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FUSION PRINTERS

HP INC

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Fusion Printers

Combining Low End Printers and User's smart phones to provide the functionality of High-End Printers

This disclosure relates to the field of printing in which the High-End Functionalities of a high-end multifunction device can be achieved by a Low-End Printer augmenting it with the User's Smart Phone at no extra cost.

A program is disclosed that would provide the functionalities of High-End Printer using the combination of Low-End Printer and User's smart phone. This is accomplished in the following way. Any Low-End Printer will have the USB interface for external communication, whereby, the printer is detected as the USB device. This interface can be connected to the User Smart Phone through Micro USB OTG (On the Go) Adapter, thereby the Low-End Printer would behave as the USB device and the User Smart Phone behaves as a USB Host. Once this setup is done, then the printer and the User Smart Phone works in tandem and User Smart Phone gets augmented with the printer as a one unit; thereby all the hardware of the mobile can be used by the printer to perform any required functionality which would otherwise be NOT possible due to limited hardware capabilities of low-end printer. Addendum to this, once we have the USB bridge established between the User Smart Phone and the printer, the Low-End Printer gets notified which probes the needed hardware and the corresponding functionality is enabled. For example, The Low-End Printer does NOT have Scan to Email feature as there is NO network port available. When this is connected in the way as explained above, the low-end printer is notified that the Network Port is available. The data flows from Low End Printer to the User Smart Phone via USB and then to the outside network via the Network/Wi-Fi Port of the User Smart Phone, thereby achieving the functionality of the High-End Printer. The same philosophy is applicable vice-versa. The USB is the common connection medium for low end devices. But this idea can be extended for any other connectivity that a printer provides too.

Concept of Fusion Printers
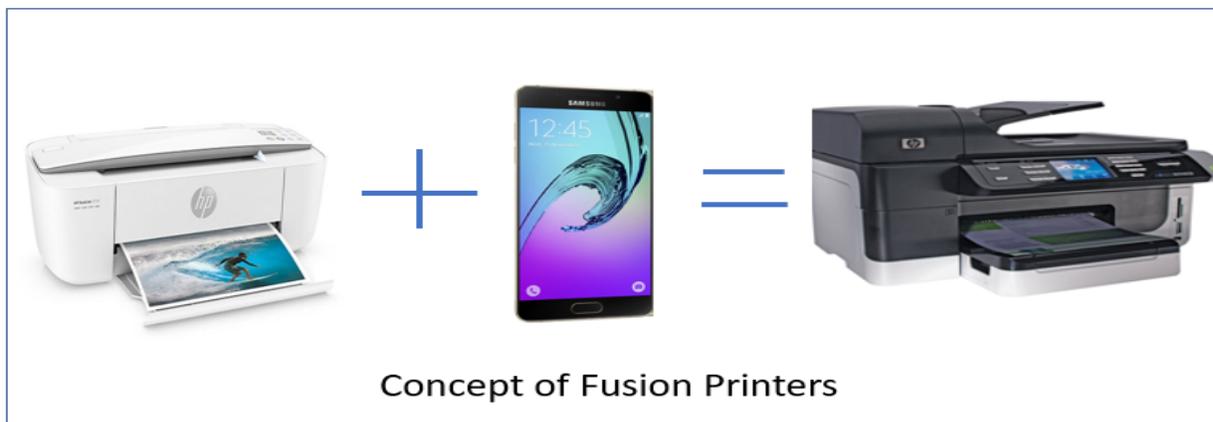
Similarly, there are many functionalities from the User Smart Phone like Bluetooth, NFC, and all other connectivity which can be leveraged.

Further to this, there are plethora of functionalities which the User Smart Phone offers and can be leveraged by the Low-End Printers. As a simple subset, Webcam, Fingerprint, Sound, Camera, Phone,

Text to Speech Converters, display which can be leveraged by the proposed method to generate new features like Call to Print, Photoprint etc., along with other features like Authentication using Face Detection, Fingerprint Sensor etc. The list can go on.

Call to Printer feature – User can do a phone call to his mobile phone which would auto answer, and the user speech would be converted to text and prompted to the user for confirmation. This can be stored to a PDF file and can be sent to the printer which can directly print.

Thus, this combination of connecting the Low-End Printer to the User Smart Phone, does NOT only serve the purpose of providing the features of High-End Printer, but also creates avenues to new features.

The business use cases for this disclosure are mainly on the SOHO (Small Office Home Office) segment. When a Home User buys a printer, there is high chance of buying a low-end printer, being cost effective. If the above setup grants him the privilege to use all high-end features, it would be a boon to the user of SOHO segment. Since, more than 60 % of the population has Smart Phones, this combination would be a very easy cost-effective technique and can create different avenues

The changes that are to be done to accomplish the proposed method are delineated as below

Data Moving from Printer to Smart Phone/External World
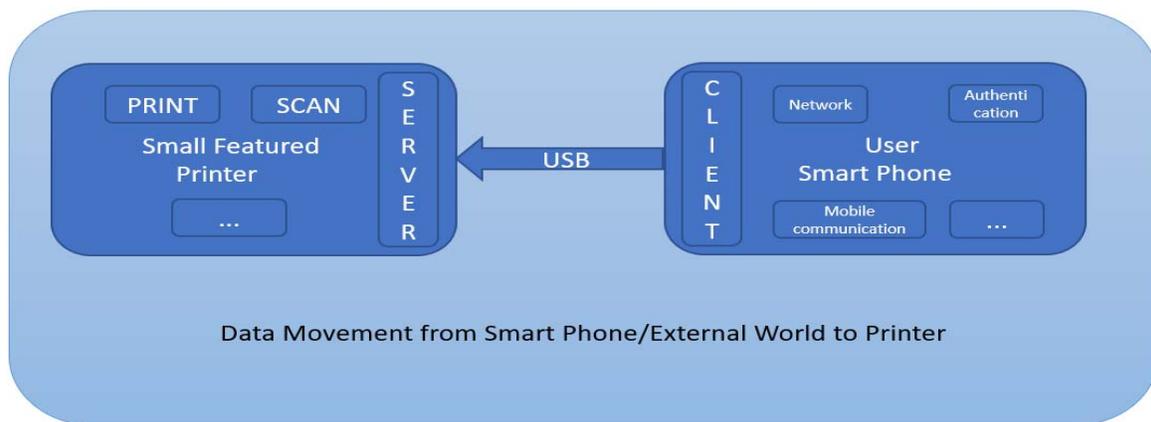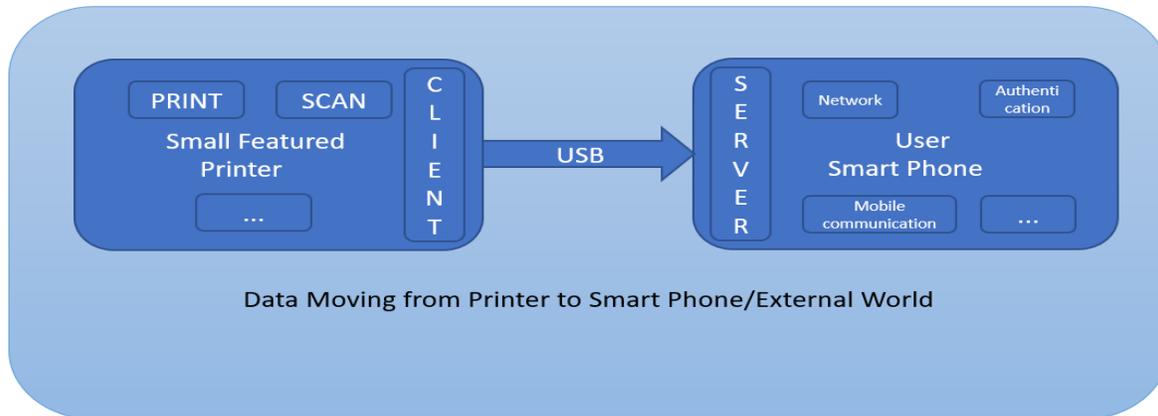
On the Printer Side:

1) Adding a feature in the software to dynamically probe this setup and enable the High-end functions of the Printer
    a. Developing a **client** which would interface the Printer to the User Smart Phone for the functionalities initiated from the Printer like Scan to Email etc. which would involve establishing the connection to the Smart Phone, hand shaking, data transfer, acknowledgment and graceful disconnection
    b. Developing a **server** which would interface the User Smart Phone to the Printer for functionalities initiated by the Smart Phone which could further be initiated by the external world like Job received via Bluetooth, NFC etc. from the external world which would involve accepting the connection from the Smart Phone, hand shaking, data transfer, acknowledgment and graceful disconnection of the client from the smart phone

On the Smart Phone Side:

1) App development which will
    a. Poll all the available connectivity at regular intervals so that user can fire a print via any of the available connectivity like Bluetooth, NFC, Wi-Fi, Wi-Fi Direct etc.
    b. Accept and process the data in the needed format and dump it to the specific location
    c. Have a **client** which would interface the User Smart Phone to the Printer for the functionalities initiated by the Smart Phone which would involve establishing the connection to the Printer, hand shaking, data transfer, acknowledgment and graceful disconnection.
    d. Have a **server** which would interface the Printer to the User Smart Phone for all functionalities initiated by the Printer which involve accepting the connection from the Printer, hand shaking, data transfer, acknowledgment and graceful disconnection of the client from the Printer.
    e. Extrapolate the same in developing new functionalities resulting due to amalgam of the Printer and Smart Phone like "Call a printer to print" feature etc.
2) Configuration

a. Prompting the user for new app installation from the Play Store OR some fixed URL whenever the User Smart Phone is connected to the Printer
b. Prompting for needed authentication settings for accessing the required folders and required functionalities.

Further, this approach that is being proposed is one of many possible approaches, based on the design aspects. We could also use single client server architecture too. But only for the ease of understanding, the above method of 2 client-server architecture is show cased

Realization of Fusion Printers

The proposed method can be realized by bringing the components together which are directly available in the market today viz. Smart phone, USB cable, OTG adapter and printer with specialized software/firmware support. These components can be interfaced with each other very easily and all the components are available in the market for a less cost (as compared to the cost of high end Multi Function Printer).

Disclosed by Zakir Ahmed, HP Inc.