

# ScanSnap SV600 Product Story

## Movement and Beauty That Surprised the World.

### The Start of a New Era for Scanners

The ScanSnap SV600 (hereafter referred to as the SV600), a totally new document scanner released in June 2013, attracted much public attention with its unique appearance, charming robot-like movements, and performance that surpasses its price.

The SV600 is a revolutionary overhead scanner that implements techniques enabling overhead document scanning. Allowing easy and smooth scanning of books and magazines without cutting, impossible with predecesing ADF scanners, it opened up a new era for scanners. The SV600 was already an extremely popular product at its release—so popular that the amount of orders far surpassed the speed at which the product could be manufactured.

The enduring individuality of the SV600 comes from the strong will of the developers, who managed to see the product to its release following a two-year development hiatus.

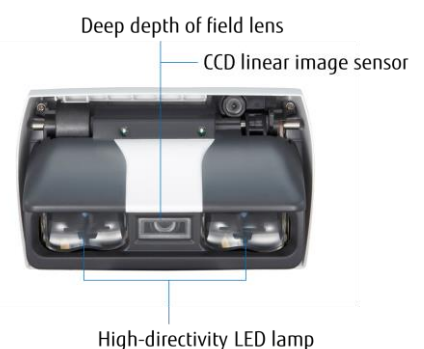


### The Possibility of Digitizing Books and Magazines Without Any Damage

The development of the SV600 first began in 2008. The brand image of the ScanSnap series of Fujitsu personal document scanners had finally begun to take root around this time. As use of smartphones and tablets spread, scanning had also become something more familiar. The situations in which scanners were used expanded from business to private life thanks to the ScanSnap series enabling fast and easy digitization of paper with the push of a button. Books, magazines, and newspapers, as documents unable to be scanned with a typical ADF, however, had to be cut. Cutting documents cleanly was often difficult, and was not an option for precious documents that users desired to keep unharmed. Such documents were often scanned with flatbed scanners, but flipping mediums and opening and closing covers was very time consuming. What our engineers came up with to resolve such issues and to be able to scan mediums as-is was the method of scanning directly from above.

### The Birth of the One-and-Only "VI Technology"

Engineers had initially been thinking of a design utilizing digital camera technology in which the scanner would photograph the medium from above, but the resulting resolution was low, and far from reaching document-scanner quality standards. Thus the plan was changed to a CCD linear image sensor, which is implemented in regular scanners, scans a line at a time, and enables higher resolution the more lines there are. Also included were a high-directivity LED lamp that reduces the impact of the amount of surrounding light and maintains a certain amount of light, and a deep depth of field lens that can focus on a wide range and cope with changes in distance between the lens and medium. These methods that enable stable and high-resolution scanning, all referred together as "VI Technology", were integrated into prototype development, which began in 2010.



### Astonishment Expressed at a Futuristic Scanner

The term "One Push", representative of the entire ScanSnap series, was deemed very important to incorporate during prototype development, and engineers strove to achieve a simple design that enabled users to do everything with the push of a button. When the scan button was pushed, the prototype head started moving while shooting a straight beam of light, scanning A3-size papers in a matter of seconds. Its revolutionary design was rated very highly even in the initial development stages, and many that witnessed demonstrations voiced that such a scanner overturned the entire concept the current scanner industry was based on. Expectations within the company were high prior to release, and completion of development was just one step away.



### Suspending Development with 67% of Users Citing Brightness

Dark clouds started to appear, however, in the last stages of product development in 2011. 67% of the people participating in usability tests reported that "The light that the SV600 releases when scanning reflects off the material and is too bright". There were no problems in safety standards, but the company came to the conclusion that it could not sell products that caused customers to experience discomfort, resulting in a sudden halt in product development.

There were many employees that desired to resume development, but several of those in charge were reassigned to take over other projects, inevitably leading the SV600 team to disperse. Very few team members were left with the hopes of resuming development, but regardless, the project leader Hironaga Hongawa did not give up. He resolved that he would somehow overcome all these challenges and complete it, and make it a good product.

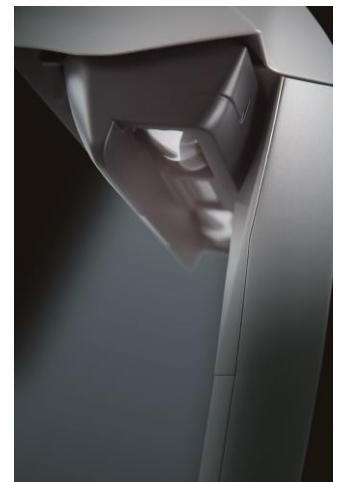


Hironaga Hongawa, a director of Imaging Products Div. Hardware Development Dept. II

### Narrowing Light to the Limits of Technology

The remaining development team members focused on the fundamental question of why people felt the light too bright. Attempting to find an answer, they sought out Dr. Masami Kojima, a professor at Kanazawa Medical University, and studied the structure of the human eye. Hints lay in how the same light may at times be perceived as too bright, and others not as much. In fact, the bigger the rays of light, the greater the amount of light that enters the human eye, leading one to find the light too bright.

Developers focused on narrowing the ray of light after this discovery, and succeeded in developing lighting technology with a narrowness of 1/4, the smallest width technologically possible, that would move alongside the movements of the CCD linear image sensor. Moreover, they were able to alleviate the brightness of the LED light source itself by making the light focus in a certain direction. Narrowing of the light required developers to adjust the CCD linear image sensor by mere microns. Such a feat was only made possible by the great amount of experience that Fujitsu had gained in scanner development over the years, thus making the SV600 emblematic of Fujitsu's research and technological prowess.



### The Vow to Create a Better Product

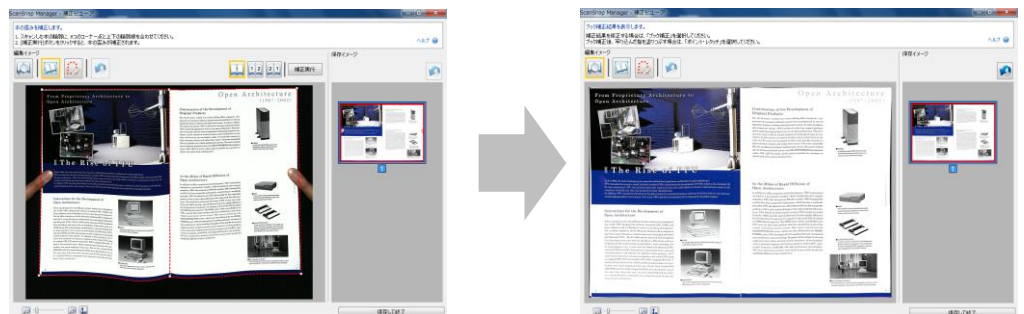
Thanks to repeated enhancements, most participants in the next round of usability tests voiced the opinion that the light was not too bright. When numerical measurements proved that the enhanced light was close to that of a fluorescent lamp, product development was resumed.

Managing to come back after a period of hiatus, the SV600 serves as a prime example of Fujitsu's fundamental will to make an even better product because it had faced setbacks. To prove this point, various new features would be added before development was resumed.



### Exact Extraction of Page Outlines

The "Book Image Correction function" focuses on correct extraction of page outlines. A 300-page book opened in the middle, for example, would split into 150 pages to the left and right, respectively. Between the outline of the first page and the 150<sup>th</sup> page would be a difference of a few centimeters, due to the thickness of the book. Being able to judge these few centimeters is crucial to outline extraction, and thus in correction of image distortion. The Book Image Correction function is able to do this thanks to a database containing the shapes of thousands of books.



### Automatic Scanning with a Flip of a Page

The "Page Turning Detection" and "Point Retouch function" were also added to make the SV600 easier to use.

The Page Turning Detection uses a camera to automatically sense the motion of the user turning the page and prepares to scan the next page. This function does not react to the user flipping through numerous pages or mere hand movements, and in this way prevents erroneous operation. The Point Retouch function enables users to edit out their fingers if they have to hold down the pages of a thick book for proper scanning.



### Usability As a Priority until the Very End

Having overcome numerous obstacles, the SV600 now possessing numerous new functions, finally made it to the IT Fair\* in 2012. The experimental model attracted much of the venue's attention with its novel "scanning from above" design, and impelled many to try the model themselves. Those in charge of product development noticed that a number of people were confused with the process of choosing whether the scanned medium was a book or plain paper, and decided to modify the model so that the user did not need to choose modes before scanning, and could scan with a mere push of the scan button. The user could then choose which mode they would like while viewing the image as scanned in both modes, allowing easy operation.

\* The IT Fair is an exhibition that our company holds every year.

### Obstacles Produce Good Products

At last, the SV600 made it to its release date in June 2013. Scanning one's book collection at home was a trend at the time, and the SV600 instantaneously became a popular product. Its good reputation spread all over television and social media and made it so popular that product orders well surpassed product production. Hironaga Hongawa states with a smile, "Before release we were worried that customers might not receive our product well, but am honestly honored and glad that it has been so well-received. It was definitely not a mistake to persist on the development and enhancement of this product".

"The bigger the obstacle is the better". The fact that no product has yet to surpass the SV600 is enough to prove just how great the obstacles that were faced during the development stages were.

### Playing an Active Part in a Futuristic Dimension of Children's Dreams

The SV600 was later used in an unexpected way and became a subject of much conversation. It was an immediate hit at the "teamLab Sketch Aquarium", in which fish drawings that children drew were projected onto a big screen to swim around. This is part of an educational project called "Learn and Play! Future Park: teamLab Island" that provides a digital dimension enjoyable for both children and adults alike. The attraction is produced by "teamLab Inc.", a collective, interdisciplinary creative group that is prominently based in Tokyo and brings together professionals from various fields of practice in the digital society: artists, programmers, engineers, CG animators, mathematicians, architects, web and print graphic designers and editors.



### The Delight of Scanning for All

Giving birth to innovative products that no one has ever seen before—the story does not end here. We have utilized the SV600's image-distortion-correction function and cropping technology to develop scanning capabilities that allow any user to scan cleanly and effortlessly with their iPhone. Some examples of products that utilize this technology are the "SnapLite", which combines LED lighting and an exclusive application to transform one's iPhone into a high-performance scanner, and the "Omoidori", which enables users to take clean scans of precious album photos from above the plastic film. Our free-thinking ideas that are not hindered by the constraints of a typical scanner continue to deliver revolutionary products. The ambition to make possible something previously impossible, impress users, and deliver added value to users' lives continues, and is passed on through all of our products.

