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(54) Title: OPTOELECTRONIC COMPUTING SYSTEMS

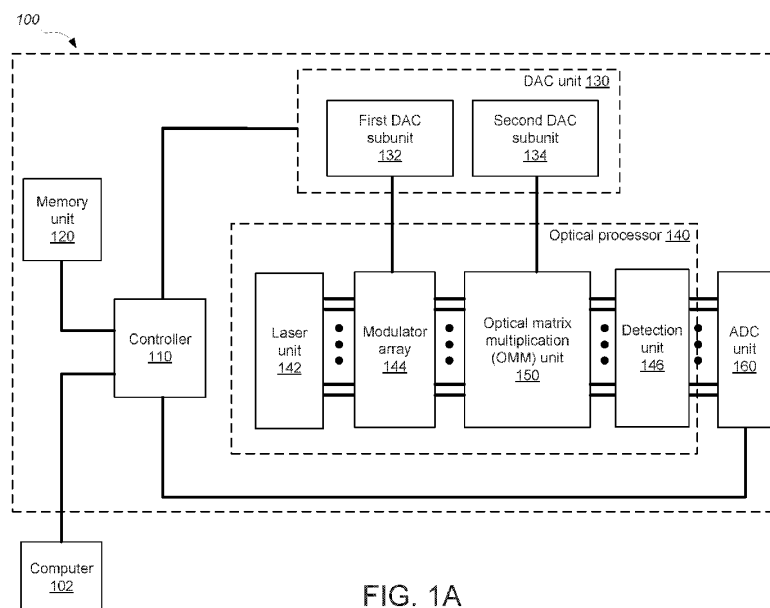


FIG. 1A

(57) Abstract: Systems and methods that include: providing input information in an electronic format; converting at least a part of the electronic input information into an optical input vector; optically transforming the optical input vector into an optical output vector based on an optical matrix multiplication; converting the optical output vector into an electronic format; and electronically applying a non-linear transformation to the electronically converted optical output vector to provide output information in an electronic format. In some examples, a set of multiple input values are encoded on respective optical signals carried by optical waveguides. For each of at least two subsets of one or more optical signals, a corresponding set of one or more copying modules splits the subset of one or more optical signals into two or more copies of the optical signals. For each of at least two copies of a first subset of one or more optical signals, a corresponding multiplication module multiplies the one or more optical signals of the first subset by one or more matrix

[Continued on next page]

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element values using optical amplitude modulation. For results of two or more of the multiplication modules, a summation module produces an electrical signal that represents a sum of the results of the two or more of the multiplication modules.