



US 20100067789A1

(19) **United States**

(12) **Patent Application Publication**
Cai et al.

(10) **Pub. No.: US 2010/0067789 A1**

(43) **Pub. Date: Mar. 18, 2010**

(54) **RECONSTRUCTION OF IMAGE IN A BAYER PATTERN**

(22) Filed: **Sep. 18, 2008**

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Publication Classification

(51) **Int. Cl.**
G06K 9/36 (2006.01)

(52) **U.S. Cl.** **382/166**

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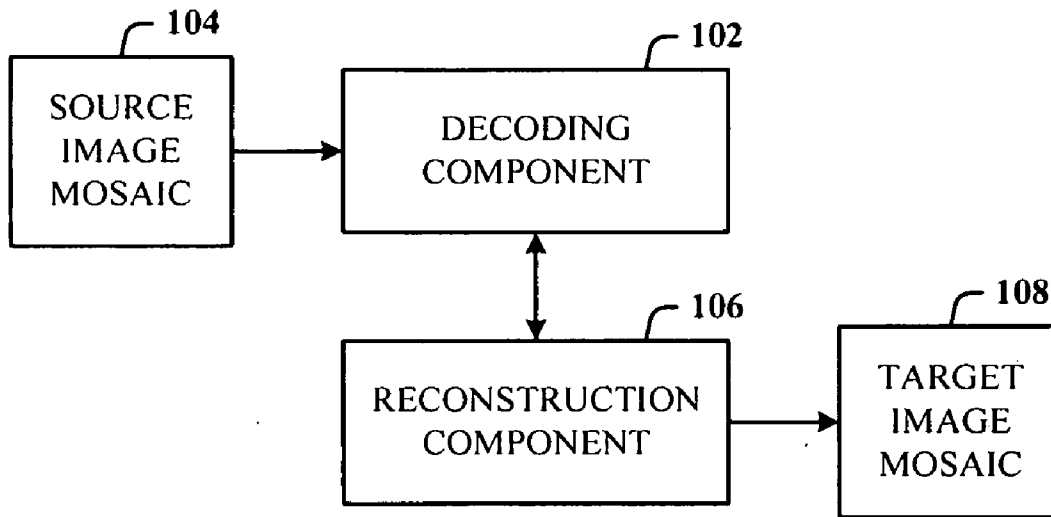
(57) **ABSTRACT**

Architecture for decoding (demosaicing) a source image and performing reconstruction directly from the Bayer pattern to reduce memory size and improve communication bandwidth. The architecture can be easily implemented in hardware such as in field programmable gate arrays (FPGAs) and application-specific integrated circuits (ASICs).

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(21) Appl. No.: **12/212,792**

↖ **100**



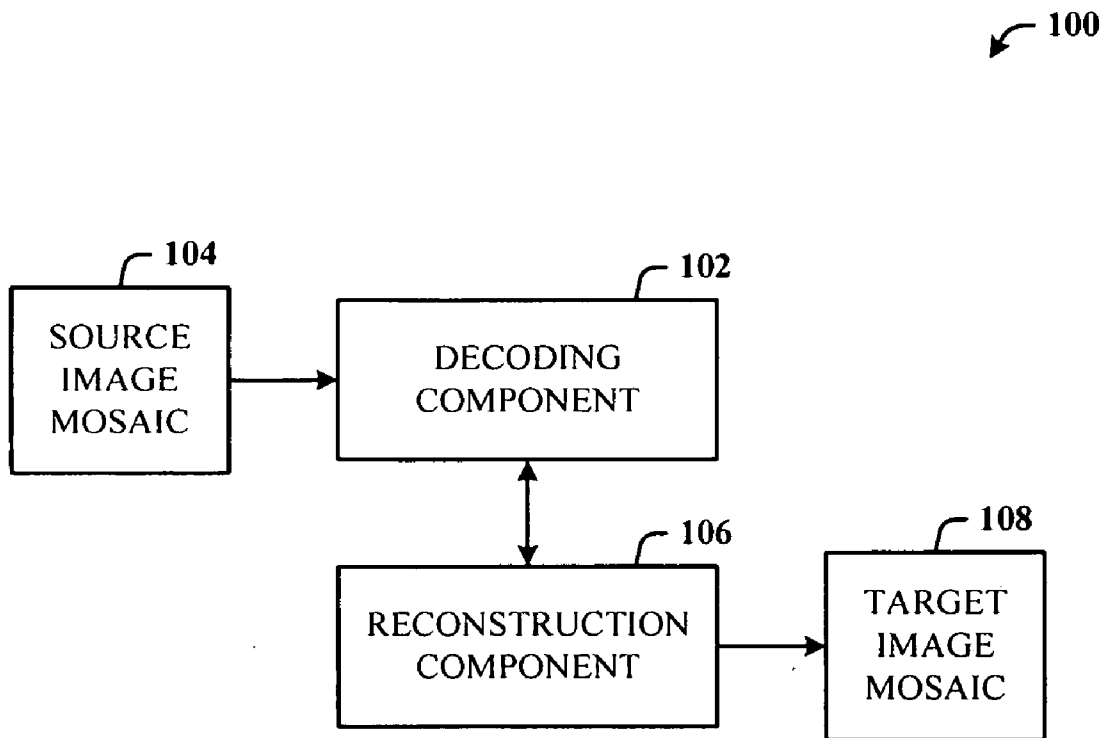


FIG. 1

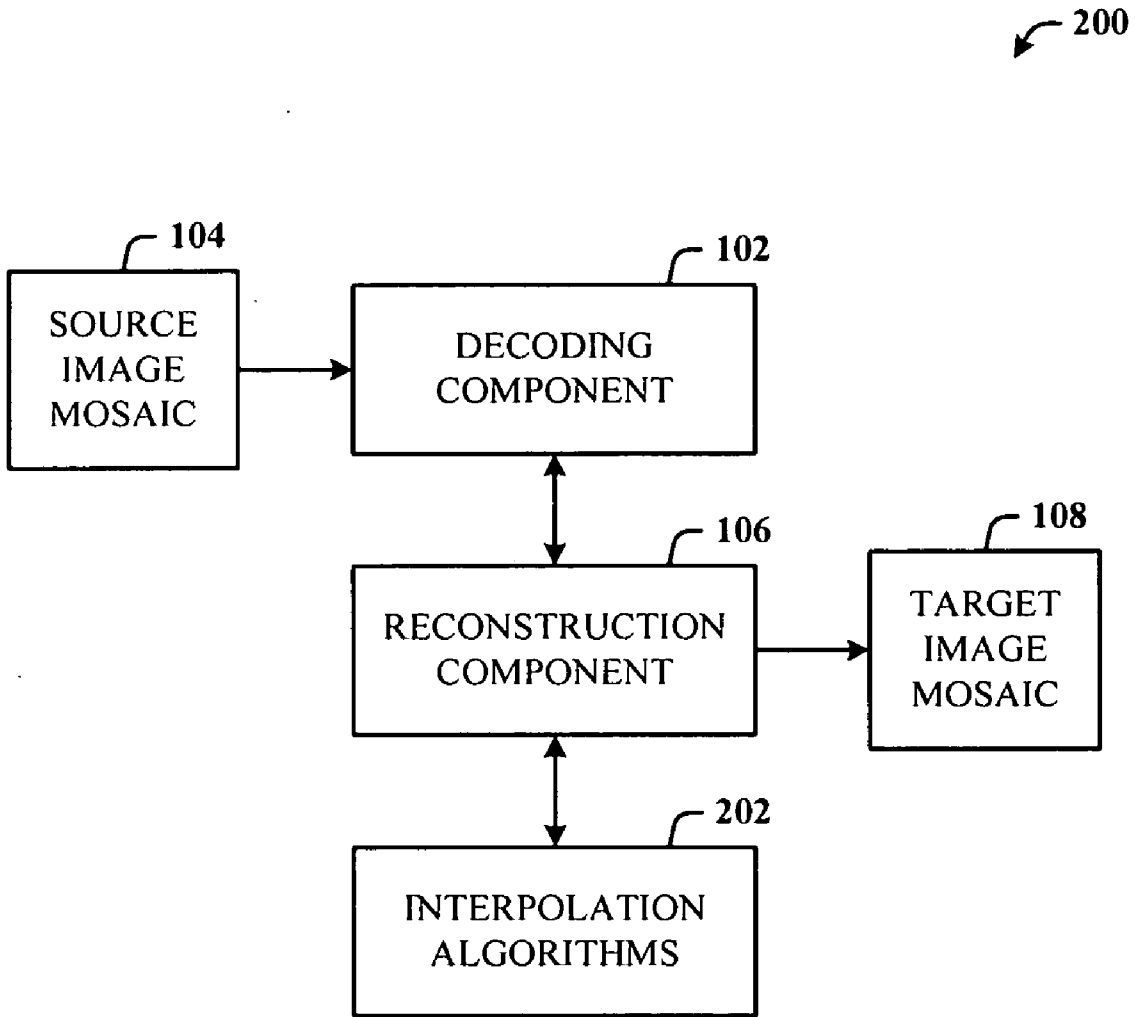


FIG. 2

300

302

$$R(X_t, Y_t) = R(x, y) = \begin{bmatrix} 1 - \frac{\Delta x}{2} - \frac{\Delta y}{2} + \frac{\Delta x \Delta y}{4} \\ \frac{\Delta x}{2} - \frac{\Delta x \Delta y}{4} \\ \frac{\Delta y}{2} - \frac{\Delta x \Delta y}{4} \\ \frac{\Delta x \Delta y}{4} \end{bmatrix} \cdot \begin{bmatrix} R(X, Y) \\ R(X + 2, Y) \\ R(X, Y + 2) \\ R(X + 2, Y + 2) \end{bmatrix}$$

304

$$R(X_t, Y_t) = R(x, y) = \begin{bmatrix} \frac{1}{2} - \frac{\Delta x}{2} - \frac{\Delta y}{4} + \frac{\Delta x \Delta y}{4} \\ \frac{1}{2} + \frac{\Delta x}{2} - \frac{\Delta y}{4} - \frac{\Delta x \Delta y}{4} \\ \frac{\Delta y}{4} - \frac{\Delta x \Delta y}{4} \\ \frac{\Delta y}{4} + \frac{\Delta x \Delta y}{4} \end{bmatrix} \cdot \begin{bmatrix} R(X - 1, Y) \\ R(X + 1, Y) \\ R(X - 1, Y + 2) \\ R(X + 1, Y + 2) \end{bmatrix}$$

306

$$R(X_t, Y_t) = R(x, y) = \begin{bmatrix} \frac{1}{2} - \frac{\Delta x}{4} - \frac{\Delta y}{2} + \frac{\Delta x \Delta y}{4} \\ \frac{\Delta x}{4} - \frac{\Delta x \Delta y}{4} \\ \frac{1}{2} - \frac{\Delta x}{4} + \frac{\Delta y}{2} - \frac{\Delta x \Delta y}{4} \\ \frac{\Delta x}{4} + \frac{\Delta x \Delta y}{4} \end{bmatrix} \cdot \begin{bmatrix} R(X, Y - 1) \\ R(X + 2, Y - 1) \\ R(X, Y + 1) \\ R(X + 2, Y + 1) \end{bmatrix}$$

308

$$R(X_t, Y_t) = R(x, y) = \begin{bmatrix} \frac{1}{4} - \frac{\Delta x}{4} - \frac{\Delta y}{4} + \frac{\Delta x \Delta y}{4} \\ \frac{1}{4} + \frac{\Delta x}{4} - \frac{\Delta y}{4} - \frac{\Delta x \Delta y}{4} \\ \frac{1}{4} - \frac{\Delta x}{4} + \frac{\Delta y}{4} - \frac{\Delta x \Delta y}{4} \\ \frac{1}{4} + \frac{\Delta x}{4} + \frac{\Delta y}{4} + \frac{\Delta x \Delta y}{4} \end{bmatrix} \cdot \begin{bmatrix} R(X - 1, Y - 1) \\ R(X + 1, Y - 1) \\ R(X - 1, Y + 1) \\ R(X + 1, Y + 1) \end{bmatrix}$$

FIG. 3

400

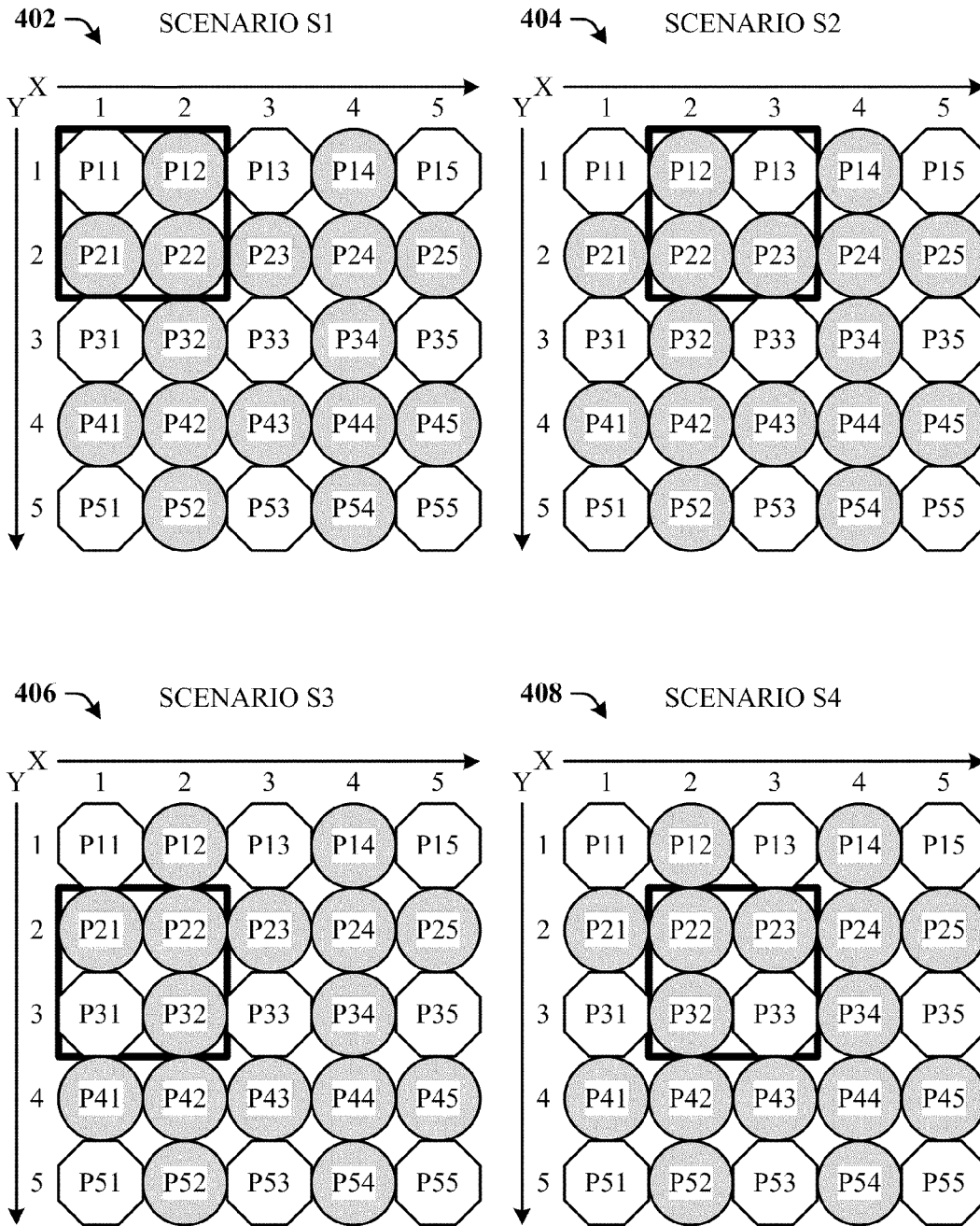


FIG. 4

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