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Low Cost Mobile Phone based Remote Home Monitoring and Security System

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Abstract: In this contemporary era home security has becoming a mammoth problem for everyone duty the hectic job schedule and nuclear family. Safety from theft, leaking of raw gas and fire are the most important requirements of home security system for people. A traditional home security system gives the signals in terms of alarm. However, the GSM based security systems provides enhanced security as whenever a signal from sensor occurs, a text message is sent to a desired number to take necessary actions. This paper focuses on the energy optimization and monitors the home using mobile phone with minimum cost. Proposed system is safe, secure, reliable, affordable and easy to use.

Keywords: GSM, Microcontroller, SMS, Home Security and Monitoring

1. Introduction

This paper suggests and efficient low cost remote home monitoring and security system by using the web camera and mobile phone [2-3]. We can easily supervise our house through our mobile phone. Smart Home can be also known as Automated Home or intelligent home which indicates the automation of daily. This paper mainly focuses on the security of a home when the user is away from the place. Fig. 1, and Fig. 2 show the IOT base application for the home automation [1].

Figure 1: Mobile Phone base Remote Home Monitoring

The second security system is SMS based and uses GSM technology to send the SMS to the owner.

Figure 2: Smart Home System

The proposed system is aimed at the security of Home against Intruders and Fire. In any of the above cases happens while the owners are out of their home then the device sends SMS to the emergency number which is provided to the system [4-5]

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2. Hardware and Software Requirement

- Microcontroller Unit
- GSM Module Unit
- Android Applications

4. Flowchart:

A model of smart home is prepared using low cost materials like acrylic, plywood *etc*., having sufficient strength as shown in Fig. 3 to test the prototype of developed system. It consists of various sensors like IR, temperature sensor, gas sensors, light sensor etc. Home appliances like LED lights and fans are also connected to make the home energy efficient.

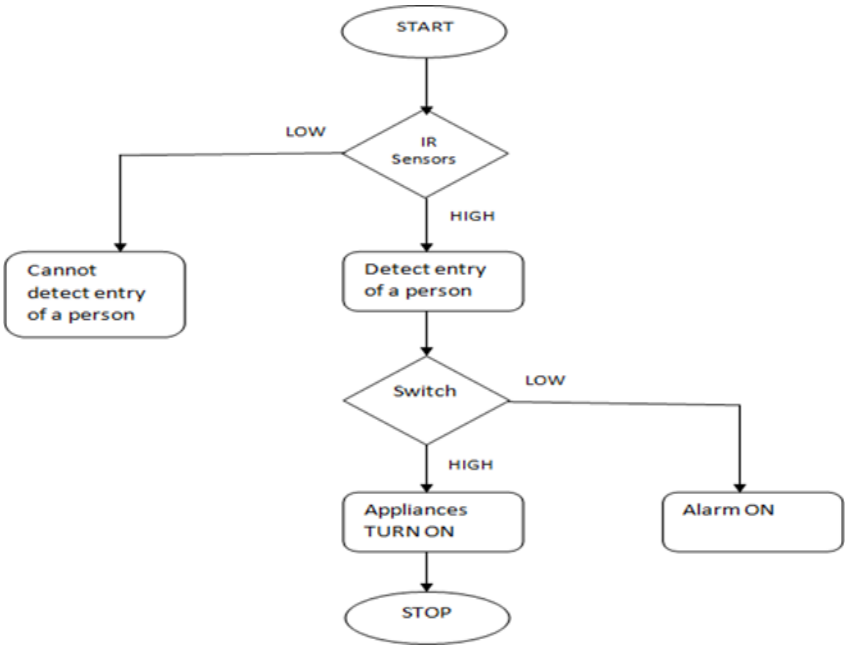

Figure 3: Arduino based Circuit Design for Home Automation

3. Circuit Design:

As the system is SMS based, there is no need to have extra circuitry to transmit SMS. Mobile networks are used for transmission. It is very cost effective, as day by day the cost of SMS is reducing. The paper is motivated by a need of increasing cost of data channel and unavailability of high speed data channel around the interior place; this surveillance system is very effective and powerful, using the latest technology artificial intelligent made this robust and cost effective due to data flow optimization technique. We can say it is cost-free implementation of security surveillance system. Learning and understanding all the underlying concepts thereby, also forms a subset of the motivation. Anyone finding the need to keep a watch on security through remote location is a potential customer of the product. To provide better security and safety new designs are implemented and also that are cost effective and to make it better further research is going on Fig. 4.

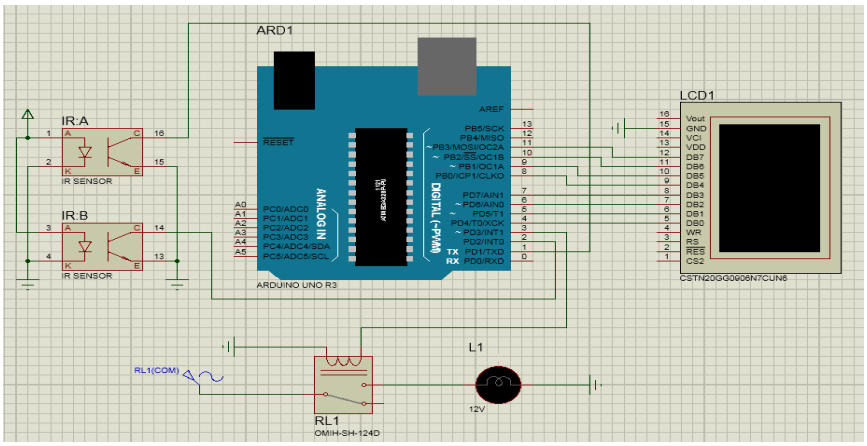

Figure 4: Arduino based Circuit Design for Home Automation

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4. Command Line:

- The following code snippet is the constructor for a class called
  RosTensorFlow():
  *class RosTensor*Flow():
  classify_image.maybe_download_and_extract()
  Now, we are creating a TensorFlow Session() object, then creating a graph from a saved GraphDef file, and returning a handle for it. The GraphDef file is available in the code bundle.
  Self._session = tf.Session()
  classify_image.create_graph()
- This line creates a cv_bridge object for the ROS-OpenCV image conversion:
  self._cv_bridge = CvBridge()
- Here are the subscriber and publisher handles of the node:
  self._sub = rospy.Subscriber('image', Image, self.callback,queue_size=1) self._pub = rospy.Publisher('result', String, queue_size=1)
- Here are some parameters used for recognition thresholding and the number of top predictions:
  self.score_threshold = rospy.get_param('~score_threshold', 0.1)
  self.use_top_k = rospy.get_param('~use_top_k', 5)
- Here is the image call back in which a ROS image message is converted to OpenCV data type:
  def callback(self, image_msg):
  cv_image = self._cv_bridge.imgmsg_to_cv2(image_msg, "bgr8")
  image_data = cv2.imencode('.jpg', cv_image)[1].tostring()
- The following code runs the softmax tensor by feeding image_data as input to the graph. The 'softmax:0' part is a tensor containing the normalized prediction across 1,000 labels.
  softmax_tensor = self._session.graph.get_tensor_by_name('softmax:0')
- The 'DecodeJpeg/contents:0' line is a tensor containing a string providing JPEG predictions = self._session.run(
  softmax_tensor, {'DecodeJpeg/contents:0': image_data}) predictions = np.squeeze(predictions)
- The following section of code will look for a matching object string and its probability and publish it through the topic called /result:
  node_lookup = classify_image.NodeLookup()
  top_k = predictions.argsort()[-self.use_top_k:][::-1]
  for node_id in top_k:
  if score > self.score_threshold:
  rospy.loginfo('%s (score = %.5f)' % (human_string,score))
  self._pub.publish(human_string)

Result:

$ rostopic echo /result

- we can view the camera images using following command:
  $ rosrun image_view image_view image:= /cv_camera/image_raw
- Here is the output from the recognizer. The recognizer detects the device as a cell phone.

5. Working Model:

The proposed systems are tested on the model of smart home (which is shown in Fig. 5). The web camera based security system detects the motion and sends email to the home owner. The system is very simple and easy to use. There are various parameters which can be adjusted in this software. Streaming of videos is also possible with this software.

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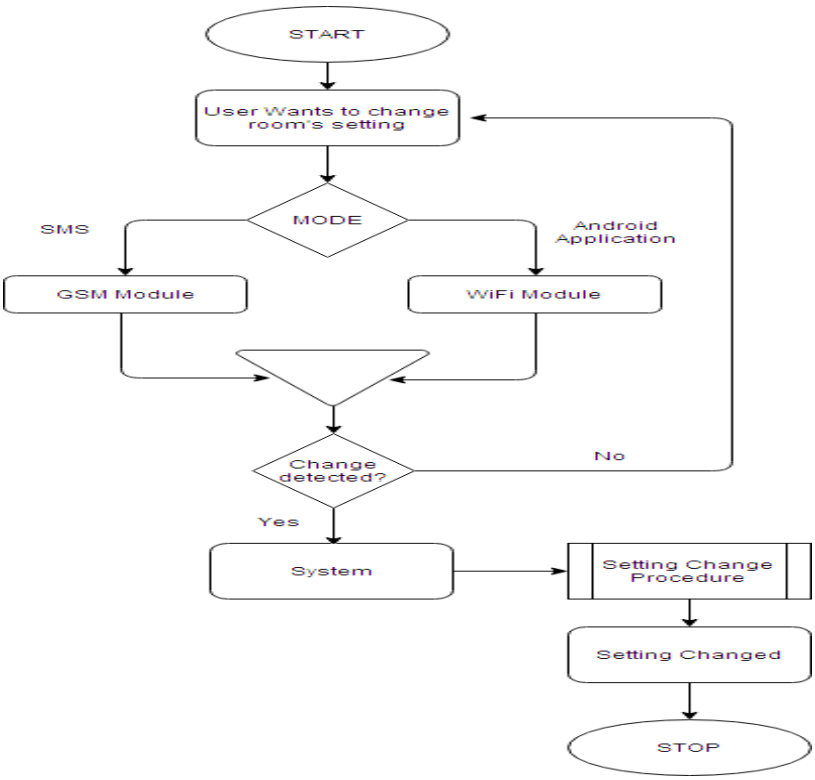

Figure 5: Input Process of Model

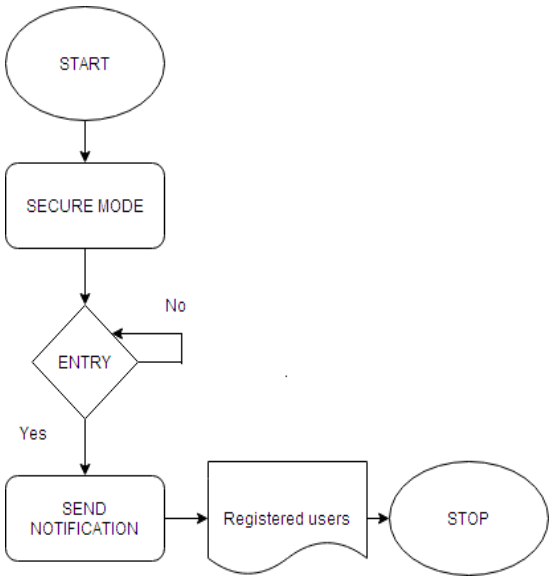

Figure 6: Output Process of System

The developed GSM based security system gives good response to the sensor and sends SMS when it detects the fire or temperature is increased above desired level or detection of intrusion at the windows. The time taken by the system to deliver the SMS is dependent on the coverage area or range of the specified mobile network. If the mobile is in the range of the system then the SMS is delivered in 25-30 seconds [5]. Input communication is shown in figure 5 and output shown in figure 6.

6. Results and Discussions

As the system is SMS based, there is no need to have extra circuitry to transmit SMS. Mobile networks are used for transmission [6]. It is very cost effective, as day by day the cost of SMS is reducing. The paper is motivated by a need of increasing cost of data channel and unavailability of high speed data channel around the interior place; this surveillance

system is very effective and powerful, using the latest technology artificial intelligent made this robust and cost effective due to data flow optimization technique. We can say it is cost-free implementation of security surveillance system [8]. Learning and understanding all the underlying concepts thereby, also forms a subset of the motivation. Anyone finding the need to keep a watch on security through remote location is a potential customer of the product. To provide better security and safety new designs are implemented and also that are cost effective and to make it better further research is going on.

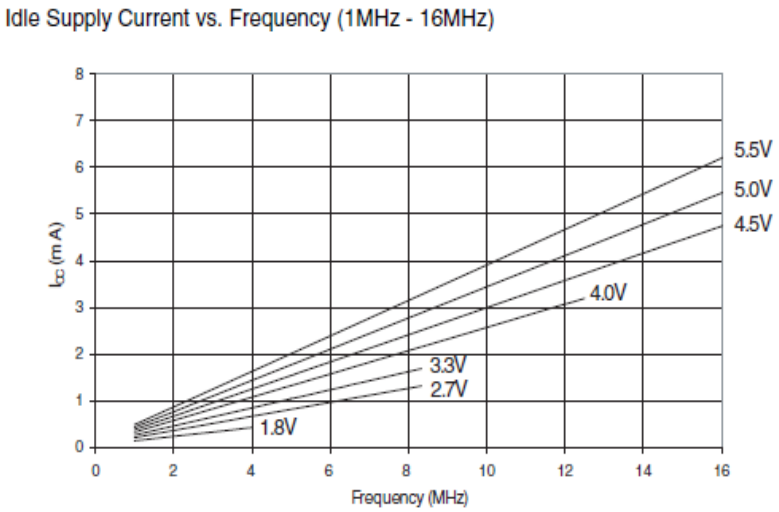

Figure 7: Idle Supply Current Vs Frequency

Actual Distance (cm)	System Detected Distance (cm)
20	21
25	24
30	30
35	35
40	40.2
45	44.1
50	50.1
55	54.8
60	60.1
65	65.3
70	69.6
75	75.2
80	80.2
85	85.3
90	90.1
95	96
100	99.2

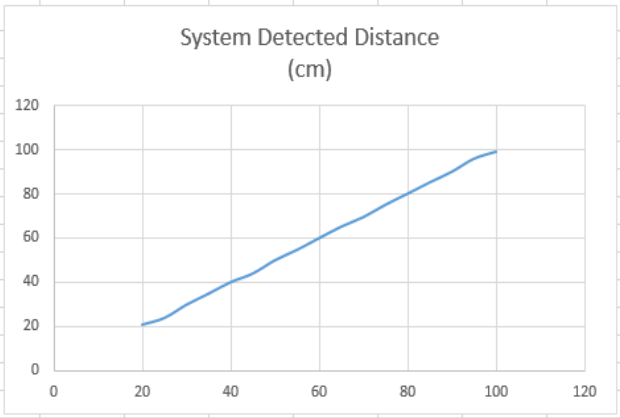

Figure 8: System Detected Distance

Capturing the image analysis provides smart surveillance systems with. Remote video verification may help in many everyday situations. In almost all these cases one could of course set up a video monitoring system that allows remote video verification. Another novelty is the encoding method, which was specially implemented for the system. This method bases artificial intelligent deep learning method which is based on neural network. For the selected region of interest in the specified resolution [7]. It does not need extensive installation, it does not required specialized components, it can be set up anywhere where site deserve to surveillance and some common hardware available. In our solution, the server application works on off-the-shelf PCs and uses USB cameras for image acquisition. Due to this, the user can access on already-owned hardware. Any Windows based PC may become a server, any USB/integrated camera can be used for image acquisition.

In practice however the memory usage and processing power scale linearly with each added camera and at some point a limit will be reached. The system was tested with 4 cameras at the most, which can be considered a reasonable amount, especially taking into account the limits on cable length for USB connection. The Android application has to be able to connect to the server PC, retrieve images from any chosen camera and display them on the mobile device screen.

7. Conclusion:

Proposed system could be the control of lights, fans, viewing of the house interiors for surveillance purposes or giving the alarm alteration or indication in case of gas leakage. Home security has changed a lot from the last century and will be changing in coming years. Security is an important aspect or feature in the smart home applications. The new and emerging concept of smart homes offers a comfortable, convenient, and safe environment for occupants. Conventional security systems keep homeowners, and their property, safe from intruders by giving the indication in terms of alarm. However, a smart home security system offers many more benefits.

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