

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 18

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte HEINZ-WERNER KEESEN

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Appeal No. 1997-2398  
Application No. 08/354,929<sup>1</sup>

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ON BRIEF

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Before HAIRSTON, FLEMING, and BARRETT, Administrative Patent Judges.

HAIRSTON, Administrative Patent Judge.

**DECISION ON APPEAL**

This is a decision on appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1, 2, 8-12 and 22. Claims 3-7, 13-21, 23 and 24 contain allowable subject matter (Answer, page 1).

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<sup>1</sup>Application for patent filed December 12, 1994.

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Briefly, and in general terms, the invention pertains to a method and apparatus for estimating movement in an image produced by a video signal. The inventors of the instant application have recognized that movement estimation can be performed using only specific bits, for example, one or more most significant bits (MSB) of the picture element values of a video image. Picture element values (pixels) in a reference block of a first video image stored in a first storage unit are compared with corresponding pixels in a search zone block of a second video image stored in a second storage unit. The comparison of corresponding pixels is performed by gates G1-G6, counters C1-C6 and a comparator. In accordance with the principles of the invention, the pixel comparison is performed using fewer bits than the number nominally used to represent each pixel. For example, pixels nominally represented by 8 bits are compared using only the one or two MSBs. Based on this truncated bit width pixel comparison, the comparator determines the search zone block and reference block that gives the highest correlation (i.e., the blocks with the greatest similarity). Upon identifying the search zone block and reference block providing the highest correlation, the

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comparator computes a movement vector representing the relative position of the identified blocks.

Claim 1 is the only independent claim on appeal, and it reads as follow:

1. A method of estimating movement in an image produced by a video signal, comprising the steps of:

a) comparing picture element values in a reference block of a first video image with corresponding picture element values in a search zone block of a second video image, wherein said comparison is performed using a number of bits N, less than all of the bits used to represent a picture element value; and

b) computing a movement vector using a relative position of a matching search zone block to said reference block, wherein said matching search zone block gives a highest correlation of picture element values with the picture element values of said reference block.

The prior art relied upon by the examiner as evidence of obviousness are:

Music et al. (Music)	4,914,508	Apr. 3, 1990
Gobert et al. (Gobert)	5,247,586	Sep. 21, 1993

Claims 1, 2, 8-12 and 22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Gobert in view of Music.

Rather than reiterate the examiner's full statement of the above-noted rejection and the conflicting viewpoints advanced by the examiner and appellant regarding those

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rejections, we make reference to the examiner's answer (Paper No. 15) for the examiner's reasoning in support of the rejection, and appellant's main and reply briefs (Paper No. 14 and Paper No. 16, respectively) for appellant's arguments thereagainst.

Appellant has indicated that claims 1, 2, 8-12 and 22 all stand or fall together (Brief, page 3). Accordingly, we select claim 1 for review and shall decide the appeal on the basis of this claim alone in keeping with 37 CFR § 1.192(c)(7).

#### OPINION

In reaching our decision in this appeal we have given careful consideration to appellant's specification and claims, to the applied prior art references<sup>2</sup>, and to the respective positions articulated by appellant and the examiner. As a consequence of our review, we will not sustain the examiner's

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<sup>2</sup>In our evaluation of the applied teachings, we have considered all of the disclosure of each teaching for what it would have fairly taught one of ordinary skill in the art. See In re Boe, 355 F.2d 961, 965, 148 USPQ 507, 510 (CCPA 1966). Additionally, this panel of the board has taken into account not only the specific teachings, but also the inferences which one skilled in the art would reasonably have been expected to draw from the disclosure. See In re Preda, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968).

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rejection of claims 1, 2, 8-12 and 22 under 35 U.S.C. § 103(a).

As a general proposition in an appeal involving a rejection under 35 U.S.C. § 103, an examiner is under a burden to make out a prima facie case of obviousness. If that burden is met, the burden of going forward then shifts to the applicant to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. See In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992); In re Hedges, 783 F.2d 1038, 1039, 228 USPQ 685, 686 (Fed. Cir. 1986); In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); and In re Rinehart, 531 F.2d 1048, 1052, 189 USPQ 1147 (CCPA 1976).

We, of course, fully appreciate the examiner's assessment of the applied prior art, as well as the manner in which the examiner proposes that the references be applied. However, the difficulty that we have with the rejection advanced by the examiner is that when we set aside what appellant has disclosed to us in the present application, it is apparent to

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us that the applied patents themselves would not have been suggestive of the invention now claimed.

The examiner (Final Rejection, page 3) basically relies on Gobert for teaching all the features required by independent claim 1 except for the limitation of comparing "... a number of bits N, less than all of the bits used to represent a picture element value." The examiner cites Music as teaching the feature of "... a number of bits N, less than all of the bits used to represent a picture element value," and contends that it would have been obvious to modify Gobert by incorporating the bit-width truncation feature of Music because such a modification would further reduce the computational complexity goal expressed by Gobert (Final Rejection, page 4). Further, the examiner states (Final Rejection, pages 3 and 4) that Music suggests the applicability of bit-width truncation in the area of frame-differencing or motion compensation.

In rebuttal, the appellant requests reversal of the examiner's rejection asserting that the examiner's rejection misinterprets the Music and Gobert references and misunderstands the effect of combining the features that these

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two references disclose. In support thereof, the appellant argues (Brief, page 4) that the use of truncated bit width pixel comparison in motion estimation is not suggested by Music or Gobert. Appellant contends (Brief, page 5) that, unlike the instant invention defined by the claims, the bit-width truncation taught by Music relates to RGB color components for the expressed purpose of reducing the quantity of data transmitted and improving data compression efficiency. Appellant further asserts that neither Gobert nor Music recognizes the advantage or the feasibility of using bit-width truncation in motion estimation and neither reference supplies any specific motivation for its use.

According to the appellant (Brief, page 7), the combination of Gobert and Music would result in a system that produces an additional computational error that deters the combination of the Gobert and Music teachings.

In response to appellant's first argument, the examiner points to column 4, lines 10-35 of the disclosure of Music for motivation for the combined teachings of Music with Gobert (Answer, page 6). Further, the examiner asserts (Answer, page 7) that based on the teachings in column 14, lines 2-17 of

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Music, "one of ordinary skill in the art would equate Music's 'frame differencing advanced processing/compression scheme' as executing 'motion estimation' as defined by Gobert."

We have reviewed the disclosure of Music, paying particular attention to the passages relied upon by the examiner, and we find that the teachings of Music would not have been suggestive of using the disclosed bit-width truncation feature in the field of motion estimation of video signals. We are in general agreement with the appellant (Brief, page 5) that the disclosure of Music is directed toward digital color components and the compression of digital color video data (Music, col. 2, line 34 to col. 3, line 45). Music uses bit-width truncation of RGB color components (col. 4, lines 30-35) for compressing digital color data as opposed to bit-width truncation for motion estimation of a video image. We do not find any evidence here that would have been suggestive of using bit-width truncation as it relates to Gobert's motion estimation. We are appreciative of the examiner's reliance on column 4, lines 10-35 of Music for its teaching of reducing the amount of data required to represent pixels of a picture. However, we find that this teaching is

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the result of using run lengths in the video signal. Thus, nothing in Music indicates that a reduction in hardware complexity can be achieved as a result of using bit-width truncation as the examiner has suggested (Answer, page 6).

The examiner points to the fact that both Gobert and Music state that their inventions are relevant to the area of video-conferencing (Answer, page 6). We find that this acknowledgment would not have suggested the combination of the teachings of Gobert and Music.

The examiner asserts (Final Rejection, page 4) that Music suggests the applicability of bit-width truncation to motion compensation, and, in support thereof, the examiner draws our attention to column 14, line 60 to column 15, line 15 of Music. We do not agree. To us, this portion of the Music disclosure teaches the artisan that further compression of color video data may be accomplished by the implementation of these additional methods and in no way reveals to us that it would have been obvious to one skilled in the art to use Music's bit-width truncation feature in the pixel comparison method of Gobert for the purpose of estimating movement in an image produced by a video signal.

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Appellant's argument (Brief, pages 4 and 8) emphasizes that Gobert's motion estimation involves significant error since Gobert only selects certain pixels in correlating pixel blocks instead of all of the pixels. Appellant points out that Gobert's method undermines the examiner's motivation for additionally incorporating truncated bit-width pixel comparison as taught by Music into the Gobert system because this would compound the existing errors produced in the Gobert method.

In rebuttal, the examiner disagrees with the appellant noting that one possessing an ordinary level of skill in the art would have been driven by reduction constraints to make the combination of Gobert and Music. In fact, in the examiner's view (Answer, pages 12 and 13), the Gobert-Music combination would have suggested several ways of reducing the error in motion estimation and improving the accuracy of the motion estimation. Firstly, as viewed by the examiner, Gobert's method includes the addition of more reference pixels in the actual correlation process for improved accuracy. Secondly, with the Gobert-Music combination, the examiner

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reasons that the truncation amount could be varied to more accurately reflect the pixel's original component values.

We find ourselves in general agreement with the appellant that the skilled artisan, equipped with Gobert's system and objectives of designing a system including simplified hardware implementation and reduced prediction error rate (col. 2, lines 63-68), would not have been motivated to combine the teachings of Music with the teachings of Gobert. More specifically, we fail to see why the skilled artisan would select certain pixel data as taught by Gobert (col. 1, lines 13-15), thereby incorporating a certain error rate into the motion estimation of a video signal, and, thereafter, further compound the error rate by truncating the bit data of the pixel when it is generally understood that such truncation would further increase the degree of error in the motion estimation of a video signal. Accordingly, we will not sustain the obviousness rejection of independent claim 1 and dependent claims 2, 8-12 and 22. Therefore, the decision of the examiner rejecting claims 1, 2, 8-12 and 22 is reversed.

DECISION

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The decision of the examiner rejecting claims 1, 2, 8-12  
and 22 under 35 U.S.C. § 103(a) is reversed.

REVERSED

KENNETH W. HAIRSTON	)	
Administrative Patent Judge	)	
	)	
	)	
	)	
	)	BOARD OF PATENT
LEE E. BARRETT	)	APPEALS
Administrative Patent Judge	)	AND
	)	INTERFERENCES
	)	
	)	
	)	
MICHAEL R. FLEMING	)	
Administrative Patent Judge	)	

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APJ FLEMING

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DECISION: REVERSED  
Send Reference(s): Yes No  
or Translation (s)  
Panel Change: Yes No  
Index Sheet-2901 Rejection(s):  
Prepared: October 13, 2000

Draft                  Final

3 MEM. CONF.    Y                  N

OB/HD                  GAU

PALM /ACTS 2/BOOK  
DISK(FOIA)/REPORT