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Use FW algorithm to achieve low cost media size detection

In order to take advantage of Apple Inc.'s AirPrint feature of iOS and macOS, printers must be certified. One requirement for Airprint compatibility is that the printer "know" the size of the media loaded in the input tray and that that information be reflected in the iOS device before sending a print job. Media size may be determined in a number of ways. For instance, users may input media size using a user interface (e.g., UI), such as by way of a control panel of the printer. However, printers without control panels present a challenge. In such cases, therefore, it may become necessary to enable the auto detection of media size. This paper proposes structures and methods to optimize a number of sensor to use for auto detection of media size in the printer (which affects cost) to enable use of a FW algorithm to differentiate between 4"x6" (102 mm x 152 mm) media with 4"x5" (102 mm x 127 mm) media (different in length) to allow use of AirPrint.

Sensor placement at different positions of the input tray may be important to enable differentiation of different media sizes. The example illustrated in Figs. #1.1 & #1.2 illustrates the use of 3 sensors (e.g., LED sensors) placed at various position to enable differentiation of three media size "buckets" : 4"x6" or smaller, 5"x7", and A/A4 size. Nonetheless, this example product cannot detect the difference between 4"x5" from 4"x6" media due to the fact that the sensors are positioned to detect *width* of the media rather than media *length*.

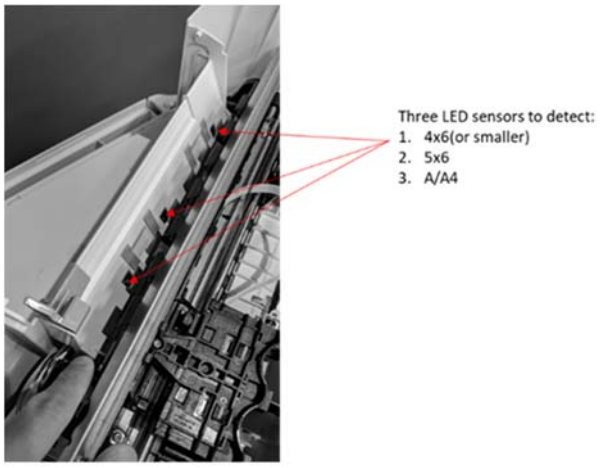

Fig. #1.1

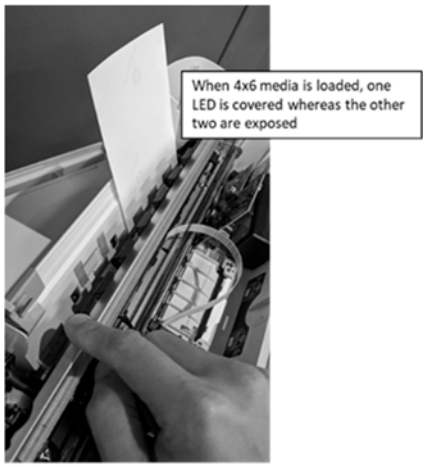

Fig. #1.2

Another example, as shown by Figs. #2.1 & #2.2, uses a sensor and moves the input tray with relation to the sensor to automate media length detection (e.g., enabling distinguishing between 4"x6" and 4"x5" media). However, this approach adds cost and mechanism complexity to the system.

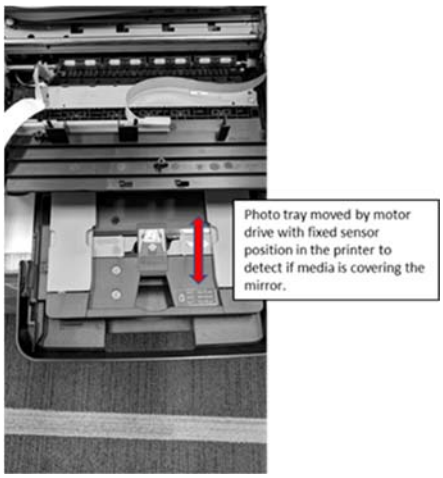

Fig. #2.1

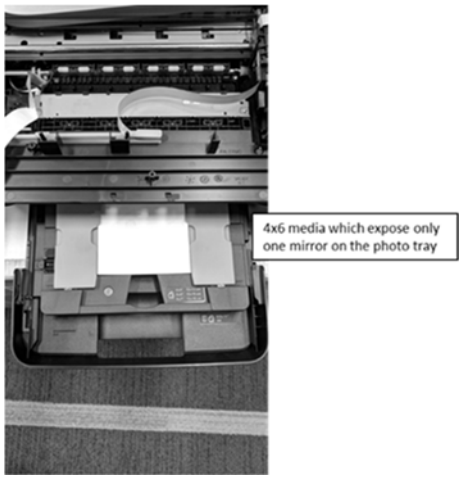

Fig. #2.2

Instead, this paper proposes the use of a REDI proximity sensor on top of the 5"x7" media when tray is fully inserted. REDI sensors use reflective surfaces (e.g., mirrors) to reflect IR signals back to a receiver. This paper proposes using different reflective surfaces (e.g., two mirrors) on the tray, such that different tray positions (and therefore, media sizes) may be determined based on the IR signals received by the REDI sensor. As such, the printer will be able to distinguish between 4x5 and 4x6 media loaded in the tray based on signals or pulses from the REDI sensor upon tray insertion (see Fig. #3.1 & 3.2).

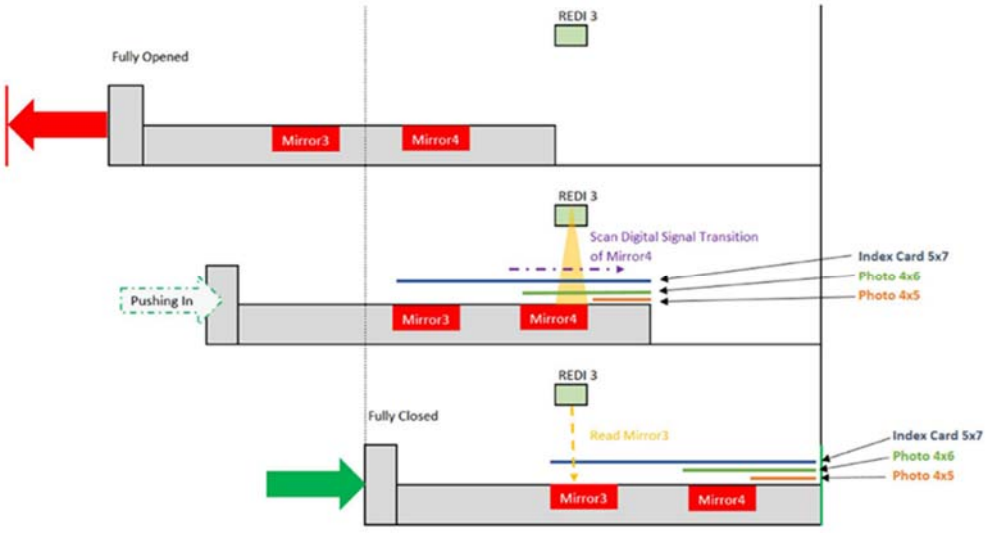

Fig. #3.1

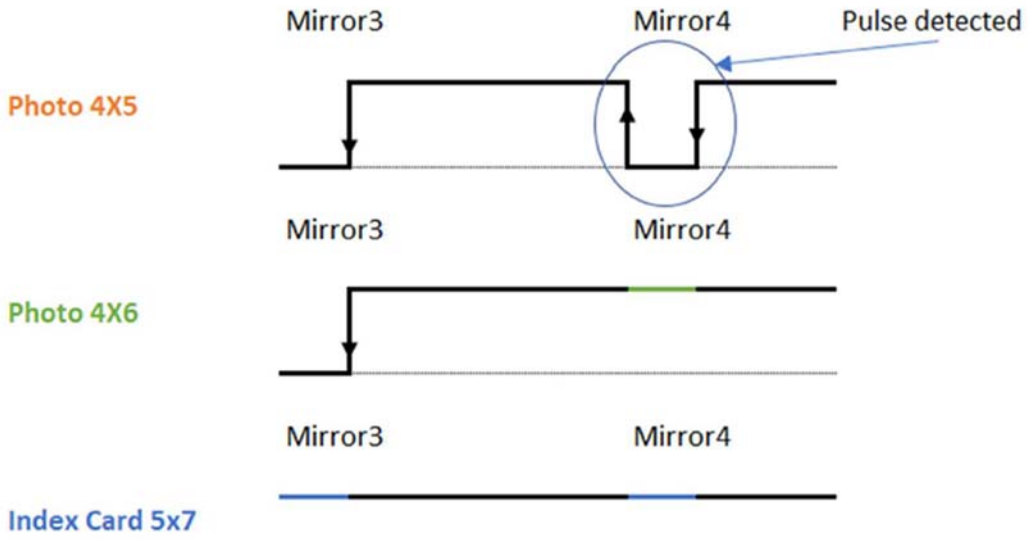

Fig. #3.2

Fig. #3.2 illustrates three different pulse patterns. First, in the case of a piece of 5x7 media, such as an index card, no matter the position of the input tray, the media will obstruct the mirror. Thus, as illustrated, little to no IR light will be reflected back to the REDI sensor. In the case of 4x6 media, as the media tray is inserted, no light will be reflected by mirror 4. However, light will be reflected by mirror 3. Said otherwise, 4x6 media will be long enough to cover mirror 4, but not mirror 3. Then, in the case of 4x5 media, both mirrors 4 and 5 will be detectable, indicating that the media in the tray is 4x5 media rather than 4x6 media. As should be appreciated, this approach allows detection of different media lengths using but a single REDI sensor.

Disclosed by Kok Chai Chong and Zyn Ming Lai, HP Inc.