

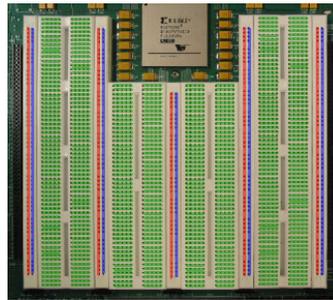
Snapshot

Mike Huhs

Sanjay Jhaveri

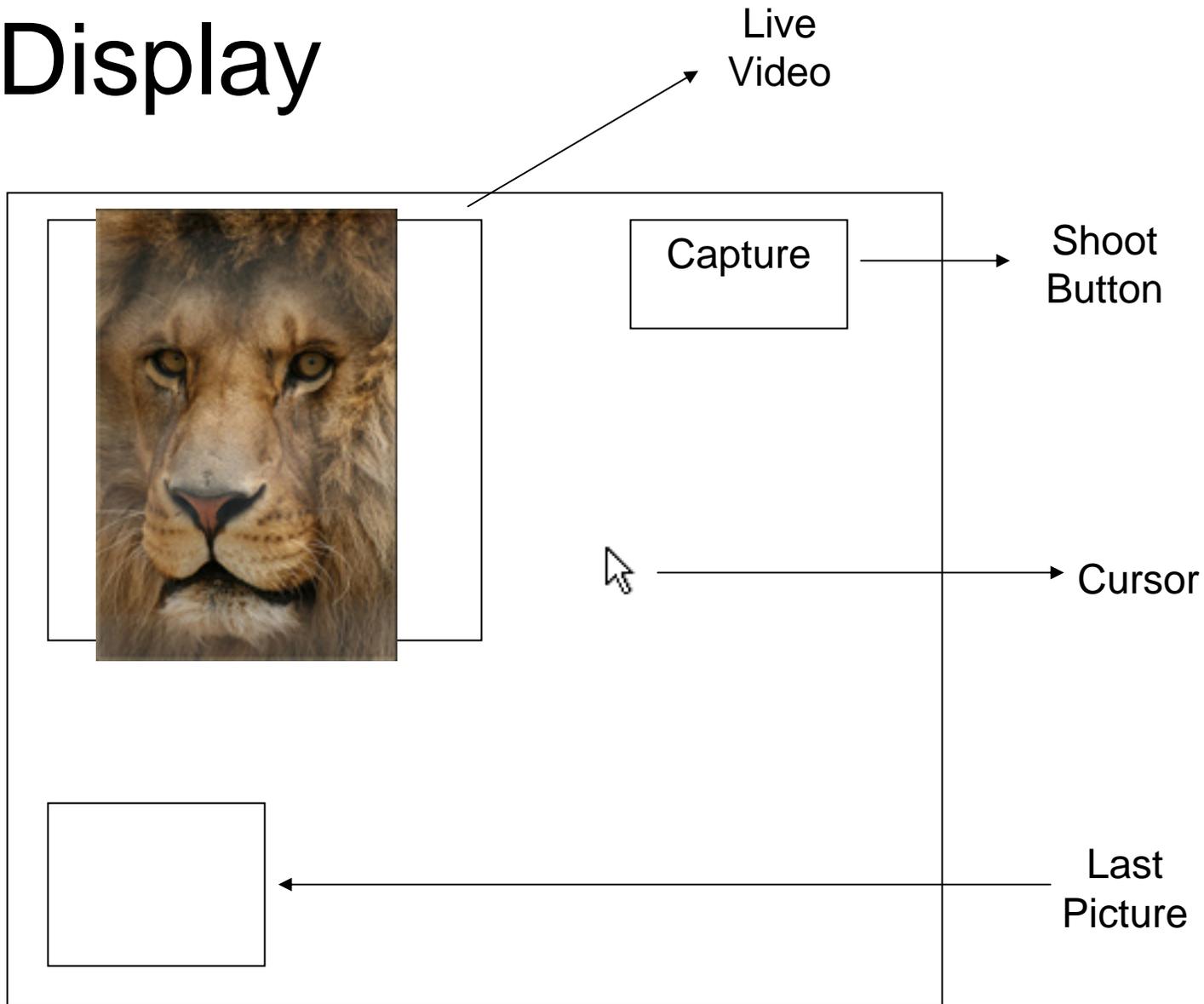
Project

- Digital Camera
 - User Interface
 - Compression and Storage



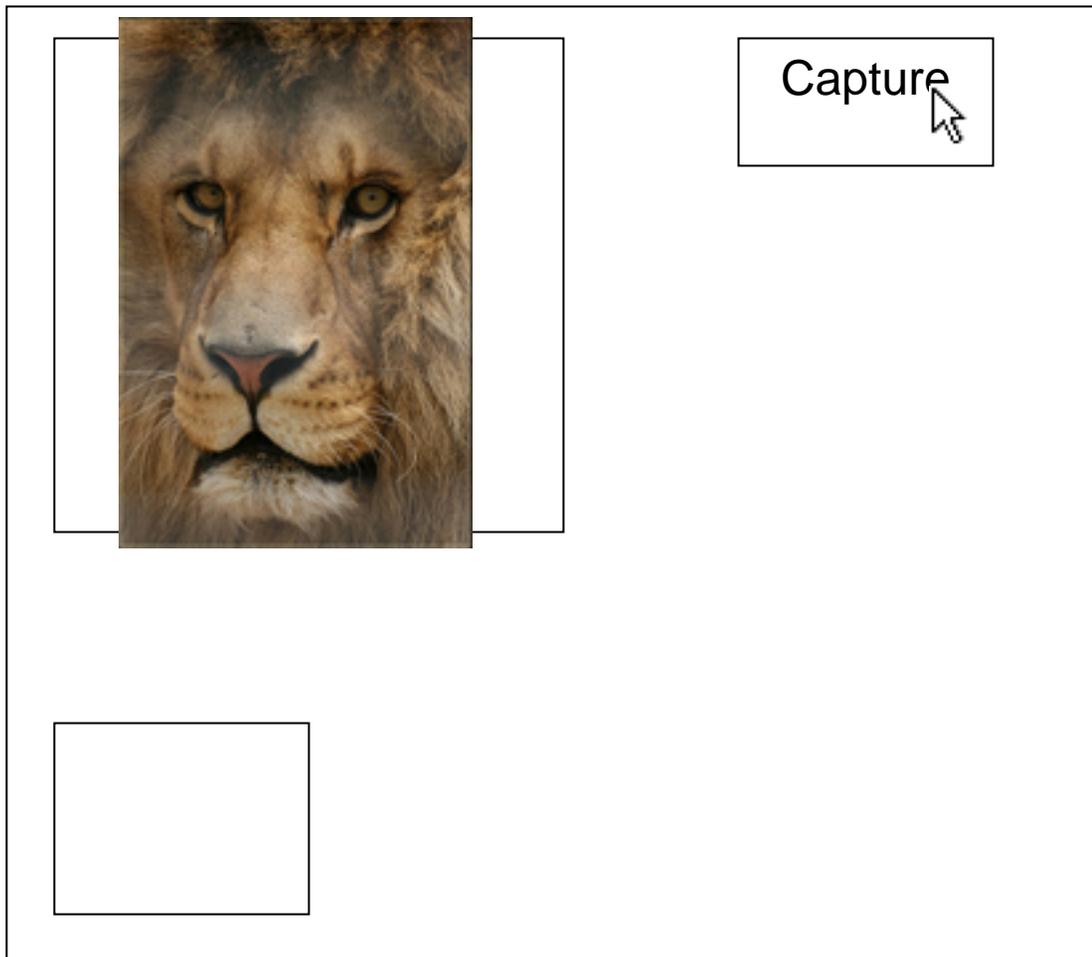
Courtesy flickr users la_salebete and smet_dk. Used with permission.

Display



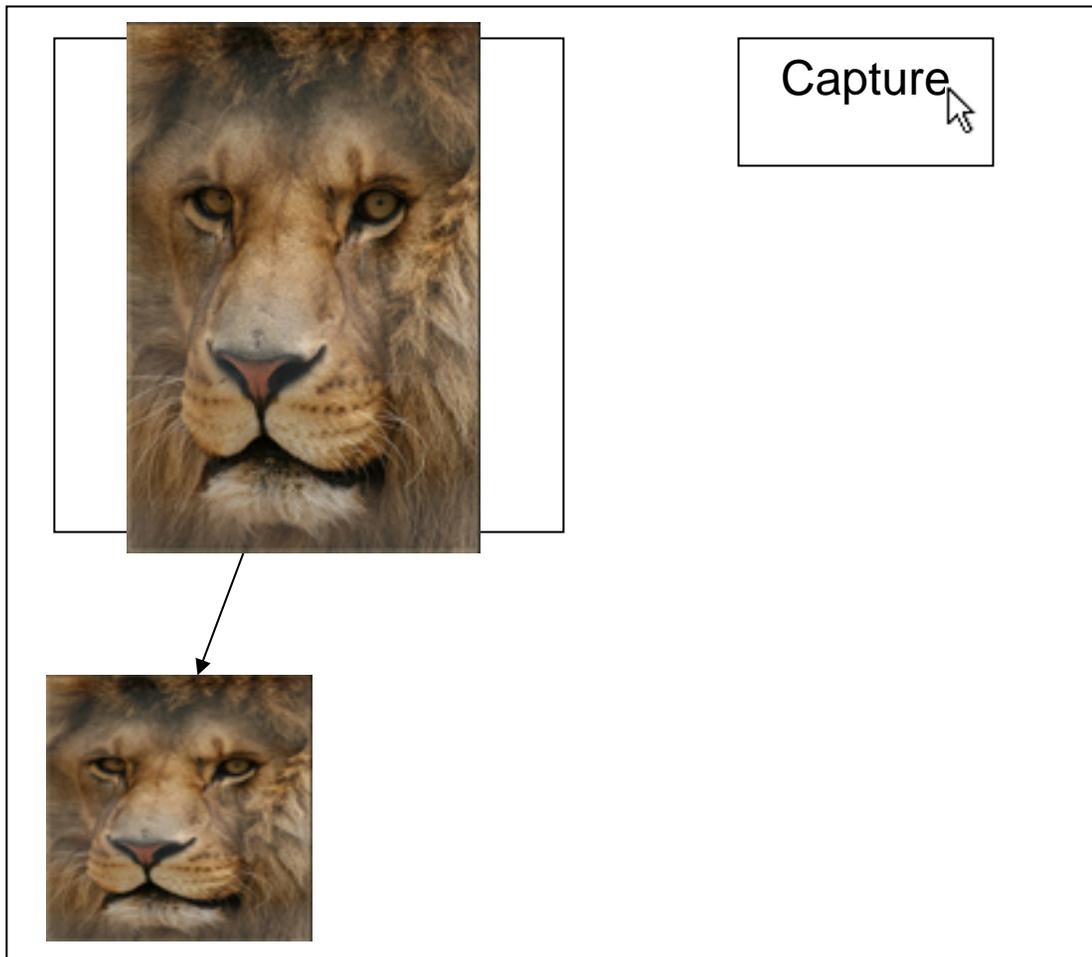
Courtesy flickr user christinatinarobinson. Used with permission.

Display



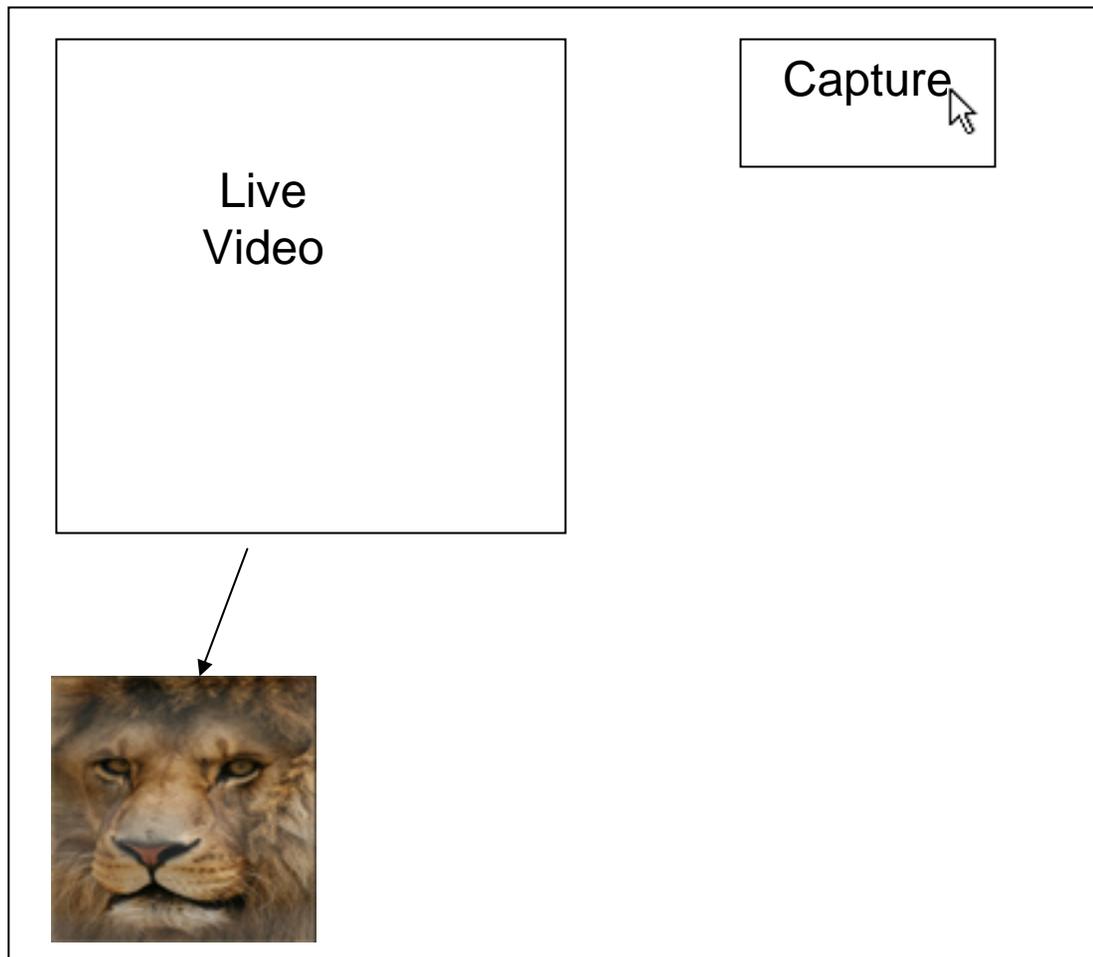
Click!

Display



Courtesy flickr user christinatinarobinson. Used with permission.

Display



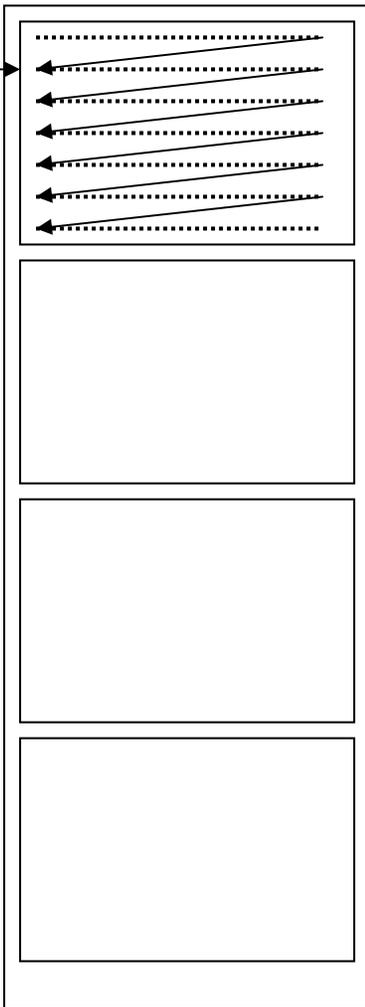
Courtesy flickr user christinatinarobinson. Used with permission.

Storage



Row, Column =
Address

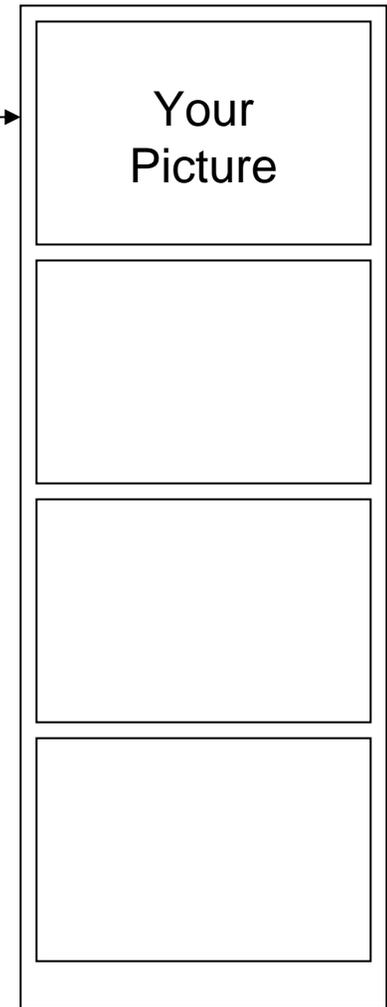
ZBT Ram 1



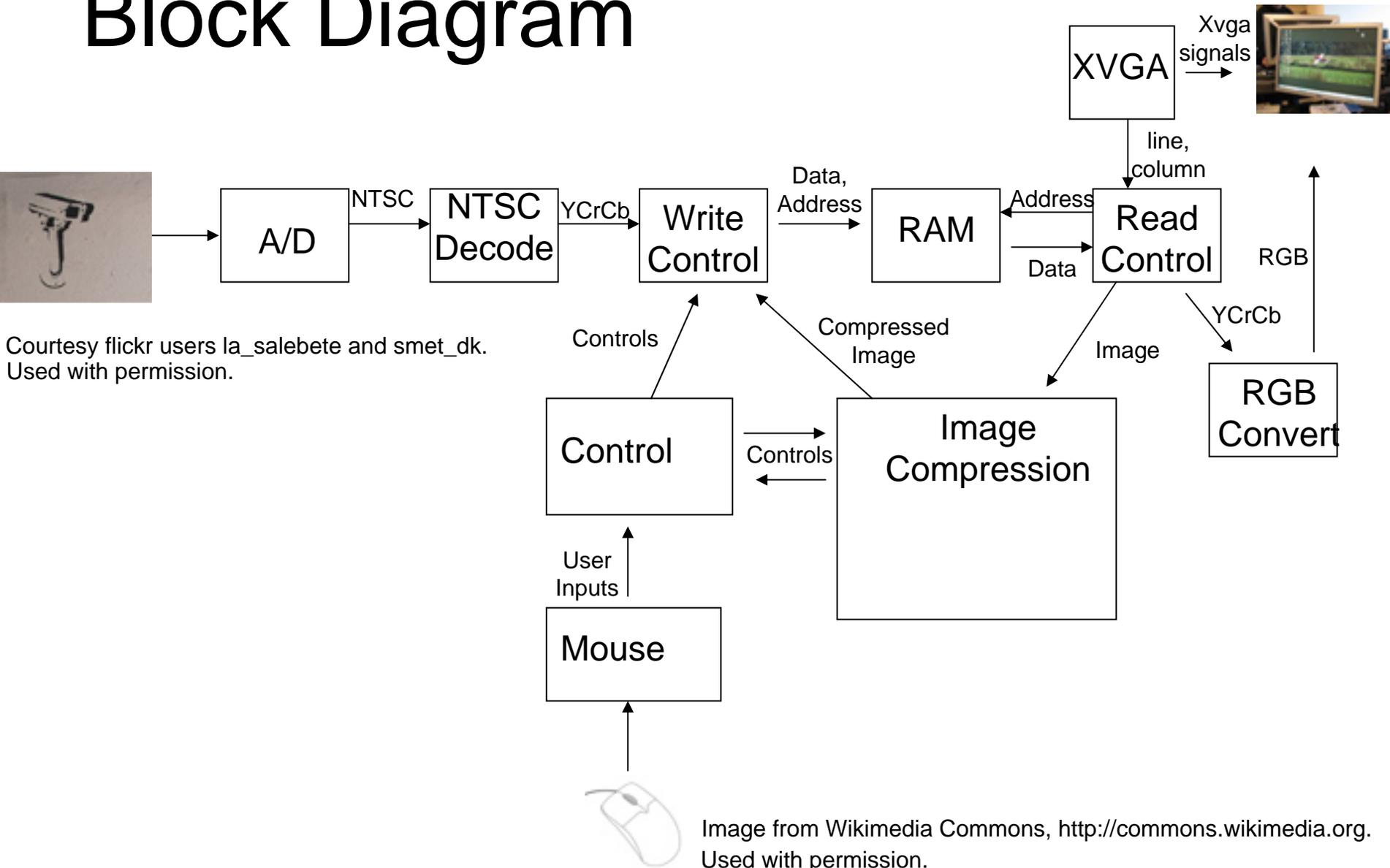
Click!

Compression

ZBT Ram 2



Block Diagram



Courtesy flickr users la_salebete and smet_dk. Used with permission.

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Image Compression

- 2D Discrete Cosine Transform: decomposes image into frequency components
 - Apply 1D transform to rows and then to columns
 - Separately transform 8 x 8 blocks of image
 - Eye acts as natural low pass filter
 - Only store low frequency components of image

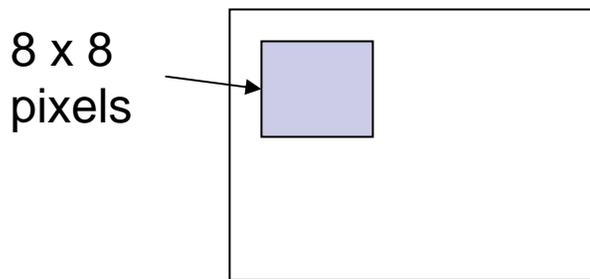
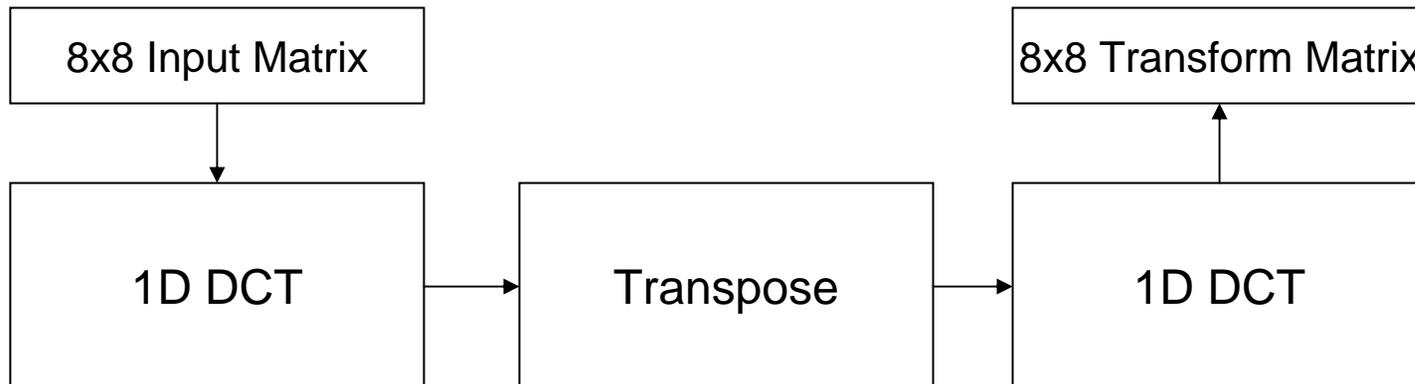
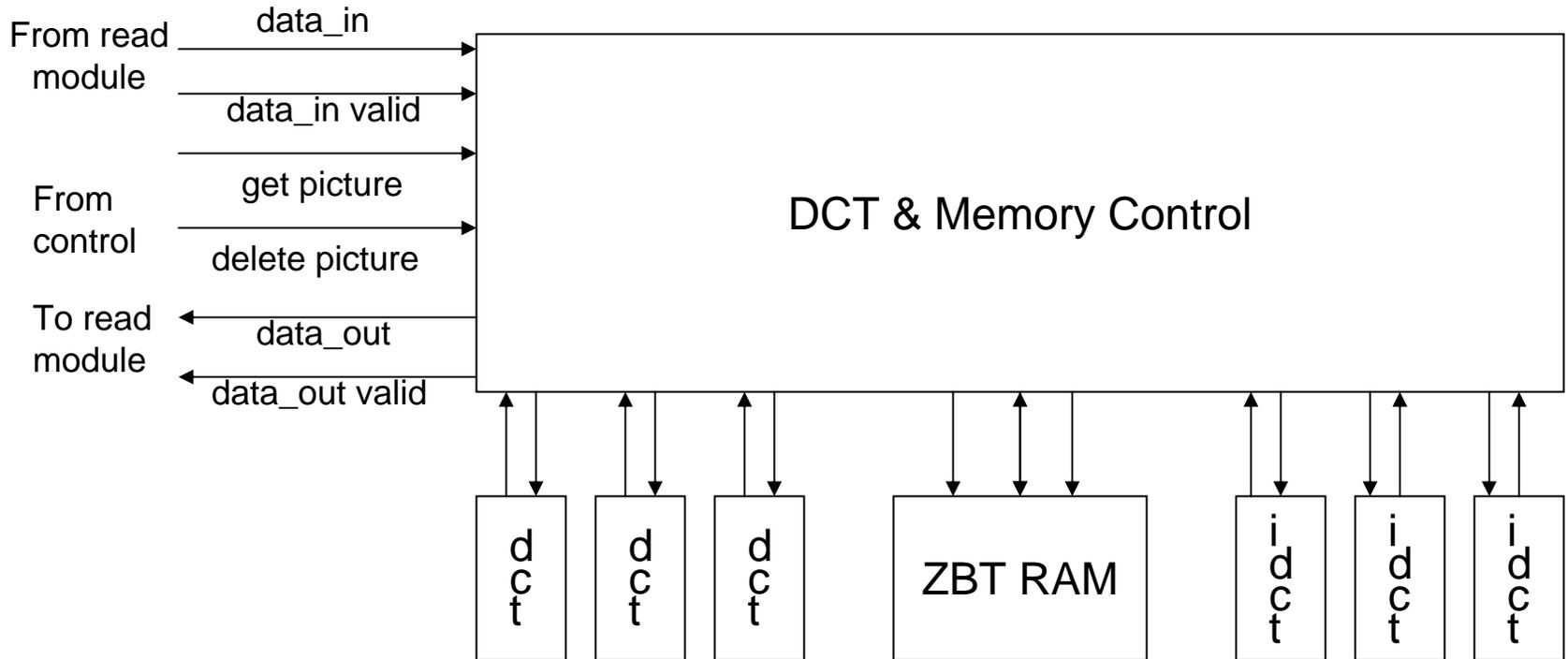

$$\begin{pmatrix} 180 & 150 & 23 & 12 & 5 & 2 & 1 & 2 \\ 130 & 125 & 54 & 22 & 8 & 3 & 5 & 4 \\ 89 & 77 & 45 & 19 & 4 & 2 & 0 & 3 \\ 45 & 33 & 21 & 15 & 8 & 4 & 3 & 1 \\ 22 & 9 & 12 & 5 & 1 & 2 & 5 & 0 \\ 17 & 13 & 7 & 10 & 8 & 6 & 2 & 2 \\ 8 & 3 & 4 & 6 & 2 & 1 & 3 & 0 \\ 5 & 2 & 8 & 3 & 1 & 2 & 5 & 0 \end{pmatrix}$$


Image Compression



- ZBT Ram can store ~ 5-6 pictures



Possible Additions

- Visual effects such as zoom, rotate, and blur
- Watermarked symbol that appears after processing the image



Questions?