely with the intensity of light incident on it. Its resistance can vary from 400 Ω (for 1000 LUX light) to as high as 10^7 Ω (for 10 LUX light). Therefore, even with a slight change in incident light intensity, there is a significant change in resistance, thus making the measurement reliable. It is provided on board to interface the board with the real world luminous intensity as the parameter. It is

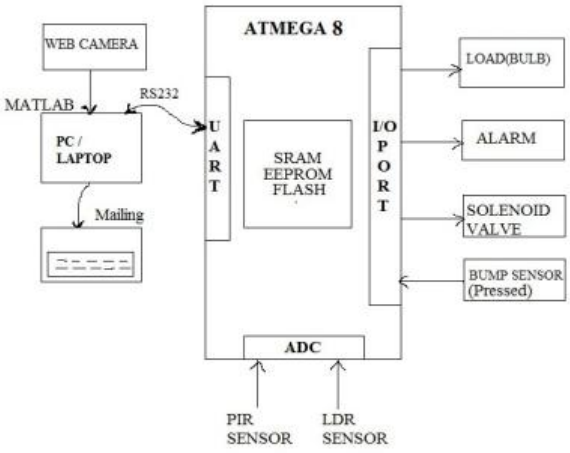

Fig. 1 Block Diagram of Embedded-Security E-Mailing System

connected in the lower half of a potential divider configuration with a 10K ohm resistor, so that the resistor-LDR junction voltage is inversely proportional to the amount of light incident on it.

B. Relay:

The relay being used is a 230V / 2A relay and is an electromechanical relay. The excitation voltage required is +12V DC. It is driven using the relay driver IC ULN2003/VLN 2003A. When the relay is excited by applying the 12V DC, it gets activated and in the process turns ON the device.

C. PIR sensor:

The PIR (Passive Infra-Red) Sensor is a pyroelectric device that detects motion by measuring changes in the infrared levels emitted by surrounding objects. This motion can be detected by checking for a high signal on a single I/O pin.

D. Bump Sensor:

Bump sensors are used to pull high on a logic pin (commonly found on a Microcontroller) when pressed. They are similar to buttons, but are useful for sensing a wall or an object.

This sensor works by acting as a SPST switch. When the "whisker" bumps into a turning off the motor. By attaching these mechanical bumpers to you robot the whiser will bump something before your robot crashes

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into it. The sensor has a 3-pin header which connects directly to the Bot Mainboard via female to female jumper wires. Use the included Bot library to make sure your robot never crashes into anything again.

Fig. 3(a) LDR.

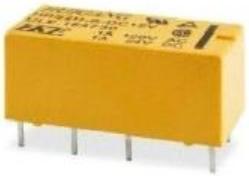

Fig. 3(b) Relay.

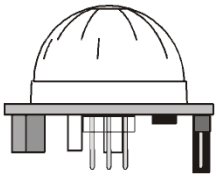

Fig. 3(c) PIR.

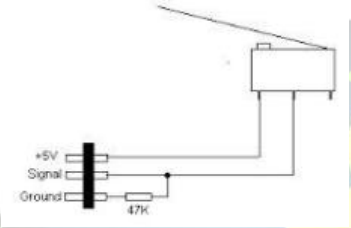

Fig. 3(d) Bump Sensor.

E. ATMEGA8 Board:

A monitoring and protection circuit for 1-cell and 2-cell Li-ion applications that require high security and authentication, accurate monitoring, low cost, and high utilization of the cell energy. The microcontroller includes 8KB self-programming flash program memory, 512-Bytes SRAM, 256-Bytes EEPROM, 1 or 2 cells in series, over-current, high-current and short-circuit protection, 12-bit voltage A/D converter, 18-bit coulomb counter current A/D converter, and debugWire interface for on-chip debug.

Fig. 3(e). ATMEGA8 Board

Accurate accumulated current measurements using an 18-bit ADC with a resolution of 0.84??V. It also supports up to 4 MIPS throughput at 4MHz. 1.8 - 9V operation.

F. Flow chart:

Figure 3(f) shows the basic flowchart of the system. The first step the motion detection will be done by the use of PIR sensor which helps in identifying the person entering into the locker room then move on to the LDR. LDR detects the change in the light intensity. Mostly locker rooms are always dark and it helps to identify the person entering with light into the locker room and the bump sensor is used to detect the locker opening and it powers the AVR micro controller board. AVR micro controller activates the solenoid valve, bulb, web camera and alarm each are particular time delay . The board is pre-programmed in such a way that it captures the image and sends a Email to the account holder and concerned officials through the MATLAB-IoT that is interfaced serially.

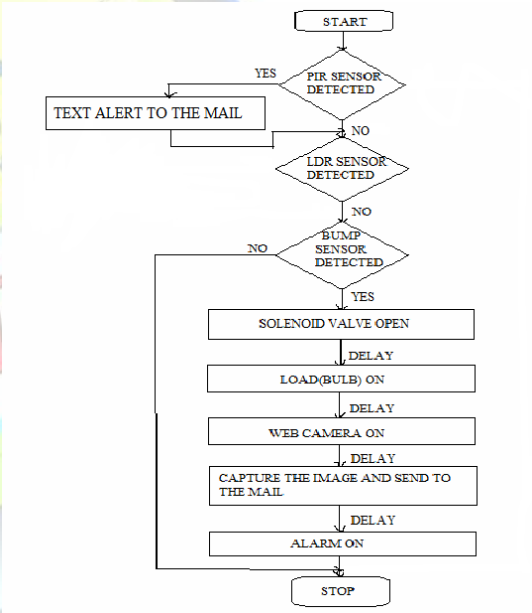

Fig. 3(f). Flow Chart

IV. RESULT

The proposed system helps in preventing the theft at the locker room. The Fig .4(a)shows the hardware after disturbing the bump sensor placed on the locker by a burglar.When the bump sensor detects the disturbance,the microcontroller is activated and the lamp connected to it is blown to figureout the image of the burglar by the web camera.

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The microcontoller is programmed that the mail is sent with the details of the detction of LDR in such a way that if the light is sensed by LDR ,the controller adds a subject as “The locker trashed with light” and if the light is not detected adds “The locker trashed without light” with the mail.The indication for the detection of each and every sensor module is programmed in the microcontroller.The codings for the opening of solenoid valve,capturing the image by the web camera and sending the captured image of burglar to the specified mail adresses are preprogrammed in the microcontroller board.

The microcontroller is also programmed to operate the alarm at the final stage to inform the nearby security system about the entrance of burglar in the locker room.

The Fig 4(b) shows the mail with the subject as “The locker trashed with lithe image of the burglar captured by the web camera connected to the microcontroller.

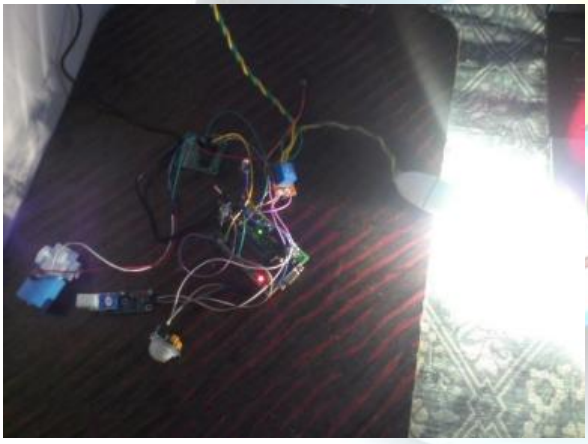

Fig. 4(a). Snapshot of Hardware Result

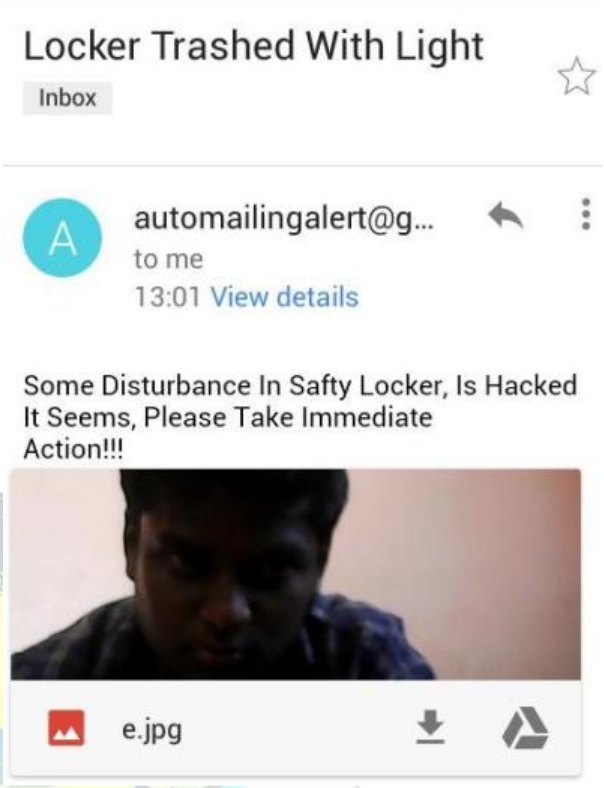

Fig. 4(b). Snapshot of Email Result

V. CONCLUSION

This paper presents a low cost and highly secured system for the locker room areas. The system will focus on the protection of the locker rooms in an effective way by detecting and controlling the theft. The proposed security system visual surveillance algorithm has been implemented for motion detection on the host computer and the resulting image data has been communicated to client side computers for web based monitoring through local area network (LAN). In this system a sensor network for theft detection and a CPU for sending the theft detection image through the email. Micro controller that sets the chloroform filled solenoid valve to helps in making the burglar to an unconscious stage and alarming system to warning nearby security officials. The proposed security system has advantages over the current security system like low cost, convenience, simple process, low communication cost and easy on time investigation.

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VI. FUTURE WORK

There are several methods by which proposed method can be improvised such as, the development of android application which gives alarm when the user doesnot notify the alert. The magnetic door doesnot allows the theif to get outside the room and the chloroform ejected immmediately to drowse the theif.

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