Kingdom of Saudi Arabia
Majmaah University
Ministry of Higher Education
College of Science Al Zulfi

المملكة العربية السعودية
جـامعـة المـجمـعة
وزارة التعليم العالي
كلية العلوم بالزلفي

Motion Detection Security Camera

Graduation Project

Submitted in partial fulfillment of the requirements for the award of
Bachelor degree of the Majmaah University
(Semester 1, 2018-19)

Submitted by:
Abdullah Suleiman Alhaydan

Under the supervision of:

Dr. Mafawez Alharbi

Abstract

Traditional security systems store all what cameras capture, this increases the load on storage devices and makes security employees do large effort while monitoring continuously all what is displayed on screens, or it makes security employees get back later to all video that has been stored and revise them. Therefore, it is necessary to have an application which is capable to set off an alarm when motion happened in front of any camera, this can be implemented by grabbing a frame of a real-time video every short period of time, for example every second, then comparing this frame with a previous frame, if there is any motion in front of the camera, the frames must be different and an event has been happened, then the application can set off an alarm or send an SMS which let the security employees pay attention to the event, as well as the application can store the images which contain the events or start recording video to document this events.

Developing an application that can set off alarm or send email when it detects motion In real-time video, where each video frame is compared to a previous frame. If there is any motion, the sequent frames must be different. The program take a picture and convert from RGB to gray to minimize the size then enhance the picture to like in real then show it to the user to see the different .

Acknowledgements

Thanks to the Department of computer Science & Information Head for his support to the graduation project unit . And would like to thank Dr. Mafawez Alharbi for his supervision and guidance to finish this work in proper way.

MAJMAAH UNIVERSITY,
COLLEGE OF SCIENCE AL ZULFI,
DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION

(CERTIFICATE BY STUDENT)

This is to certify that the project titled "*Motion Detection Security* Camera" submitted by me (Abdullah Suleiman Alhaydan, 341101433) under the supervision of Dr. Mafawez Alharbi for award of Bachelor degree of the Majmaah University carried out during the Semester 1, 2018-19 embodies my original work.

Signature in full: ----------

Name in block letters:ABDULLAH SULIMAN ALHAYDAN

Student ID: 341101433

Date: 22/11/2018

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Chapter 1

1.1 Introduction

Traditional security systems store all what cameras capture, this increases the load on storage devices and makes security employees do large effort while monitoring continuously all what is displayed on screens, or it makes security employees get back later to all video that has been stored and revise them. Therefore, it is necessary to have an application which is capable to set off an alarm when motion happened in front of any camera, this can be implemented by grabbing a frame of a real-time video every short period of time, for example every second, then comparing this frame with a previous frame, if there is any motion in front of the camera, the frames must be different and an event has been happened, then the application can set off an alarm or send an SMS which let the security employees pay attention to the event, as well as the application can store the images which contain the events or start recording video to document this events.

1.2 Problem definition

Normal security systems store all videos that have been captured by cameras, so it is difficult in some situations to detect unusual events because of large number of cameras which in turn exceeds the capability of human operators to watch them, as well as the process of saving all the captured videos consumes large capacity of memory to store them, and the process of revising the stored video could be late to react to the events.

1.3 Goals:

1- Developing an application can set off an alarm or send SMS when detect any motion in front of cameras

2- Developing an application can document the unusual events as images or video as well as documenting the date and the time of these events.

3- Increasing the security systems efficiency by decreasing the needed memory capacity to store the real-time videos as well as reducing the employees burden in monitoring the real-time videos.

1.4 feasibility study:

1. ما رأيك بفكرة المشروع

			إجمالي الإجابات	نسبة الإجابات
1	ممتازة		6	60.00%
2	جيدة إلى نوع ما		4	40.00%
3	جيدة		0	0.00%
4	سيئة		0	0.00%
			10	تم الإجابة عليه
			0	تم تخطيه

تحليل						
	متوسط:	1.4	انحراف معياري:	0.49	معدل الرضا:	13.33
	اختلاف:	0.24	خطأ معياري:	0.15		

2. هل سيحقق المشروع النجاح

			إجمالي الإجابات	نسبة الإجابات
1	نعم		7	70.00%
2	ممكن		3	30.00%
3	لا		0	0.00%
			10	تم الإجابة عليه
			0	تم تخطيه

تحليل						
	متوسط:	1.3	انحراف معياري:	0.46	معدل الرضا:	15
	اختلاف:	0.21	خطأ معياري:	0.14		

3. فائدة التطبيق للمجالات المستخدمة له

			نسبة الإجابات	إجمالي الإجابات
1	مفيد		80.00%	8
2	نوع ما		20.00%	2
3	غير مفيد		0.00%	0
			تم الإجابة عليه	10
			تم تخطيه	0

تحليل

متوسط:	1.2	انحراف معياري:	0.4	معدل الرضا:	10
اختلاف:	0.16	خطأ معياري:	0.13		

4. هل سيحقق التطبيق النجاح

			نسبة الإجابات	إجمالي الإجابات
1	نعم		100.00%	10
2	لا		0.00%	0
			تم الإجابة عليه	10
			تم تخطيه	0

تحليل

متوسط:	1	انحراف معياري:	0	معدل الرضا:	0
اختلاف:	0	خطأ معياري:	0		

5. هل سيقلل التطبيق من عمليات السرقة والتخريب

			إجمالي الإجابات	نسبة الإجابات
1	نعم بشكل كبير		6	60.00%
2	نعم		3	30.00%
3	ممكن		1	10.00%
4	لا		0	0.00%
			10	تم الإجابة عليه
			0	تم تخطيه

تحليل

متوسط:	1.5	انحراف معياري:	0.67	معدل الرضا:	16.67
اختلاف:	0.45	خطأ معياري:	0.21		

6. هل التطبيق قابل للتطوير في المستقبل

			إجمالي الإجابات	نسبة الإجابات
1	نعم		10	100.00%
2	لا		0	0.00%
			10	تم الإجابة عليه
			0	تم تخطيه

تحليل

متوسط:	1	انحراف معياري:	0	معدل الرضا:	0
اختلاف:	0	خطأ معياري:	0		

7. هل ممكن بيع التطبيق

			إجمالي الإجابات	نسبة الإجابات
1	نعم		9	90.00%
2	لا		1	10.00%

تحليل	متوسط:	1.1	انحراف معياري:	0.3	معدل الرضا:	10
	اختلاف:	0.09	خطأ معياري:	0.09		

تم الإجابة عليه	10
تم تخطيه	0

1.5 Work plan

Task		Weeks						
		1-2	3-4	5-6	7-8	9-10	11-12	13-14
1-management								
2-requirement								
3-design								
4-coding								
5-testing								
6-evaluation								

Chapter 2: Theoretical background

2.1 Digital image

A digital image is considered as a two dimensional array of pixels , each pixel is used to represent a single color consist of three values, where each value represent a degree of one of the following colors: red, green and blue (RGB), each value varies between 0-255. This means that each pixel can give a color combination of 256 x 256 x 256 which is over 16.7 million different colors. Image processing can be used to change digital images appearances by changing the image's pixel data. For example a colored image can be turned into a grey scaled image. Pixels

in a grey scaled image uses one data value which defines the intensity of white light, the range of the value is between 0-255 where 0 is black and 255 is white. [2]

2.2 Computer vision

Computer vision (CV) is one of computer science areas which focuses on making computers capable of interpreting images. Computer vision can be applied in many areas such as in motion detection and object tracking.[3]

2.3 Motion detection

Motion detection can be used for the purpose of automatically executing a task when motion occurs. Motion detection through image processing can be done by comparing the pixels at the same positions between two images with each other by. If the images are the same it means that each difference between every corresponding two pixels are 0. But if the images are different the difference between some pixels will not be 0. [4]

Chapter 3: Overall Description

This section will show an overview of the entire system. The system will be explained in its context to show how the system interacts with other systems and describe the basic functionality of it.

3.1. Product Perspective

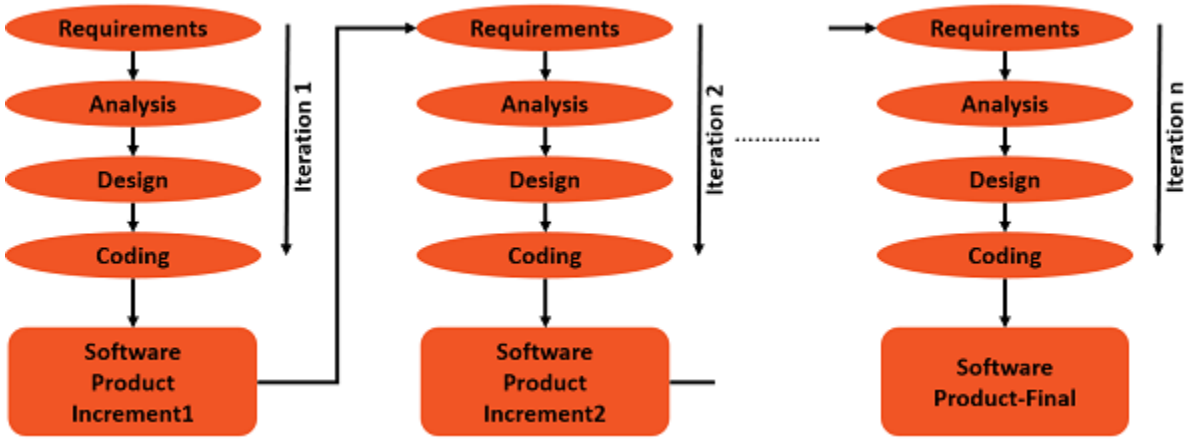
Everyone can use this product for the purpose to preserve an area such as a house or a bank from the intruders. Actually this product provides an motion detection system through image processing by producing alarms.

3.2. Product Functions

The product will take real-time video from a camera. After detecting motion in the real-time video the product will start alarm and send SMS to notify the home owner or the security employee. The product will make some other actions when motion is detected, it can store the image of the event that causes the motion or it can start recording a video.

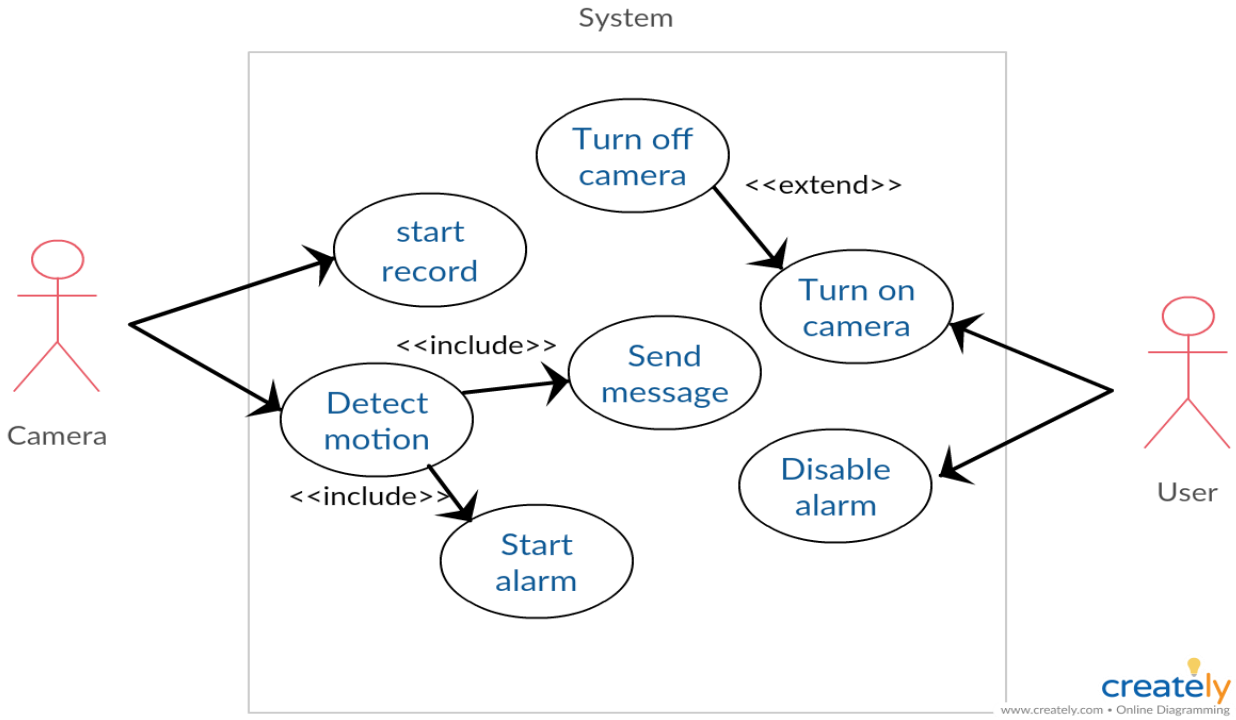
3.3 Project Process Model

The process model that has been using in this project is the iterative model, An iterative live cycle model does not specify the entire system requirements at the beginning of the software development. Instead, it specifies and implements just part of the software, which can then be reviewed in order to identify further requirements. This process is then repeated, producing a new version of the software for each cycle of the model.[5]

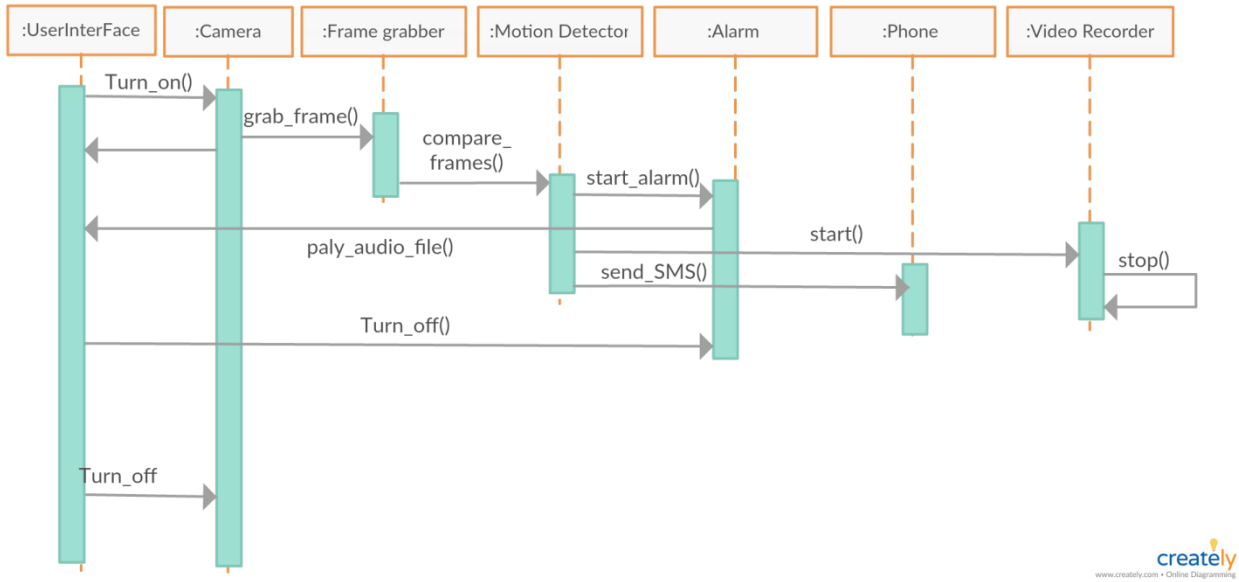


3.4 System UML diagram

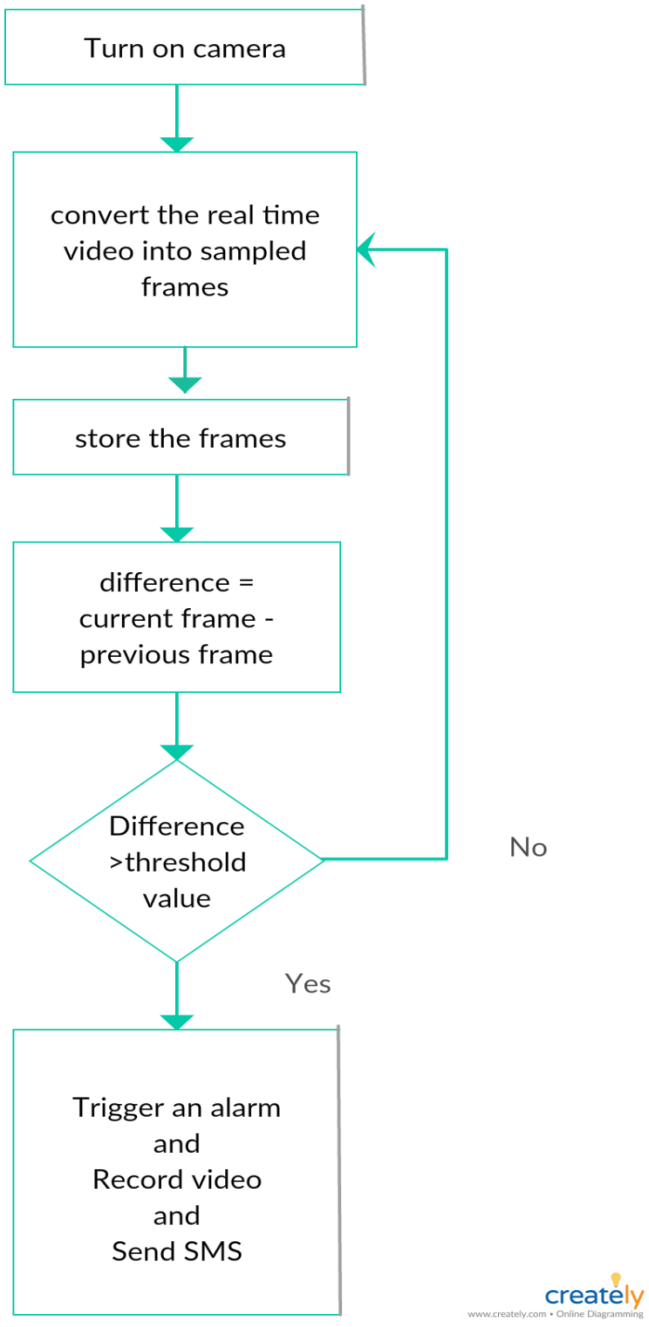
3.4.1 Use Case Diagram



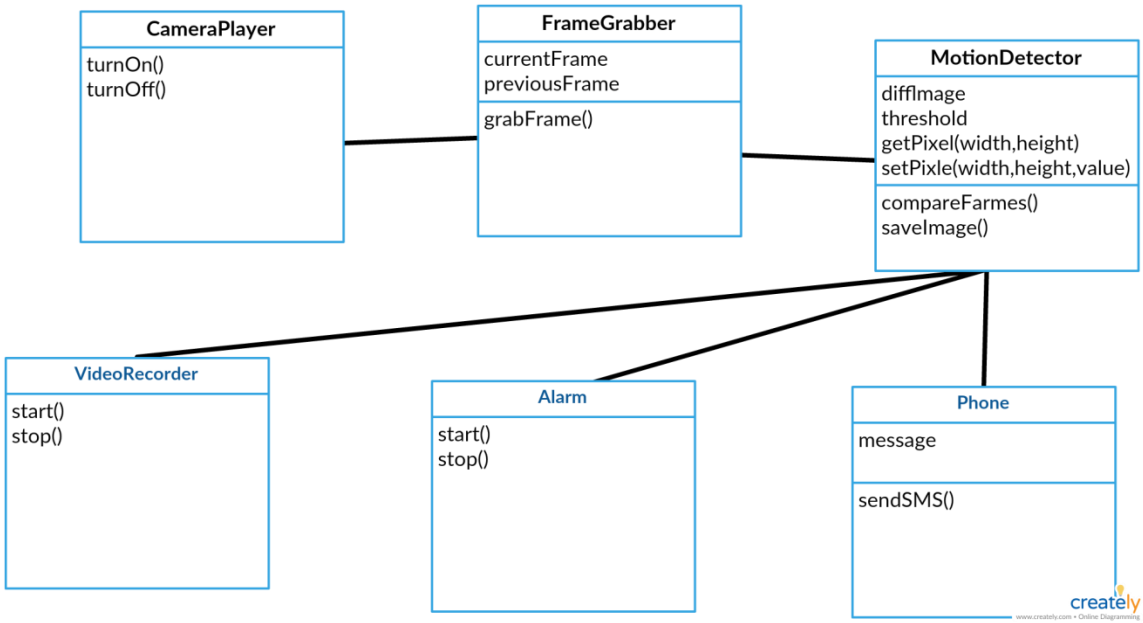
3.4.2 Sequence Diagram



3.4.3 Data Flow Diagram

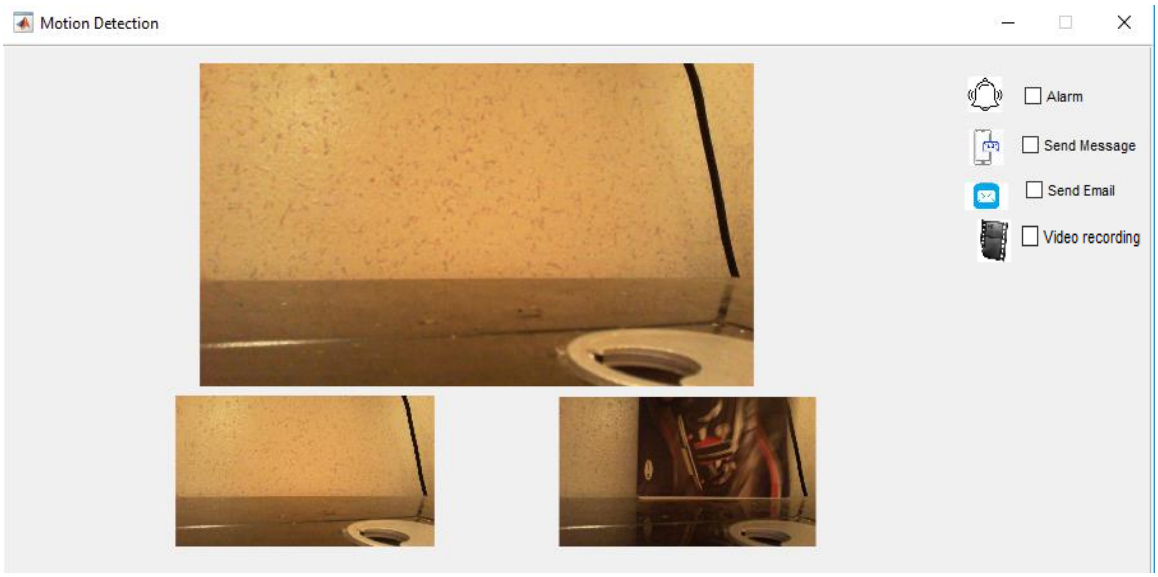


3.4.4 Class Diagram



3.5 Interface Requirements

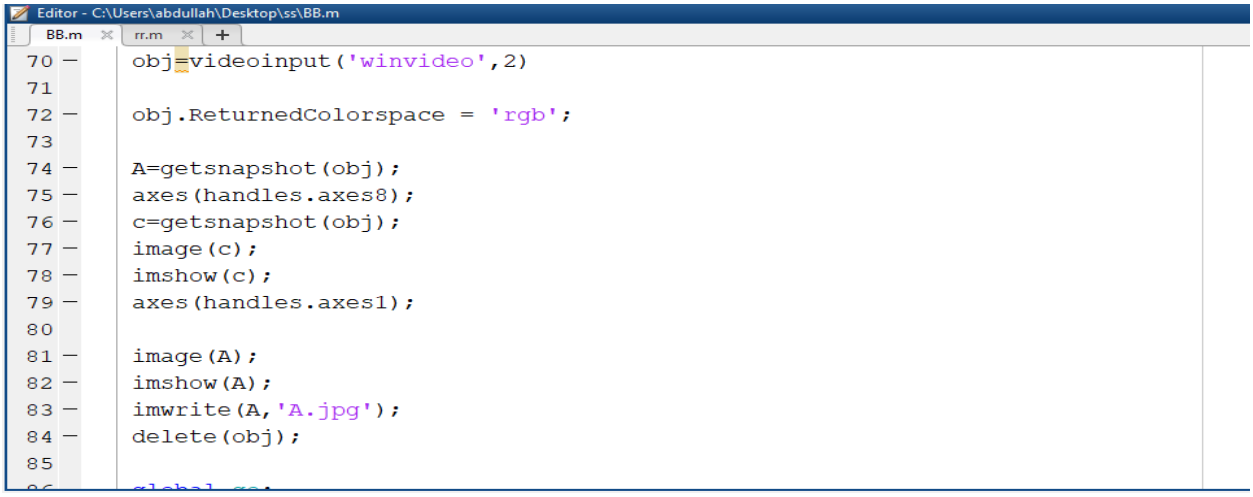
The product has one interface page has a frame to show the real-time video captured by camera as well as some buttons to turn on or turn off the camera and stop the alarm and to send messages as shown below.



3.6 Functional Requirements

3.6. 1 Frames Grabbing

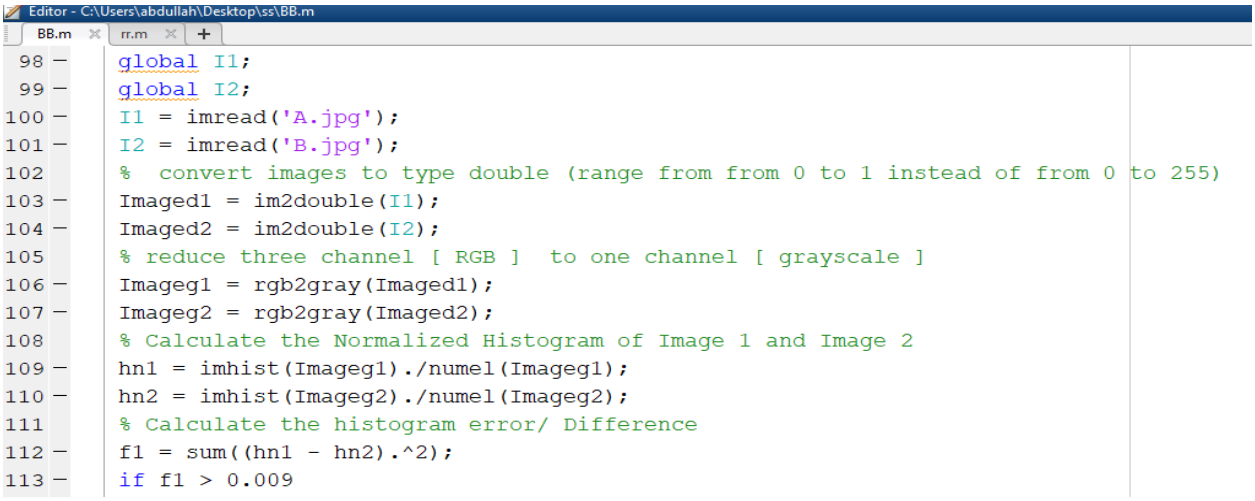
Initially a video is displayed as a series of frames from a camera for traditional monitoring, while displaying the video, a frame is grabbed automatically each a period of time depends on the required processing time.



this is the code for the task

3.6.2 Frames Comparing

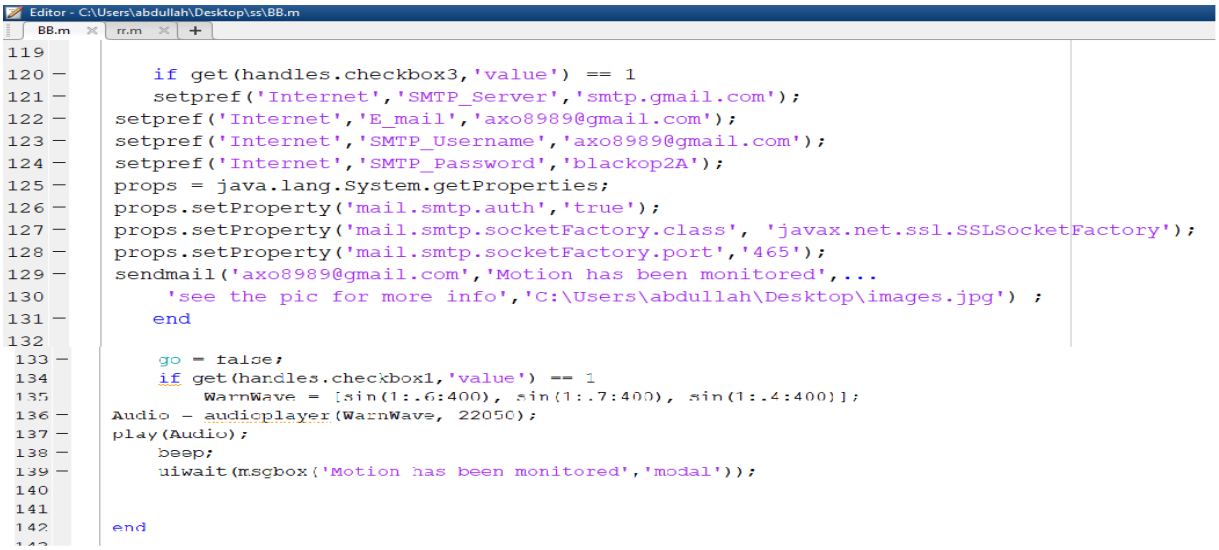
The current frame is simply subtracted from the previous frame, and if the difference in values for a given pixel is greater than a threshold value, the pixel could be part of an moving object in the scene. If there is enough number of these pixels, this means motion has been happened.



this is the code for the task

3.6.3 Alarming and sending an SMS.

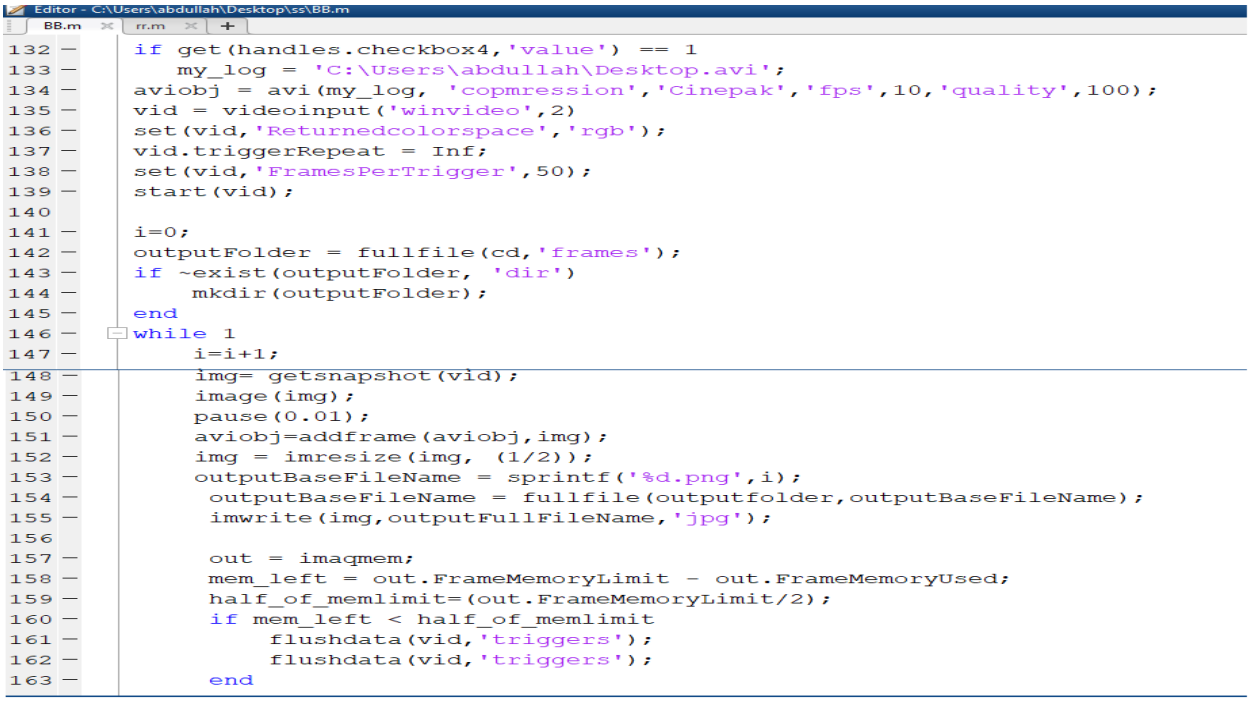
When there is motion in the scene, the product concludes that an intruder and it is necessary to alert the home owner or the security employee by starting Alarm and sending SMS to the responsible person.



this is the code for the task

3.6.4 Recording a video of an event

In addition to the alert , the documentation of the event is required, this will be done by recording short video as well as by storing the image that contains the moving objects.



this is the code for the task

Conclusion

We have described a camera surveillance system using motion detection , The proposed algorithm efficiently detects the intruder its motion. This algorithm integrates the motion detection task for better performance. The proposed algorithm is also supported by the simulation results obtained from practical hardware implementations. The application also informs the user that there is a movement by issuing a beep and sending a message to the email along with the image in which the action occurred. The application then records a video clip for a minute to see what happened.

Future Work

It is possible to develop the program in the future so as to alert the user that there is movement when only the event is unusual or likely to pose a risk when recognizing the movement.
It also develops the system by adding more than one camera to the system and informing the user of any camera in which the change occurred.

Reference

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