

Claims

1. An apparatus for transferring electronic devices from a holding unit to a processing station, the apparatus comprising:
 - 5 a first rotating mechanism comprising a plurality of handlers, each handler configured to retrieve an electronic device from the holding unit and to move the electronic device to a transfer position;
 - a second rotating mechanism comprising a plurality of holders, each holder configured to retrieve the electronic device from a respective handler at the transfer
 - 10 position and to transfer the electronic device to the processing station;
 - an imaging mechanism configured to capture an image of each handler and each holder;
 - a processor configured to calculate an offset between each holder and the respective handler at the transfer position using the captured images; and
 - 15 an adjusting mechanism configured to adjust a relative position between each holder and the respective handler at the transfer position based on the calculated offsets prior to the electronic device being retrieved by the holder.
2. The apparatus according to claim 1, wherein the holders and handlers each
- 20 comprises a retrieving element configured to retrieve the electronic device, and wherein the captured images comprise images of the retrieving elements.
3. The apparatus according to claim 1 or claim 2, wherein the imaging mechanism comprises a first camera configured to capture the images of the handlers and a second
- 25 camera configured to capture the images of the holders.
4. The apparatus according to any one of the preceding claims, wherein the imaging mechanism comprises both a down-look camera and an up-look camera.
- 30 5. The apparatus according to any one of the preceding claims, wherein the adjusting mechanism is configured to move only the first rotating mechanism to adjust the relative position between each holder and the respective handler at the transfer position.

6. The apparatus according to any one of the preceding claims, wherein the adjusting mechanism is configured to move one or both of the rotating mechanisms along two perpendicular axes.

5 7. The apparatus according to any one of the preceding claims, wherein the first and second rotating mechanisms are configured to rotate perpendicular to each other.

8. The apparatus according to claim 7, wherein the first rotating mechanism is configured to rotate vertically and the second rotating mechanism is configured to rotate
10 horizontally.

9. The apparatus according to any one of the preceding claims, wherein the adjusting mechanism is configured to move one or both of the rotating mechanisms along a single axis.

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10. The apparatus according to claim 9, wherein the one or both of the rotating mechanisms is further configured to rotate to adjust the relative position between each holder and the respective handler along a second axis perpendicular to the single axis.

20 11. The apparatus according to any one of the preceding claims, further comprising an image capturing device configured to capture an image of each holder after the holder retrieves the electronic device to determine a position of the electronic device relative to the holder.

25 12. The apparatus according to claim 11, wherein the adjusting mechanism is configured to adjust the relative position between each holder and the respective handler based further on the determined position of the electronic device relative to the holder.

13. The apparatus according to any one of the preceding claims, wherein the offsets
30 are calculated by: determining first deviations of the handlers from an expected handler stopping position; determining second deviations of the holders from an expected holder stopping position; and determining differences between the first and second deviations.

14. The apparatus according to claim 13, wherein the deviations are represented by vectors, and the differences are determined using the vectors.

5 15. The apparatus according to claim 13 or claim 14, wherein the imaging mechanism comprises cameras positioned opposite the expected handler and holder stopping positions.

16. The apparatus according to claim 15, wherein the expected handler stopping position is located away from the expected holder stopping position.

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17. A method for transferring electronic devices from a holding unit to a processing station, the method comprising:

capturing an image of each of a plurality of handlers;

capturing an image of each of a plurality of holders;

15 calculating an offset between each handler and a respective holder at a transfer position using the captured images;

retrieving an electronic device from the holding unit and moving the electronic device to the transfer position using a handler;

20 adjusting a relative position between the handler and the respective holder at the transfer position based on the calculated offsets; and

retrieving the electronic device from the handler at the transfer position and transferring the electronic device to the processing station using the holder.