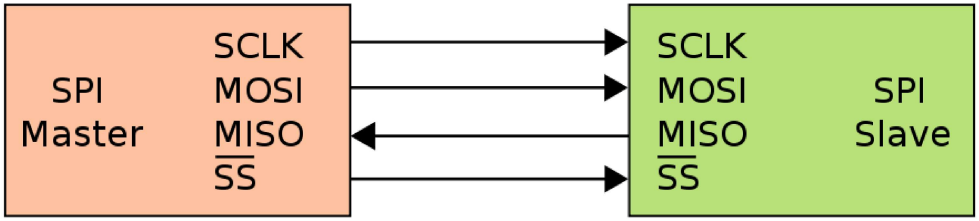
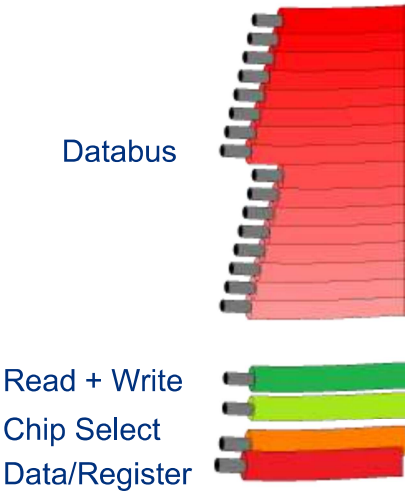
- SPI (Serial Peripheral Interface)
  - Ideal for small-scale Application
  - Less IO-lines required
  - Lower resolutions typ. 240x320 pixels
  - NOT suitable for high frame-rate applications
    - 240x320 pixels x 16bit color = 1.228.800 data bit per frame
    - 10MHz / 1.228.800 ≈ 8.1 frame/sec
    - Consider MCU or RGB!



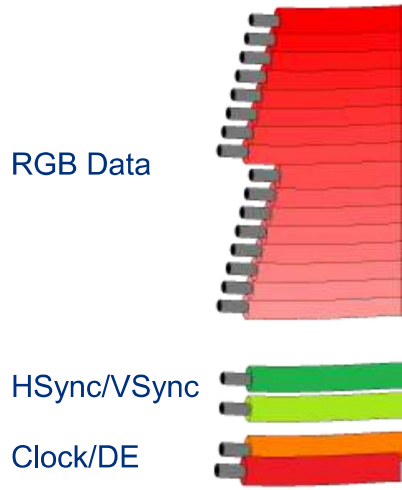
MCU Interface

- MCU (Parallel Interface)
  - Originally i8080 and M6800 Buses
    - Databus, Addressbus and control-signals
  - Display mostly implement only Databus and control-signals
    - Addressing is done by Index-register
    - Clocks 8-bit/9-bit/16-bit or 18-bit Data per clock-pulse
    - Better choice for small-scale application with demand for frame-rate
    - Mostly found on smaller displays (<=3.2”) w/ built-in controller



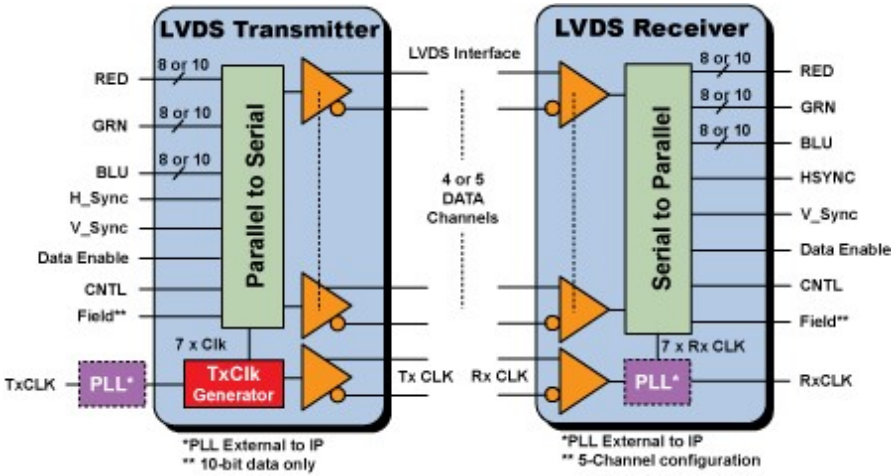
RGB Interface

- RGB (Parallel Interface)
  - Clocks Color-Data to Display pixel-by-pixel
  - Continuously sending color data from GPU to Display
  - SYNC- or Data Enable/DE-Mode
  - Typical Resolutions max. 800 x 480 pixels
    - @60Hz Framerate clock-frequency approx. 30MHz
    - Crosstalk may appear with long cables
    - EMI/Radiated Emission
    - Higher resolutions/Longer cables: Use LVDS/MIPI



LVDS/MIPI Interface

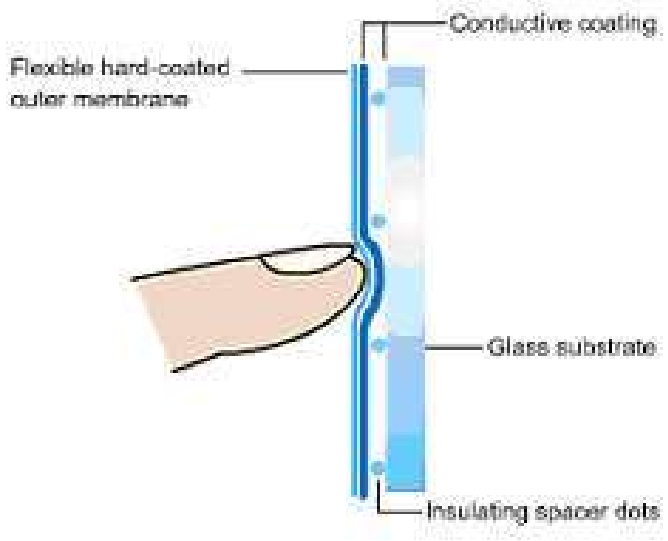
- LVDS (Low-voltage differential signaling Bus)
  - Serialized Data-transmission
  - Differential/Balanced transmission lines (twisted pair)
  - 3 Data lines: 18bit per color, 4 Data lines: 24-bit per color
  - Advantages:
    - Longer Distance btw Application and Display
    - Higher Display Resolution (typ. 1024x600+)
    - Better EMI-capabilities
  - MIPI = Mobile Industry Processor Interface



Source: Internet

Resistive Touch Technology

- Resistive Touch Panel (RTP)
  - Simple technology
  - PE-Glass Laminate
  - Activated by mechanical pressure
  - 4/5/6/7 or 8-wire interface
  - Only requires ADC – or simple touch controller



Source: Internet

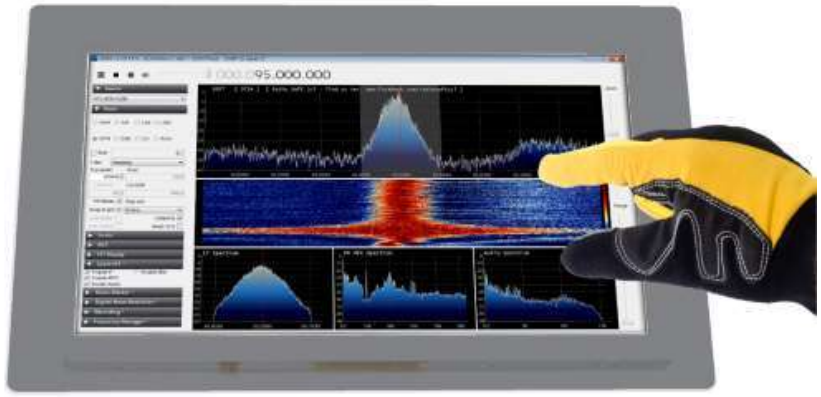
Resistive Touch +-

- RTP Pros
  - Simple Technology
  - Low price
  - Tactile feedback
  - Requires mechanical activation: Finger/Stylus/Card can be used
  - Easy to adapt: Dedicated controller or ADC in customers MCU
  - Software generally available

- RTP Cons
  - Optically not on-par to Glass!
  - Requires mechanical activation force
  - Wear and Tear to the top PET-layer
    - Scratches to Surface
    - Micro-cracks in PET ITO-layer causes bad linearity over time
  - Calibration required at Production time
  - Integration Restraints
  - No Vandal-proofing
  - No Sunlight Readability

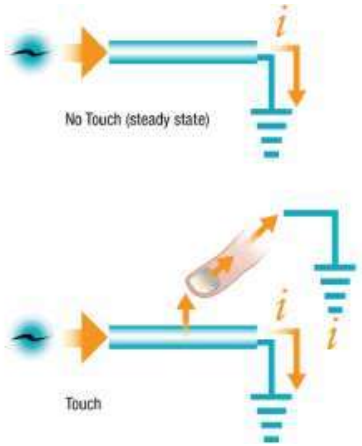
Capacitive Touch Technology

- Consider your needs
  - Single Finger or Multi-Finger touch function?
  - Swipe, slide, zoom, rotate?
  - Glove? (what kind of glove?)
  - Humid/moist/wet environment?
  - Public Application?
    - Cover Lens in General
    - Improvements for Outdoor Readability
    - Improvements for Vandal-proofing



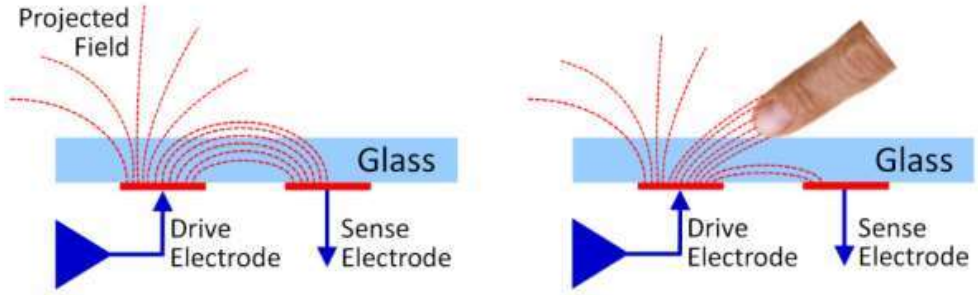
Capacitive Sensing Technologies

- Self Capacitance Technology
  - Not able to detect Multiple Touchpoints
  - Works with mist/water on the glass



Source: Internet

- Mutual Capacitance Technology
  - Can detect multiple individual Touchpoints
  - Challenged if water occur



Source: Internet