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## POP-OUT CAMERA FOR LAPTOP COMPUTER

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## **Pop-Out Camera for Laptop Computer**

**Abstract:** A moveable camera positioned below the display of a clamshell allows the border area around the display to be minimized.

This disclosure relates to the field of laptop and notebook computers.

A technique is disclosed that provides a camera for a clamshell computer that has a display with narrow borders.

Laptop and Notebook computers typically have a "clamshell" mechanical design. A lower portion or base contains the keyboard and main electronics board (PCB). An upper portion or lid, hinged connected along one edge to a complementary edge of the lower portion, contains the display, display electronics, and a camera. The camera is used, for example, during video chats, zoom calls, and the like. The camera is typically disposed at the opposite (top) edge of the upper portion within a border area or bezel of the display. The border area is sized to accommodate the camera.

According to the present disclosure, and as understood with reference to the Figure, a camera 10 is disposed at the long hinge cap area 15 at the bottom of the display 20, instead of at the top border area of the display 20, to reduce the width of the border area 25 on the display 20.

The camera 10 (shown in a raised position, ready for use) is moveable in a vertical direction by a modularized motor 30, coupled to the camera 10 and camera housing 12 by a connector bar 32, which controls the movement of the camera 10 in response to commands from the main PCB 35. A Hall sensor 40, which may be mounted on a small PCB 45, provides input signals which control the positioning of the camera 10 by the motor 30 to the main PCB 35.

When the lid housing the display 20 is opened to greater than a predefined angle with respect to the base 50, the Hall sensor 40 signals the main PCB 35 to issue a "camera open" command, and the motor 30 in turn raises the camera 10 out of the base 50 and into an enabled position. In the enabled position, the camera 10 is angled such that it captures the face of a user at the computer 55.

When the lid is closed, or open to less than a predefined angle with respect to the base 50, the Hall sensor 40 signals the main PCB 35 to issue a "camera close" command, and the motor 30 lowers and withdraws the camera 10 into the base 50 to avoid damaging the camera 10 through interference from the display.

The disclosed technique is advantageously used to implement a display with very narrow borders while still providing camera functionality. This can increase the effective display area, and/or provide an improved appearance. Positioning the camera in this manner also provides increased security for the camera.

Disclosed by Stanley Chu, HP Inc.

INC: POP-OUT CAMERA FOR LAPTOP COMPUTER

