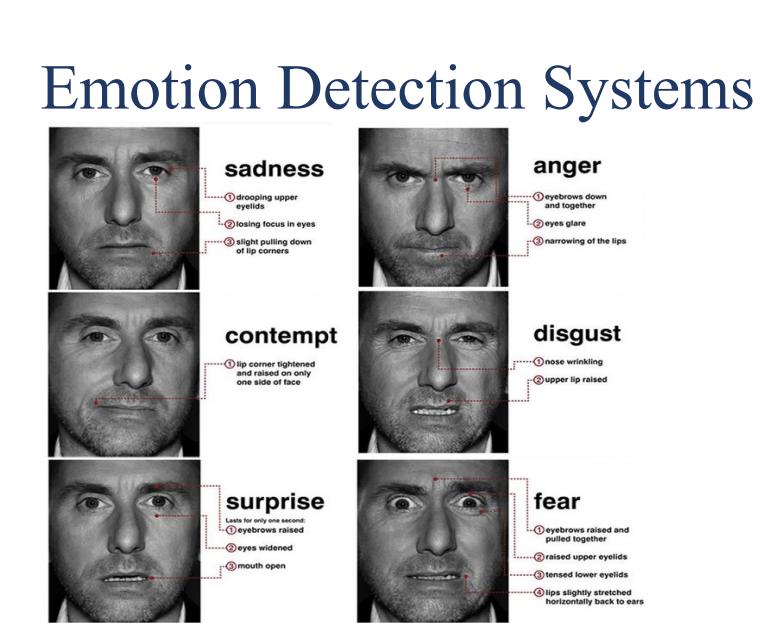
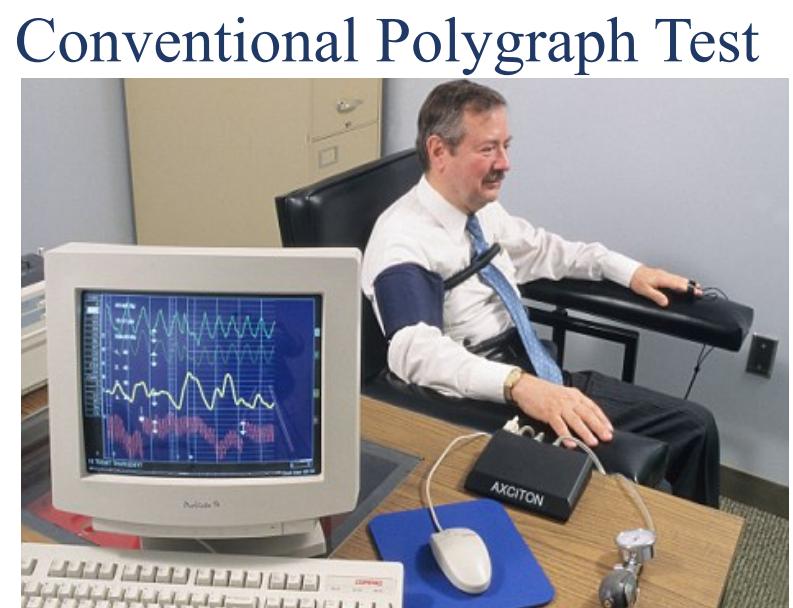


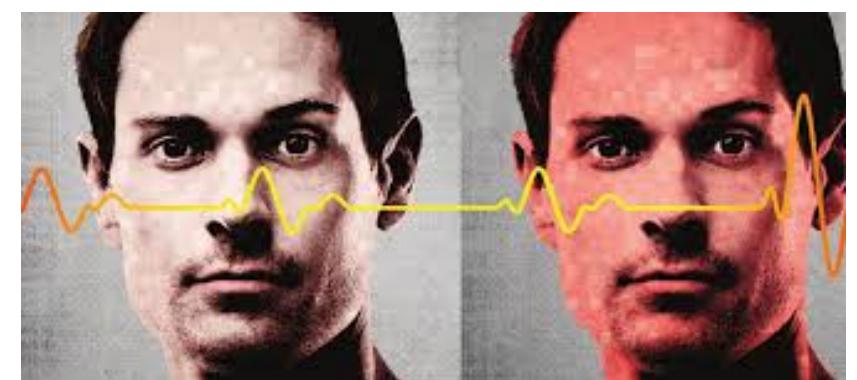


Computer Vision B657 Spring 2016, School of Informatics and Computing, Indiana University Bloomington<sup>4</sup>

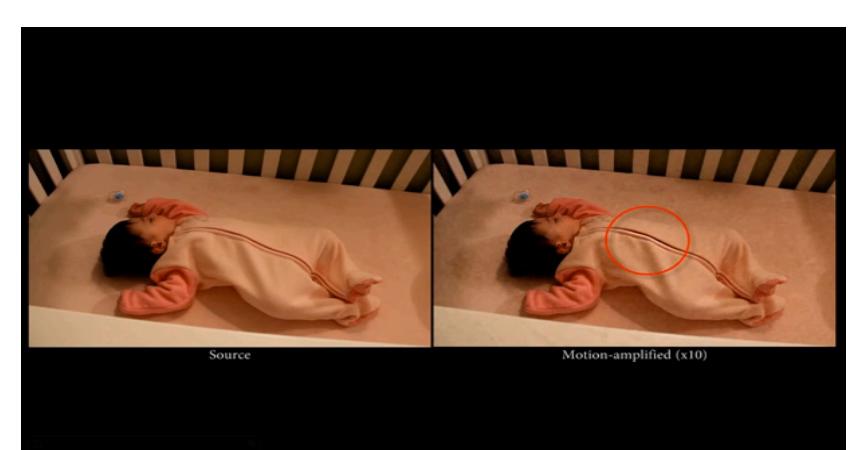
## Introduction



What if we can amplify very small changes in a video?  
Eulerian Video Magnification [5], [6], [7]



Pulse Rate Estimation



Respiration Rate Estimation



Improved Dynamic Biometrics  
with Phase Based Amplification



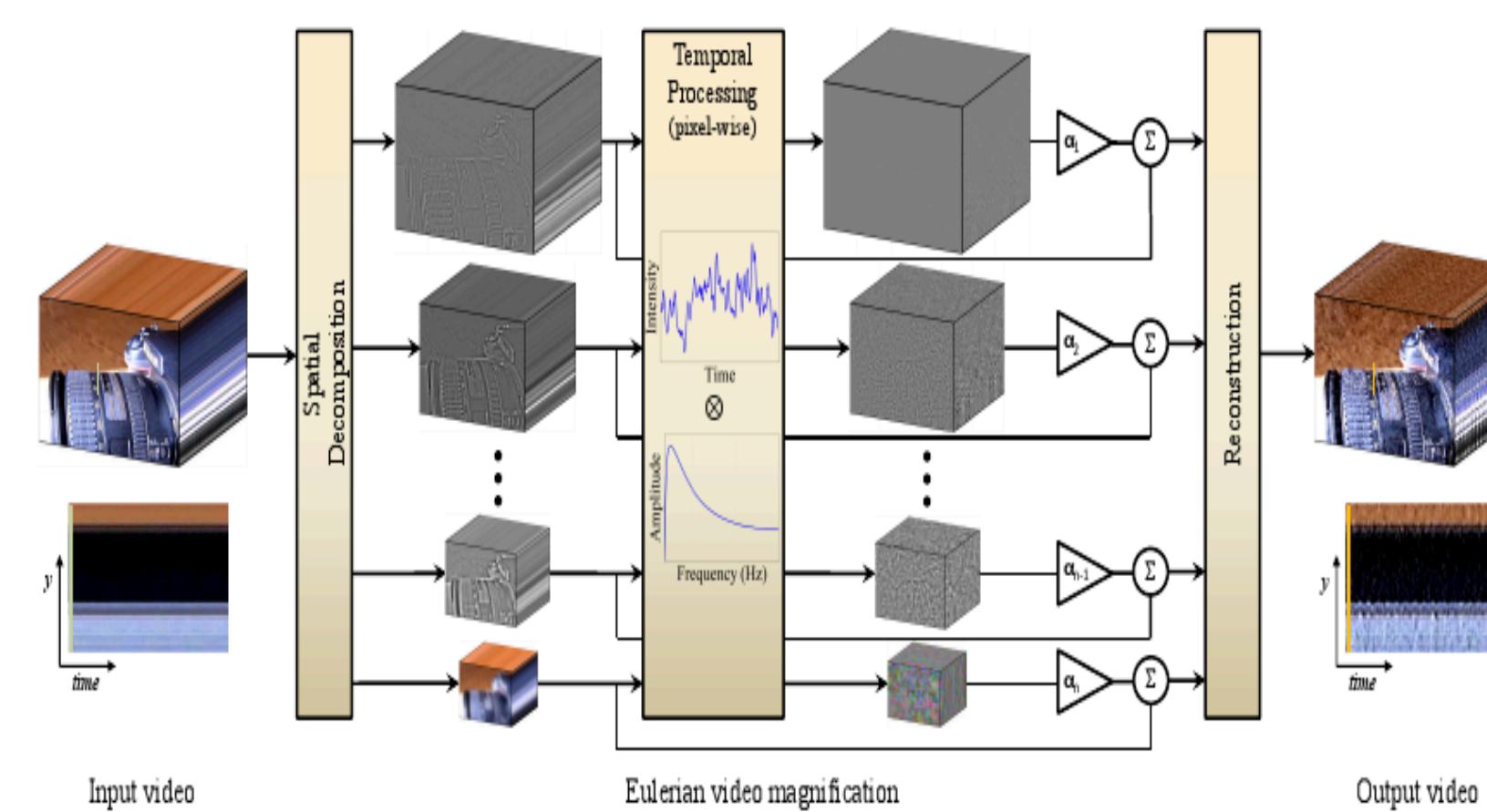
Micro-expression Detection and  
Amplification

What if we use amplified video feeds and use multiple modalities with deep learning in assisting lie detection?

## Objectives

- Implementation of EVM (Eulerian Video Magnification) using a portable language like Java.
- Automate detection of faces using Viola-Jones.
- Use EVM technique for pulse estimation, respiration rate estimation, biometrics, micro-expression detection and amplification
- Integrate the above techniques and use deep learning for better estimation of concealed emotions and thereby assist lie detection

## Eulerian Video Magnification Block Diagram



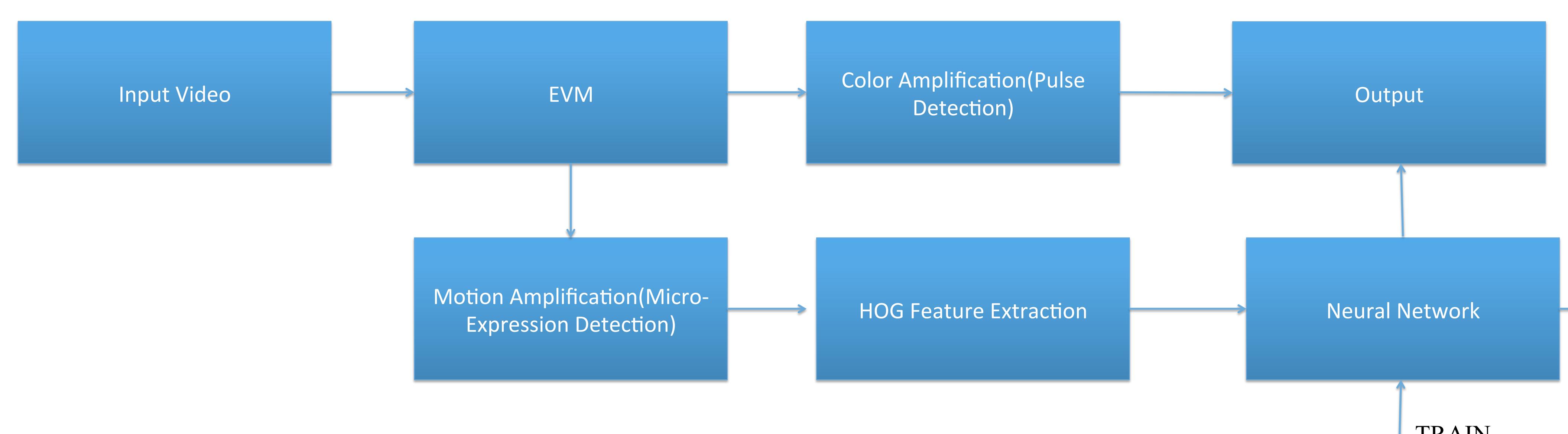
## COLOR AMPLIFICATION

- Convert image from time domain to frequency domain using fourier transformation.
- Filter out and then amplify the desired frequency
- Convert the image back to time domain
- Stack up the image upon the original image and display the result

## MOTION MAGNIFICATION

- Convert images from time domain to frequency domain using fourier transformation.
- Amplify and then Filter out the desired frequency band using bandpass filter.
- Convert the image back to time domain.
- Stack up the image on the original image and display the result.

## LIE DETECTION ASSISTANCE SYSTEM



## Results

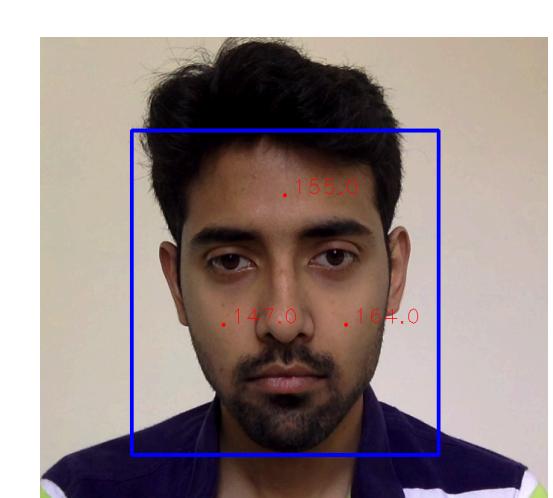


FIG 1(PULSE  
DETCTION)

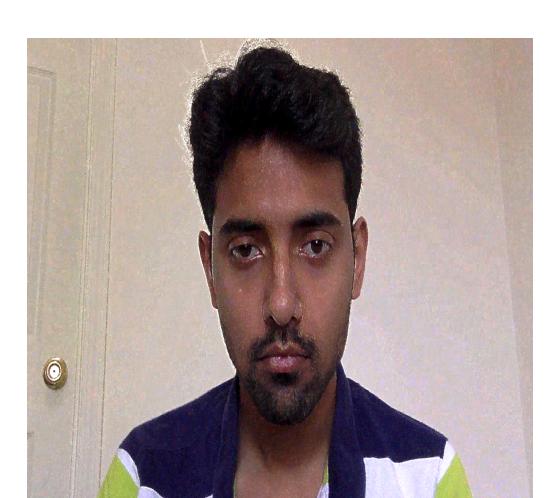


FIG  
2(MOTION  
DETECTION,  
 $\alpha=5$ )

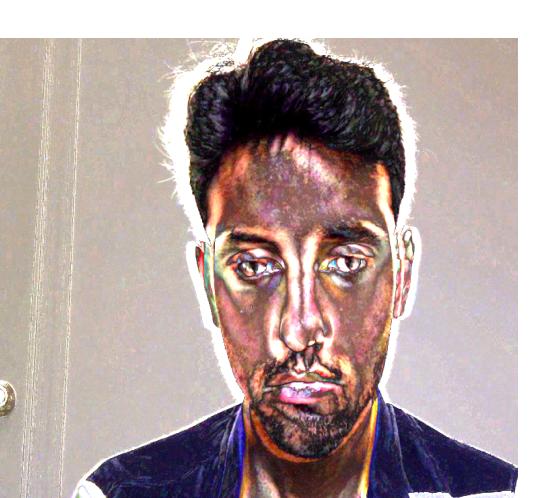


FIG  
3(MOTION  
DETECTION,  
 $\alpha=20$ )

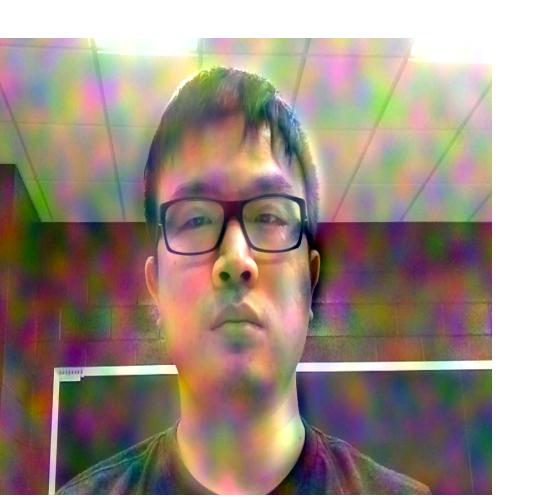


FIG 4(COLOR  
MAGNIFICATION,  
 $\alpha=50$ )

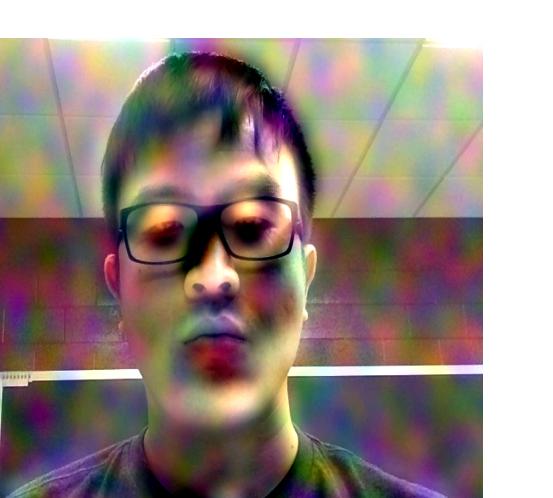


FIG 5(COLOR  
MAGNIFICATION,  
 $\alpha=100$ )

## Conclusions

- Pulse detection works with some offset which could be corrected by using IIR or Butterworth Filters.
- Micro expression requires training of the Neural Network which requires optimization.
- Once the neural network is trained, we could easily detect emotions(which could be used for lie detection) and use the pulse data along with it to create the desired system.

## References

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## Contact Information

- [achbogga@indiana.edu](mailto:achbogga@indiana.edu)
- [ddwivedy@indiana.edu](mailto:ddwivedy@indiana.edu)
- [furzhang@Indiana.edu](mailto:furzhang@Indiana.edu)
- [soiccsr@indiana.edu](mailto:soiccsr@indiana.edu)
- [djcran@Indiana.edu](mailto:djcran@Indiana.edu)
- [venugopal1035@gmail.com](mailto:venugopal1035@gmail.com)