

Provisional Application for Patent Cover Sheet					
This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c)					
Inventor(s)					
Inventor 1					<input type="button" value="Remove"/>
Given Name	Middle Name	Family Name	City	State	Country
Erez		Galil	Sunnyvale	CA	
All Inventors Must Be Listed – Additional Inventor Information blocks may be generated within this form by selecting the Add button.					<input type="button" value="Add"/>
Title of Invention		Content Based Dynamic Range Correction			
Attorney Docket Number (if applicable)		MZCO08020			
Correspondence Address					
Direct all correspondence to (select one):					
<input checked="" type="radio"/> The address corresponding to Customer Number			<input type="radio"/> Firm or Individual Name		
Customer Number			76331		

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.	
<input checked="" type="radio"/> No.	
<input type="radio"/> Yes, the name of the U.S. Government agency and the Government contract number are:	

Apple Inc. v. Qualcomm Incorporated

IPR2018-01251

Qualcomm Ex. 2003

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Entity Status

Applicant claims small entity status under 37 CFR 1.27

☐ Yes, applicant qualifies for small entity status under 37 CFR 1.27☒ No**Warning**

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

Signature

Please see 37 CFR 1.4(d) for the form of the signature.

Signature	/Aditya Krishnan/			Date (YYYY-MM-DD)	2009-12-09
First Name	Aditya	Last Name	Krishnan	Registration Number (If appropriate)	41531

This collection of information is required by 37 CFR 1.51. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **This form can only be used when in conjunction with EFS-Web. If this form is mailed to the USPTO, it may cause delays in handling the provisional application.**

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6. A record in this system of records may be disclosed, as a routine use, to a n other federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Title: Content based dynamic range correction

Question 1)

What is the "Advance In The State Of The Art" offered by the new concept? In other words, why is the new concept better than current methods? To answer this question:

- a) Provide a short description of the problem addressed by the new concept;
- b) Provide a short description of how the problem is currently addressed;
- c) Provide a short description of how the new concept addresses the problem;
- d) Define the Advance In The State Of The Art offered by the new concept

Answer 1)**(a) The Problem Being Addressed**

The image sensor in a digital still camera (DSC) has a limited dynamic range, this prevents from capturing all the information in a scene. For example, taking a picture of a person standing in the shade in front of an bright open window -- in this situation, the sensor cannot capture both the details of the bright view coming through the window and the details of the Person face (in the shade). In situations, where the sensor lacks in dynamic range, it is necessary to compensate for the lack of dynamic range by adjusting the exposure time and/or employing dynamic range compression/enhancement methods.

The problem being addressed is that in situations in which the sensor has limited dynamic range, the images captured lack in details which are important to the end user (such as the person face). The reason is that cameras do not consider image content (such as human face) when deciding on the method and amount of correction for the image sensor's dynamic range problem. Not considering the content delivers images which lacks in details which are important to the end user.

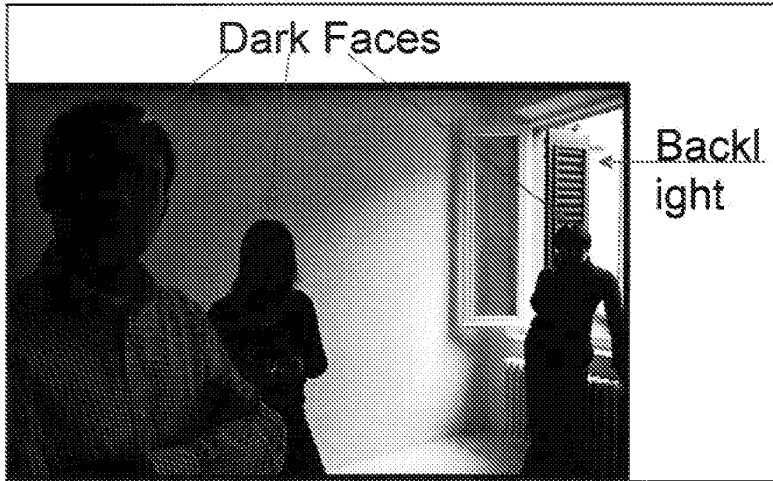


Figure 1: Situation with dynamic range problem causes content loss (dark faces)

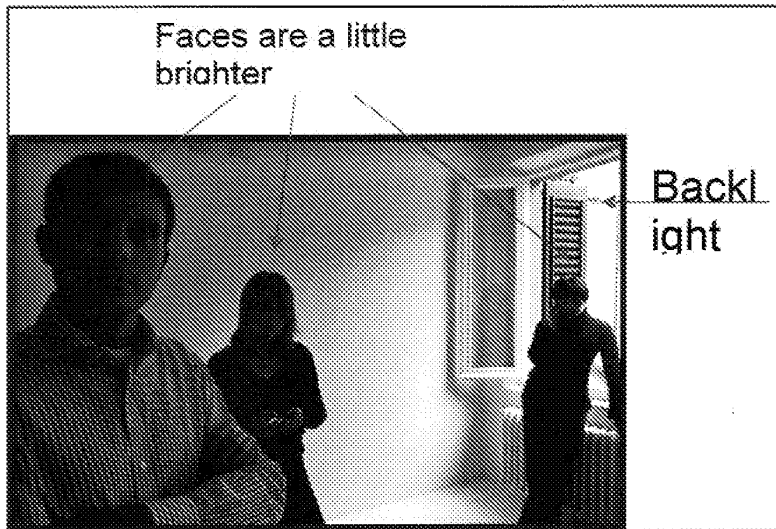


Figure 2: Image after dynamic range compression, faces are more visible, but still too dark

(b) How The Problem is Currently Addressed

Currently, the problem is being addressed by adjusting the exposure of the sensor and/or employing dynamic range compression/enhancement correction methods. The current method for handling the problem does not take into consideration the content of the image, for example – showing the details of a face in the foreground should have higher priority over showing the details of view in the background.

(c) How The New Concept Addresses The Problem

The new concept identifies important content, such as faces using Face Detection. The location of the faces is using to determine dynamic range correction methods and amount.

For example, using the location of a dark face to determine the exposure time, the exposure will be adjusted so that the face is bright and visible. This might come on account of losing information in the image highlights (saturation).

Another example, is adjusting the dynamic range compression (Z-light) parameters so that the face is gained up digitally. In this case, the face is bright and visible without causing loss of information in the highlights (saturation).

(d) The Advance In The State Of The Art Offered By The New Concept

The advanced in the state of the art offered by this new concept is the use of image content to determine methods and amount of dynamic range correction. For example, detecting dark faces and brightening them (using dynamic range correction) when needed to achieve a more pleasing image with visible content which is important to the end user.

Question 2)

What benefits does the new concept bring to Zoran customers? For example, these benefits could be new product features, more reliable operation of old product features, faster operation of old product features, lower cost, smaller size, lower power use (longer battery life or less heat generated), or greater compatibility with existing products.

Answer 2)

The new concept allows Zoran's customers to achieve pictures that show better the content that is important to the end customer – for example, light up dark faces without degrading the bright scene in the background.

Question 3)

What basic methods, techniques, strategies and implementation does the new concept use to provide the benefits described in 2)? The answer to this question defines the fundamental principles used by the new concept, how these fundamental principles work, how these fundamental principles provide the unique benefits offered by the concept, and how an knowledgeable person can build the invention. Note that an algorithm CANNOT be patented, but the hardware/software combination, which implements the algorithm, can be. So if the concept is a new algorithm, make sure you describe the steps the algorithm follows in WORDS, supported by equations if needed (its "Method"), AND the hardware the algorithm executes on (its

"apparatus"). Use block diagrams and drawings to support a description of the concept's implementation. You can use any drawing tool, but please convert the output to the JPEG format and paste these JPEG drawings into the NCD form. If you use acronyms make sure you define each acronym when it is first used. Do not assume the reader knows the meaning of any acronym.

Answer 3)

One way of content based dynamic range correction is using Coach 11 Face Detection for content identification and Coach 11 Z-Light for dynamic range compression. The Coach 11 Face Detection will be used to identify faces in the image. The output of the Face Detection module is a list of faces along with their corresponding locations in the image. The list of faces locations will be used as an input to the Z-Light module. The Z-Light module will analyse the face locations in the image and determine the digital gain to be applied to those areas.

For normal image data (non-face), Z-Light applies a digital gain which is calculated according to a user defined gain LUT. The LUT defines the input/output relation (digital gain), further more Z-Light will make sure local contrast is maintained when applying the digital gain. The gain LUT, is designed by the camera manufacturer to best fit normal content (without specific priority).

For specific image content (i.e. face), Z-Light will use a gain LUT which is optimized to brighten the face to a desired user level. The gain LUT will be calculated according to the face image data which can be obtained from the image data (input to Z-Light) and the face location (output of Face Detection module).

Another way to achieve a similar effect is to edit the Z-light gain map at the location of faces. The Z-Light gain map is a 2D map of digital gain coefficients which will be applied to the image data. This can be done using SW (CPU only) or by applying an alpha map which is composed of the face locations using the Coach 11 IMIX HW accelerator.

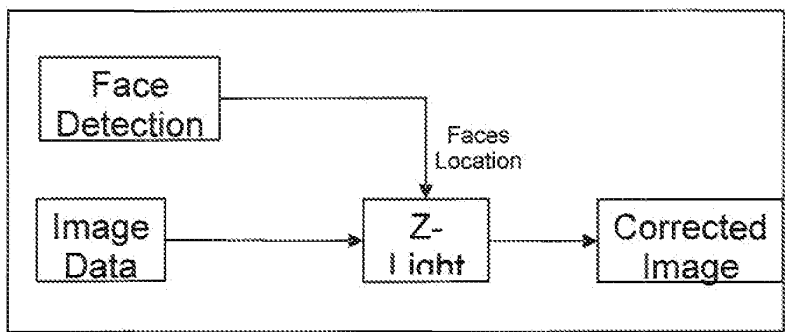


Figure: Face Detection based Z-Light block diagram

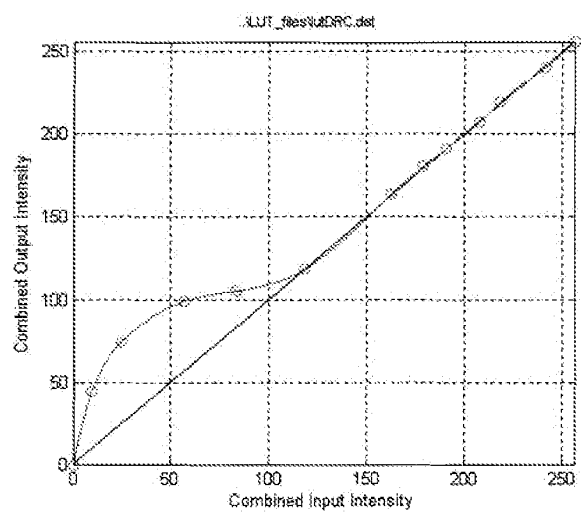


Figure: Z-Light gain LUT

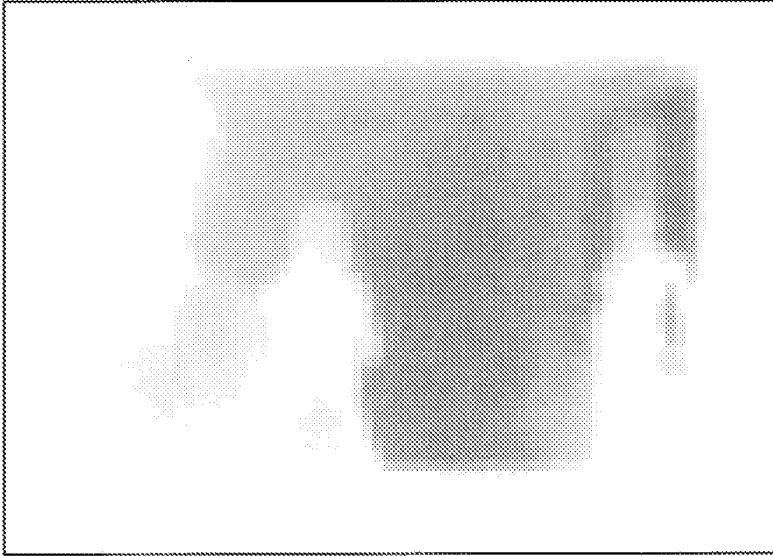


Figure: Z-Light 2D gain map – bright areas represent higher gain, darker areas represent lower gain

Question 4)

What other ways are there to achieve the same results realized by the new concept, even if these other ways cost more, are more complex, or require significantly greater processing power? How is the advance different and better than these other ways?

Answer 4)

Use sensor/processing with higher dynamic range.

Question 6)

If the application environment changes, will the new concept still have value? For example, if:

- a) the price of memory drops by half;
- b) available processing power increases by 2 times, or;
- c) new technologies for the sensing, transmission, protection, processing, display or storage of data, are introduced;

do you think the new concept will still offer an advantage to Zoran customers? What would this advantage be? This is an important question because it takes 3 to 4 years for a patent application to be granted and issued. In that time the application environment will most definitely change.

Answer 6)

The new concept is useful as long as there is a problem of dynamic range.

Question 7)

How can a product that uses the new concept be readily identified? Can it be identified by off chip measurements, by improved product performance, by unique product features, by the use of particular peripheral chips, or the use of a unique board layout? How can the concept be implemented so that its use can be detected from off chip measurements? This is important so Zoran can see if another company is using the concept without its permission.

Answer 7)

The way to identify whether the technology is being used in a product is by capturing pictures with and without specific content (such as faces) and check whether the camera uses any special processing which is dependant on the content.

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		Content Based Dynamic Range Correction		
First Named Inventor/Applicant Name:		Erez Galil		
Filer:		Aditya Krishnan/Danielle Schmidt		
Attorney Docket Number:		MZCO08020		
Filed as Large Entity				
Provisional Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Provisional application filing	1005	1	220	220
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				220

Electronic Acknowledgement Receipt	
EFS ID:	6604966
Application Number:	61285063
International Application Number:	
Confirmation Number:	7431
Title of Invention:	Content Based Dynamic Range Correction
First Named Inventor/Applicant Name:	Erez Galil
Customer Number:	76331
Filer:	Aditya Krishnan/Danielle Schmidt
Filer Authorized By:	Aditya Krishnan
Attorney Docket Number:	MZCO08020
Receipt Date:	09-DEC-2009
Filing Date:	
Time Stamp:	16:59:47
Application Type:	Provisional

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$220
RAM confirmation Number	3500
Deposit Account	504472
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Page	Pages 14 of 18
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1	Provisional Cover Sheet (SB16)	ProvisionalSB.pdf	1000713 bee4f8e2e4ac039cad237f934987437d0e727e23	no	3
Warnings:					
Information:					
2	Specification	provisionalMZCO08020.pdf	1287810 90c087862a105cf807a69fbc4df6e4f83d79c493	no	8
Warnings:					
Information:					
3	Fee Worksheet (PTO-875)	fee-info.pdf	29251 6ce3e322b1aa13c75e6e771dd29ab6e5e3182d0b	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			2317774		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
61/285,063	12/09/2009		220	MZCO08020		

CONFIRMATION NO. 7431

76331
Zoran Corporation
1390 Kifer Road
Sunnyvale, CA 94086

FILING RECEIPT



OC000000039290089

Date Mailed: 12/23/2009

Receipt is acknowledged of this provisional patent application. It will not be examined for patentability and will become abandoned not later than twelve months after its filing date. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Erez Galil, Sunnyvale, CA;

Power of Attorney:

Aditya Krishnan--41531

If Required, Foreign Filing License Granted: 12/17/2009

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 61/285,063**

Projected Publication Date: None, application is not eligible for pre-grant publication

Non-Publication Request: No

Early Publication Request: No
Title

Content Based Dynamic Range Correction

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page 1 of 3

patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

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