

# Image analysis of strain visualization stickers with mobile tablets

Keywords: color extraction, real time image analysis, smartphone, tablet PC

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- Background**
- Strain visualization sticker, developed by Dr. H. Fudouzi (NIMS), is a unique sensor for public infrastructures like bridges, and shows us where stress acts along its surface.
  - We need automated image analysis tools to reduce subjective variability.

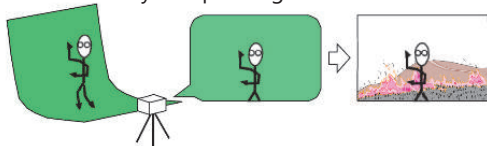
- Aim**
- Provide inexpensive analysis tools for helping nonexpert collaborators to inspect the targets.
  - Make the analysis real-time to find the target area quickly.
  - Apply the computer vision technology that is already used in robotics and automatic car-driving.

## Advanced Research Topics

### Logic

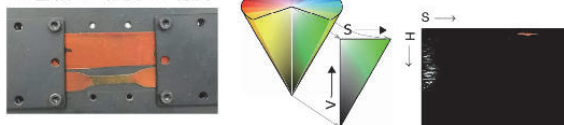
How to detect color change

- Modified "Chroma key compositing"

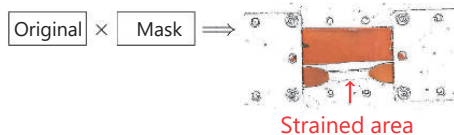


- Convert RGB pixels to HSV and calculate histogram

H: 色相 S: 彩度 V: 明度



- Leave the area of similar color



### Application

Platform-independent



Strained area

- Computer vision library  
⇒ Open source
- Multiplatform  
  - Mobiles
  - PC + USB Camera
- ⇒ Each application calls a common routine for image analysis written in C++
- Colored-scale conversion available



**Publications** • H. Fudouzi et al, Proc SPIE 1016820 (2017). <https://doi.org/10.1117/12.2259822>



### Summary

- Evaluation by "Bring-your-own-device"
- Highlight the area of interest by real-time analysis
- Multiplatform application powered by OpenCV

### Research outcome

- Develop an analytical method independent on the position of light source
- Do field tests and get feedback
- Remote monitoring with IoT technology