

EXHIBIT B



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(12) **United States Patent**
Kruglick

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(54) **AUTOMATIC FLIGHT CONTROL FOR UAV
BASED SOLID MODELING**

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See application file for complete search history.

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(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

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This patent is subject to a terminal dis-
claimer.

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(21) Appl. No.: **14/574,329**

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(74) *Attorney, Agent, or Firm* — Turk IP Law, LLC

Related U.S. Application Data

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application No. PCT/US2010/050829 on Sep. 30,
2010, now Pat. No. 8,965,598.

(57) **ABSTRACT**

(51) **Int. Cl.**
G05D 3/00 (2006.01)
B64C 39/02 (2006.01)

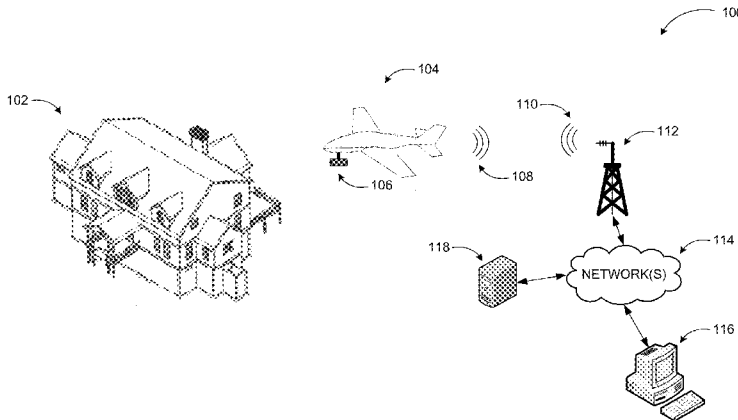
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Technologies are generally described for controlling a flight
path of a UAV based image capture system for solid model-
ing. Upon determining an initial movement path based on an
estimate of a structure to be modeled, images of the structure
to be modeled may be captured and surface hypotheses
formed for unobserved surfaces based on the captured
images. A normal vector and a viewing cone may be com-
puted for each hypothesized surface. A set of desired loca-
tions may be determined based on the viewing cones for the
entire structure to be modeled and a least impact path for the
UAV determined based on the desired locations and desired
flight parameters.

(52) **U.S. Cl.**
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(2013.01); **G05D 1/0088** (2013.01); **G05D**
1/0094 (2013.01); **G05D 1/101** (2013.01);
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(58) **Field of Classification Search**
CPC B64C 2201/141; B64C 2201/146

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US 9,352,833 B2

Page 2

- (51) **Int. Cl.**
G05D 1/00 (2006.01)
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G06T 17/05 (2011.01)
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 CPC **G06T 17/05** (2013.01); **G06T 17/10**
 (2013.01); **B64C 2201/127** (2013.01); **B64C**
2201/141 (2013.01); **B64C 2201/146** (2013.01);
G06T 2210/21 (2013.01); **G06T 2210/61**
 (2013.01)

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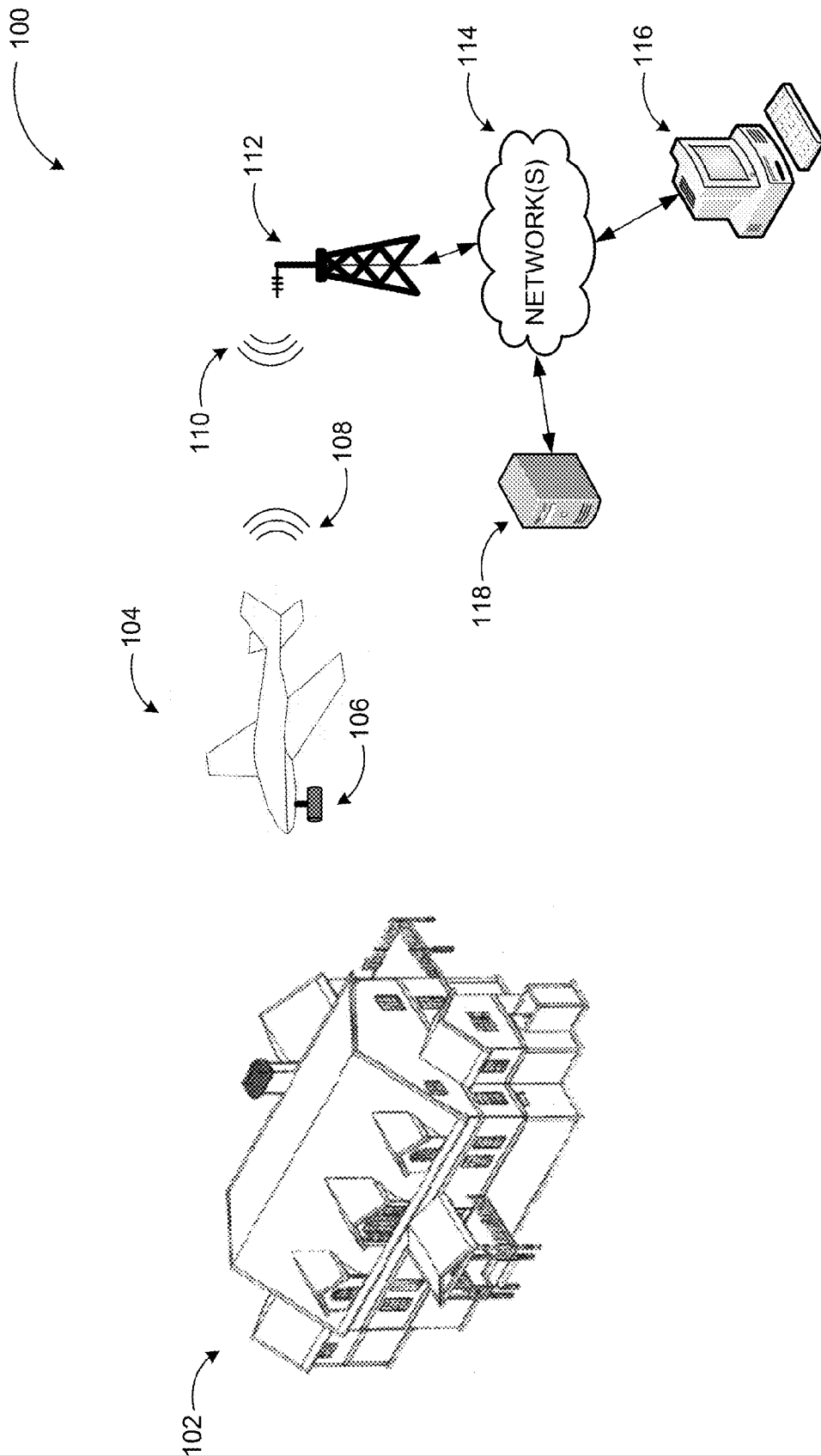


FIG. 1

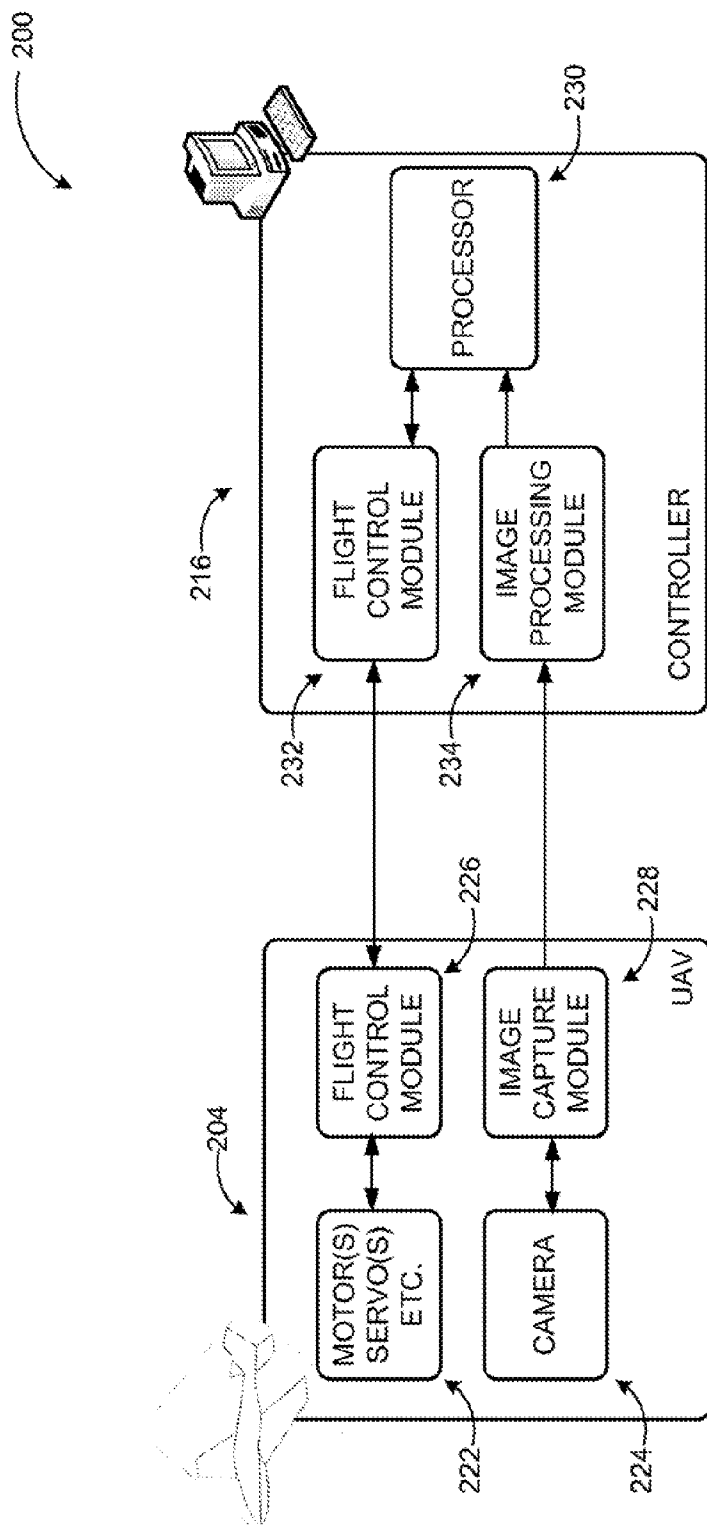


FIG. 2

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