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PRINTER SERVICE DOOR OPEN DETECTION USING SCANNER

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Printer Service Door Open Detection using Scanner

Users need to open service door to access printzone for paper jam clearance or cartridge replacement. In some printers, opto sensor or hall sensor is equipped to detect door open. When user opens door, door sensor status changes and it triggers carriage to move to the center for user to replace cartridge. On the other hand, when user opens door during printing, printer immediately stops printing upon sensing door open for safety reason. Below is an illustration of an all-in-one printer. The scanned assembly can be lifted to expose printzone.

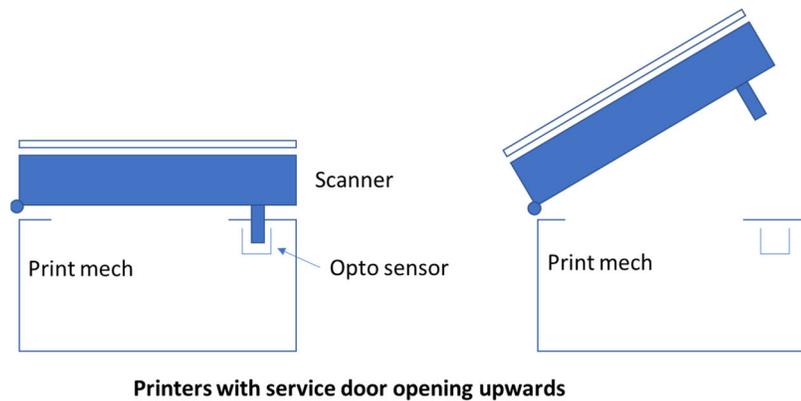
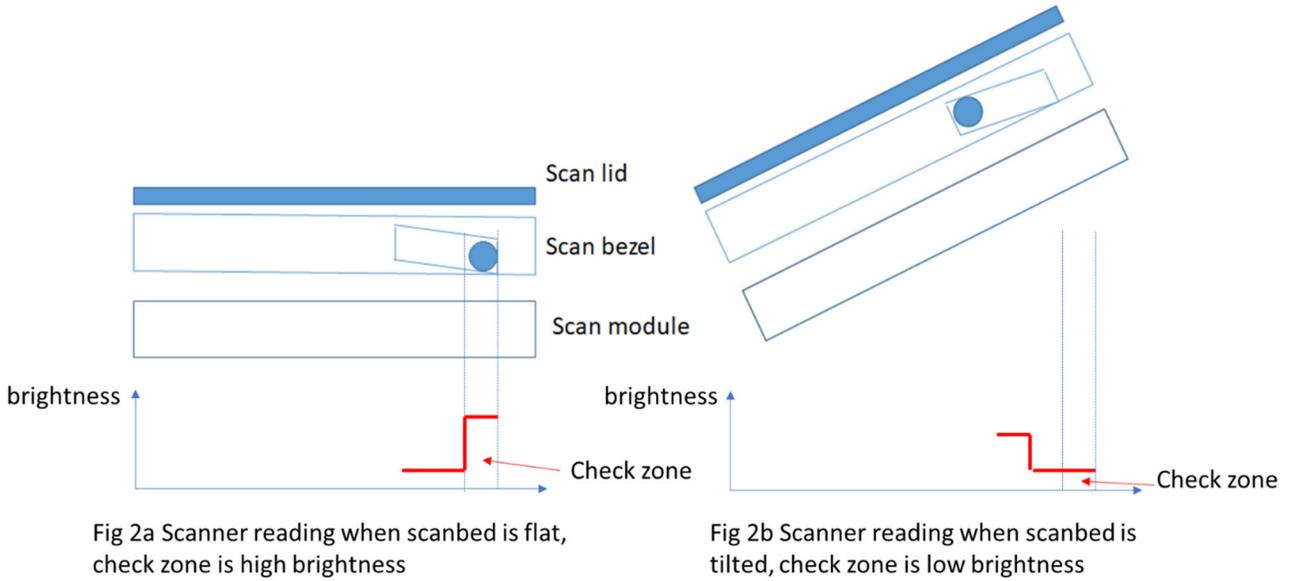


Fig.1 Illustration of opto sensor as door sensor

This article provides a cost saving solution for such printer to eliminate physical door sensor. The solution is to detect tilt angle of scanned: install a ball inside scan bezel (the plastic part holding the glass, on top of scanner carriage). The ball changes position according to scanner tilt angle. Use scanner to detect ball position periodically to get door open/close status.

As shown in Fig 2a, a white plastic ball is inside scan bezel and is on a slope. When scanned is flat, i.e., service door is closed, the ball is always at one side. Scanner is periodically checking this zone for ball presence. If ball is present, the brightness is high, which means the door is closed. When scanned is tilted, as shown in Fig 2b, service door is open, the ball rolls to the other side. By looking at the same region, ball is not present, the brightness is low, and it can report door open now.



The benefit of using ball is the compact size to have minimum impact to product. Other mechanism can be a pendulum, rolling cylinder etc which changes position when tilted due to gravity, however the pocket size to accommodate such mechanism is larger than the ball solution.

The implementation on one printer is shown below.

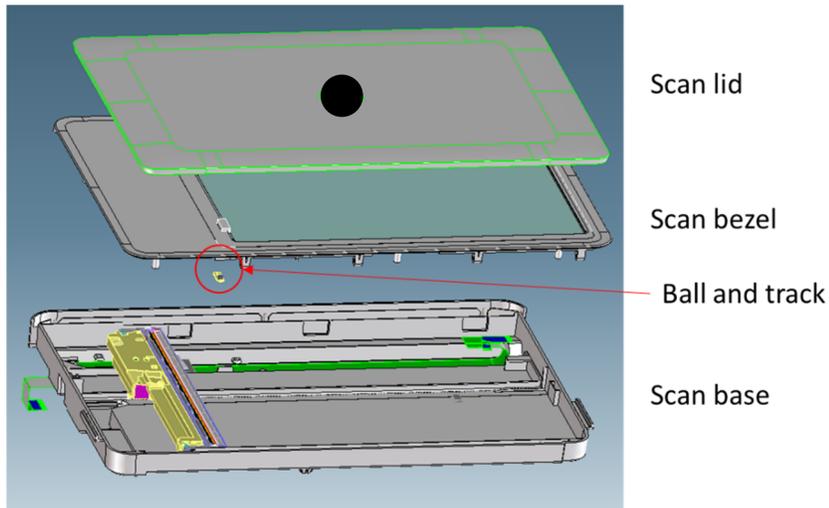


Fig 3 Explosive view for scanner reading ball position solution

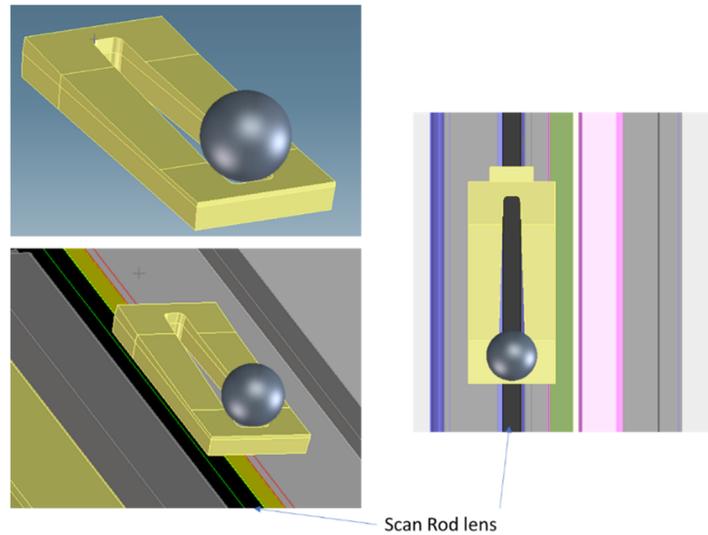


Fig.4 Ball, track, and scan line

Design such as difference in slot width, different height on the track ensures ball always stay at one side when flat (door closed). When scanner is opened, the ball moves to the other end due to gravity. Below is one example of the prototype, and one example of the image captured.

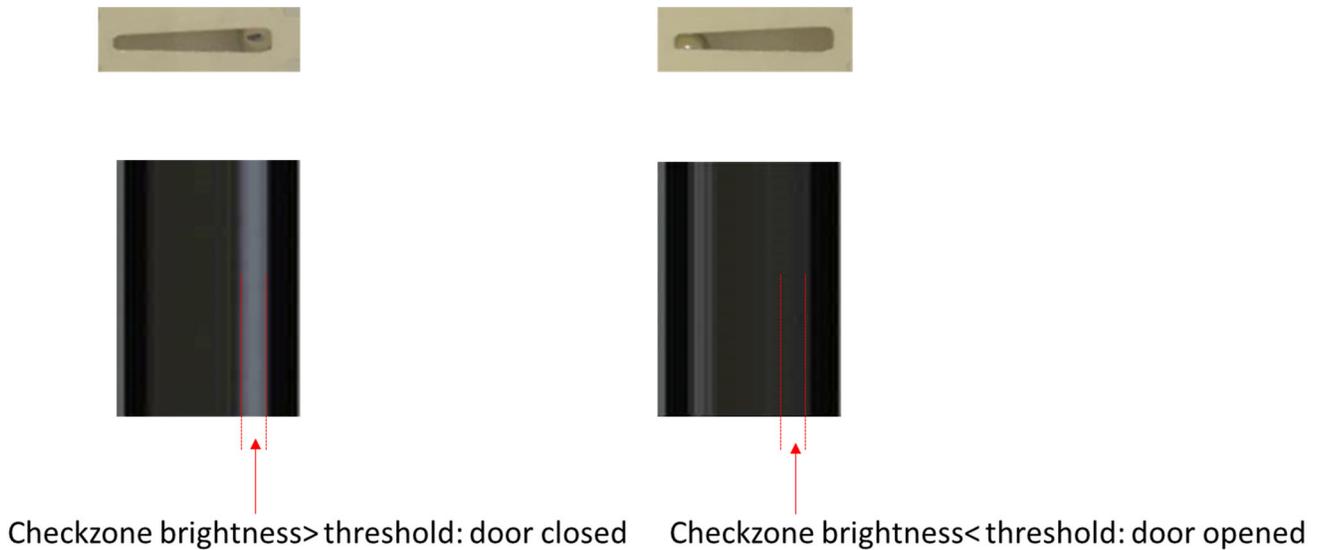


Fig.5 Prototype and scan result

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