UNIVERSITY OF CAMBRIDGE

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Reduction of Common Mode Noise and Global Multi-valued Offset in Touch Screen Systems by Correlated Double Sampling

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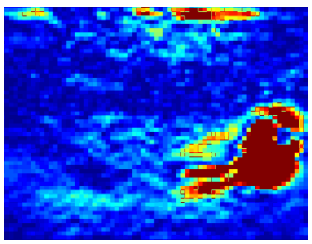
Introduction

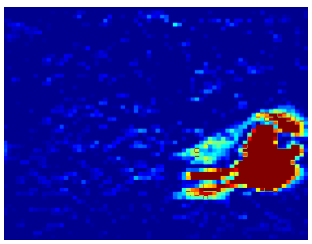
- Touch based interactivity has become an ubiquitous function in displays.
- Noise in the touch screen panels (TSPs) give rise to high power consumption and short battery lifetime.
- Correlated double sampling (CDS) based technique is employed to cancel global multi-valued and reduce common mode noise.

Results and Discussions

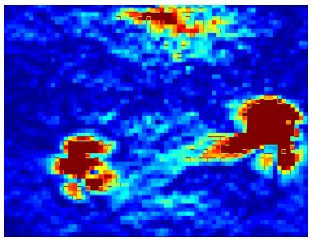
- Original touch frames and CDS processed frames:



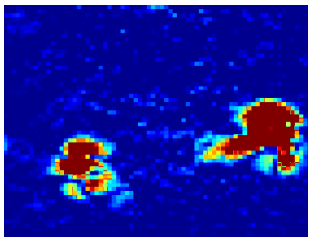
One Touch Frame



CDSed One Touch Frame

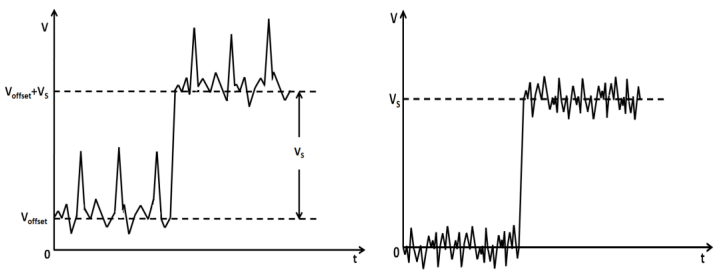


Multi-touch Frame

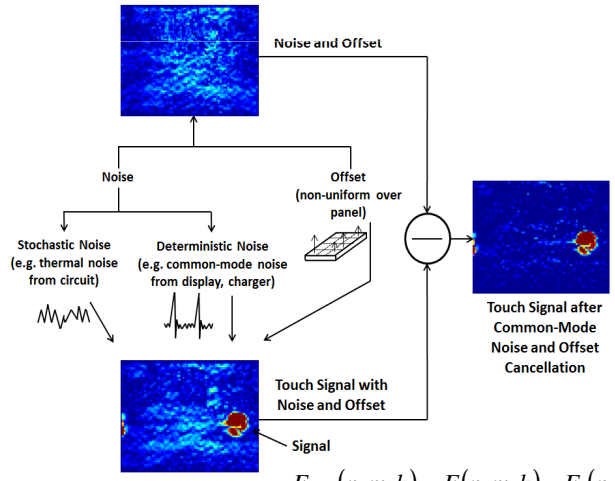


CDSed Multi-touch Frame

- Conceptual output of CDS and related issue:

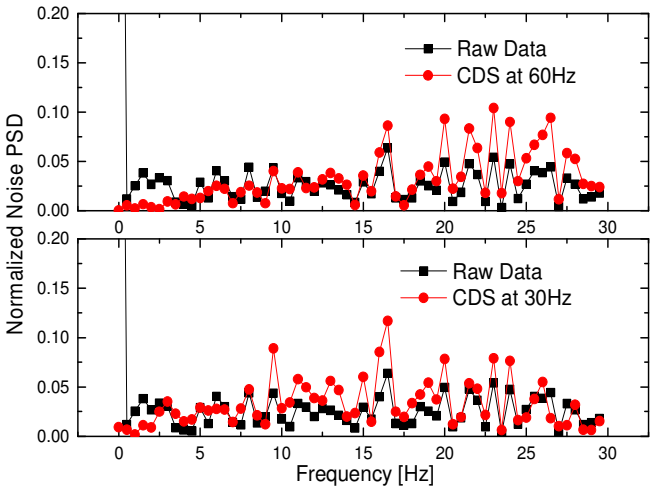


- Noise sources and concept of CDS algorithm:



$$F_{CDS}(n,m,k) = F(n,m,k) - F_0(n,m)$$

- Normalized PSD plots of original and CDS outputs:



Conclusion

- Common mode noise and global multi-valued offsets are reduced. SNR within 10% sampling frequency boosted by 7.6dB.
- Noise spikes due to weak correlation between adjacent frames are generated.

Related Publication: • Shuo Gao *et al.*, ***IEEE Journal of Display Technology***, 2016.