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United States Patent [19]

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Nishio

[45] Date of Patent: ***Jul. 30, 1996**

[54] **VEHICLE CRASH PREDICTIVE AND EVASIVE OPERATION SYSTEM BY NEURAL NETWORKS**

FOREIGN PATENT DOCUMENTS

[75] Inventor: **Tomoyuki Nishio**, Kawasaki, Japan

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[73] Assignee: **Takata Corporation**, Tokyo, Japan

[*] Notice: The term of this patent shall not extend beyond the expiration date of Pat. No. 5,377,108.

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[21] Appl. No.: **375,249**

Rumelhart et al "Parallel Distributed Processing", vol. 1 pp. 161, 162, copyrighted 1986.

[22] Filed: **Jan. 19, 1995**

Primary Examiner—Brent A. Swarhout
Attorney, Agent, or Firm—Kanesaka & Takeuchi

Related U.S. Application Data

[63] Continuation of Ser. No. 97,178, Jul. 27, 1993, abandoned.

[30] Foreign Application Priority Data

Aug. 4, 1992 [JP] Japan 4-229201

[51] Int. Cl.⁶ **G08G 1/16**

[52] U.S. Cl. **340/903; 340/435; 348/148; 364/424.04; 395/23; 395/905**

[58] Field of Search 340/435, 995, 340/903, 905; 348/170, 113, 148, 149; 364/424.01, 424.04, 424.05; 395/905.22, 11, 21, 23; 382/104, 157

[57] ABSTRACT

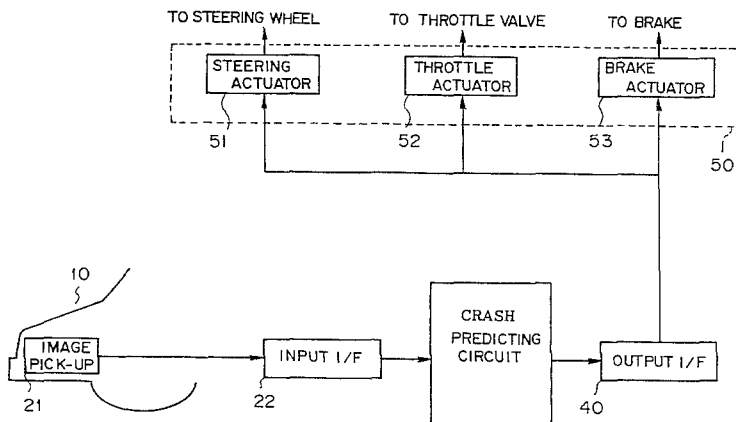
A system for predicting and evading crash of a vehicle includes an image pick-up device mounted on the vehicle for picking up images of actual ever-changing views when the vehicle is on running to produce actual image data, a crash predicting device associated with said image pick-up device, said crash predicting device being successively supplied with the actual image data for predicting occurrence of crash between the vehicle and potentially dangerous objects on the roadway to produce an operational signal when there is possibility of crash and a safety drive ensuring device connected to said crash predicting device for actuating, in response to the operational signal, an occupant protecting mechanism which is operatively connected thereto and equipped in the vehicle. The crash predicting device includes a neural network which is previously trained with training data to predict the possibility of crash, the training data representing ever-changing views previously picked-up from said image picking-up device during driving of the vehicle for causing actual crash.

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4 Claims, 7 Drawing Sheets



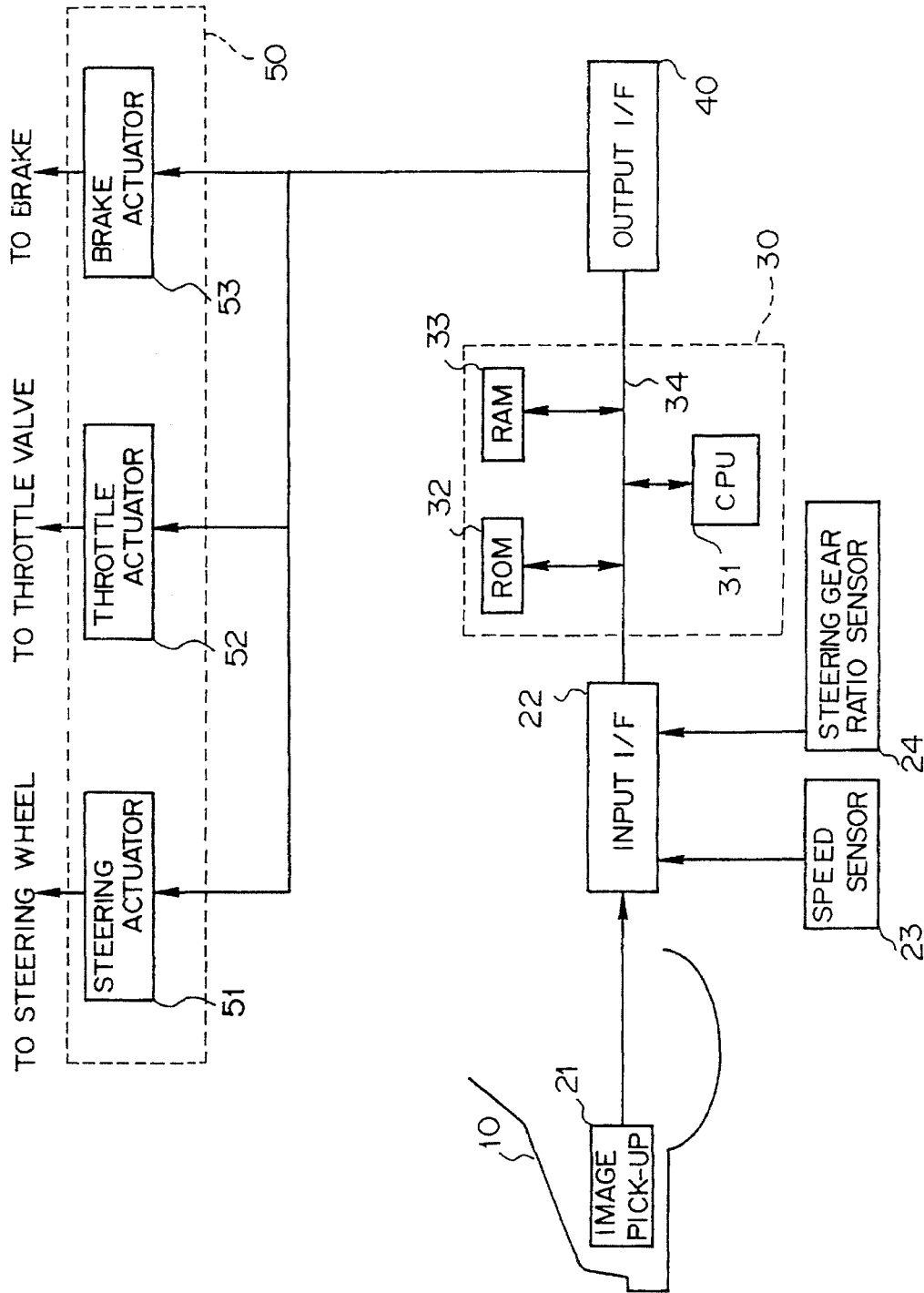


FIG. 1 PRIOR ART

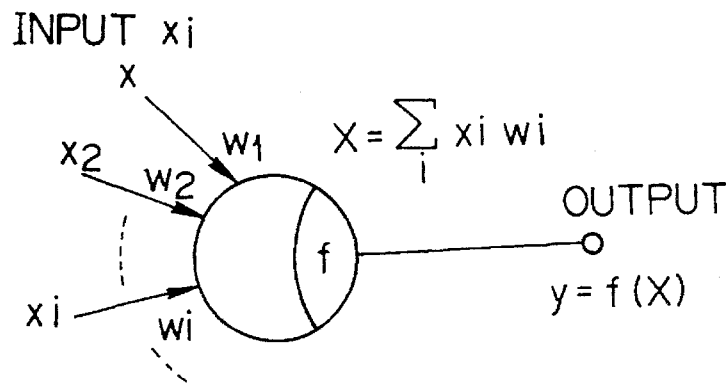


FIG. 2
PRIOR ART

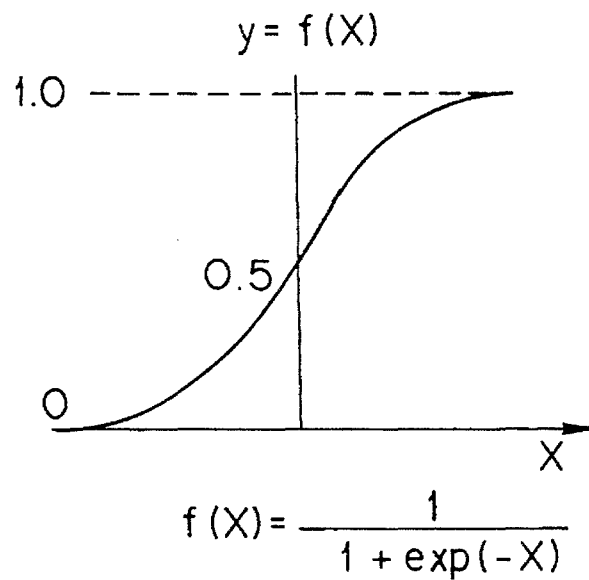


FIG. 3
PRIOR ART

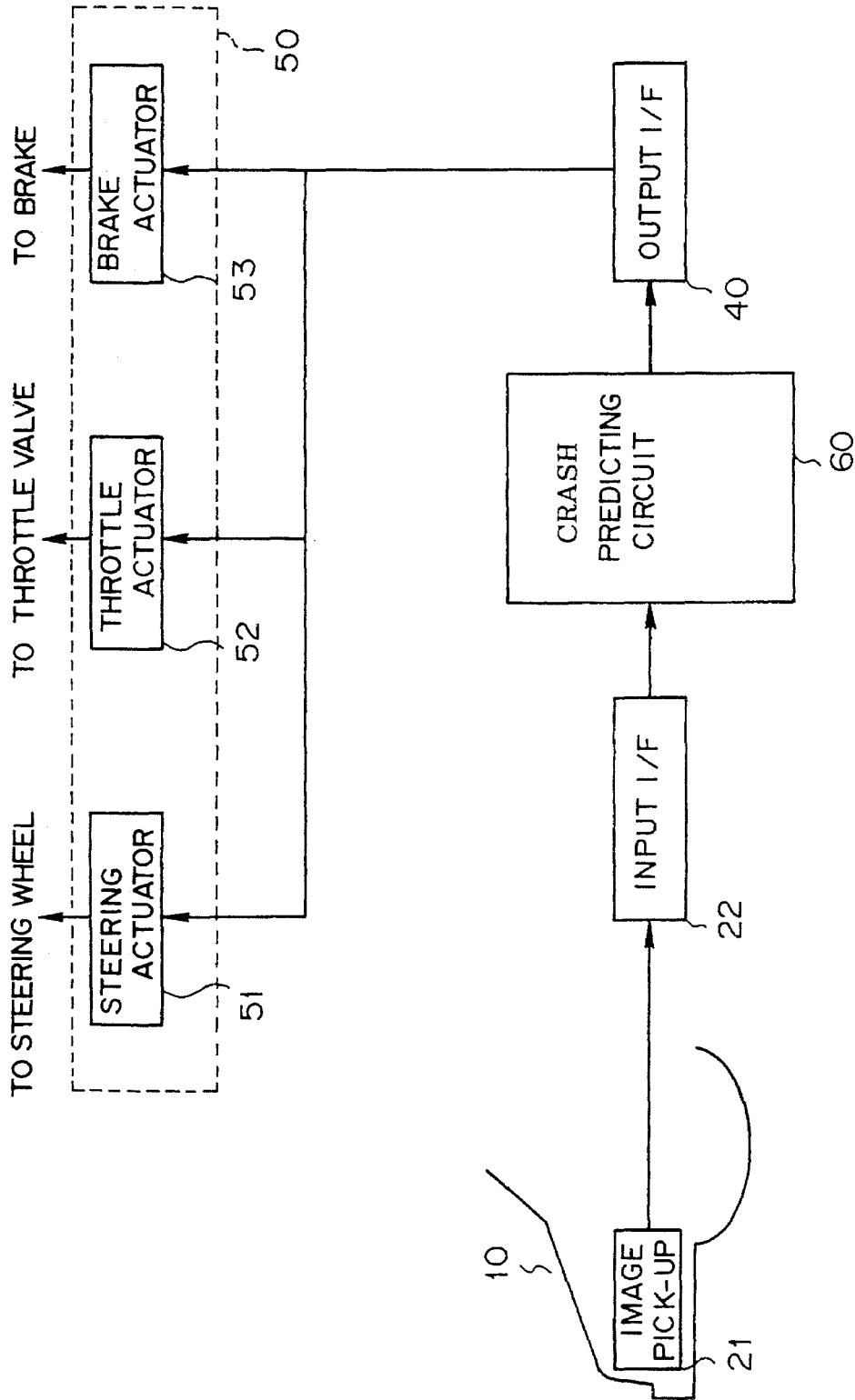


FIG. 4

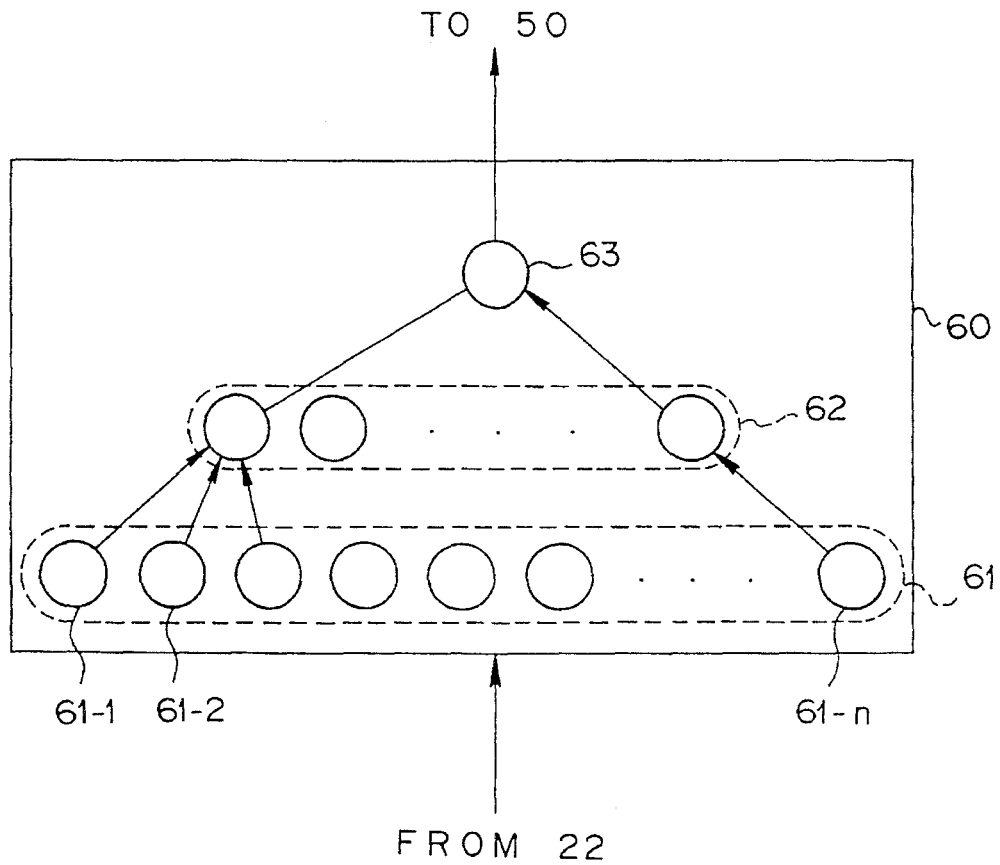


FIG. 5(a)

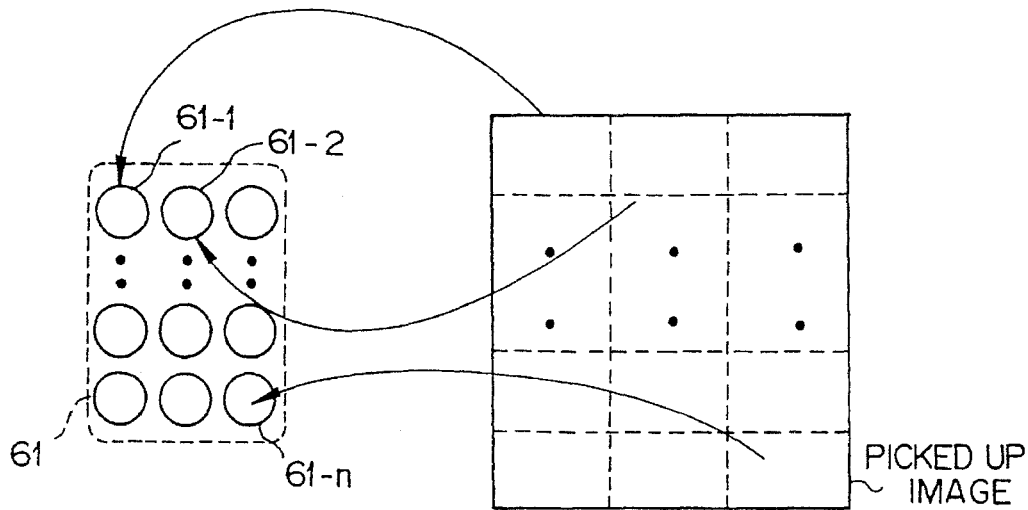


FIG. 5(b)

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