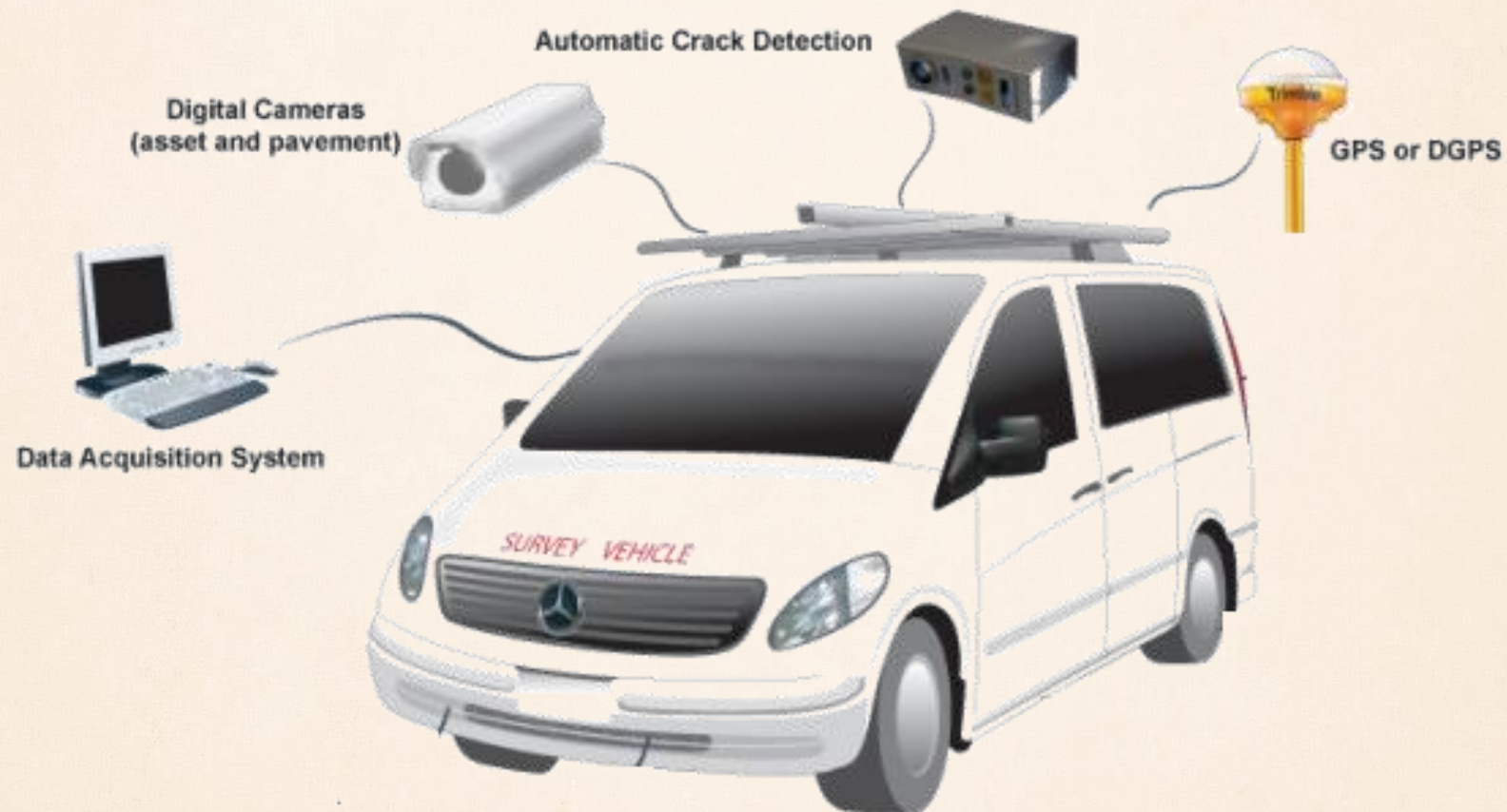


CRACK DETECTIVE

“ROAD CRACK DETECTION AND CLASSIFICATION”



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MOTIVATION / RATIONALE

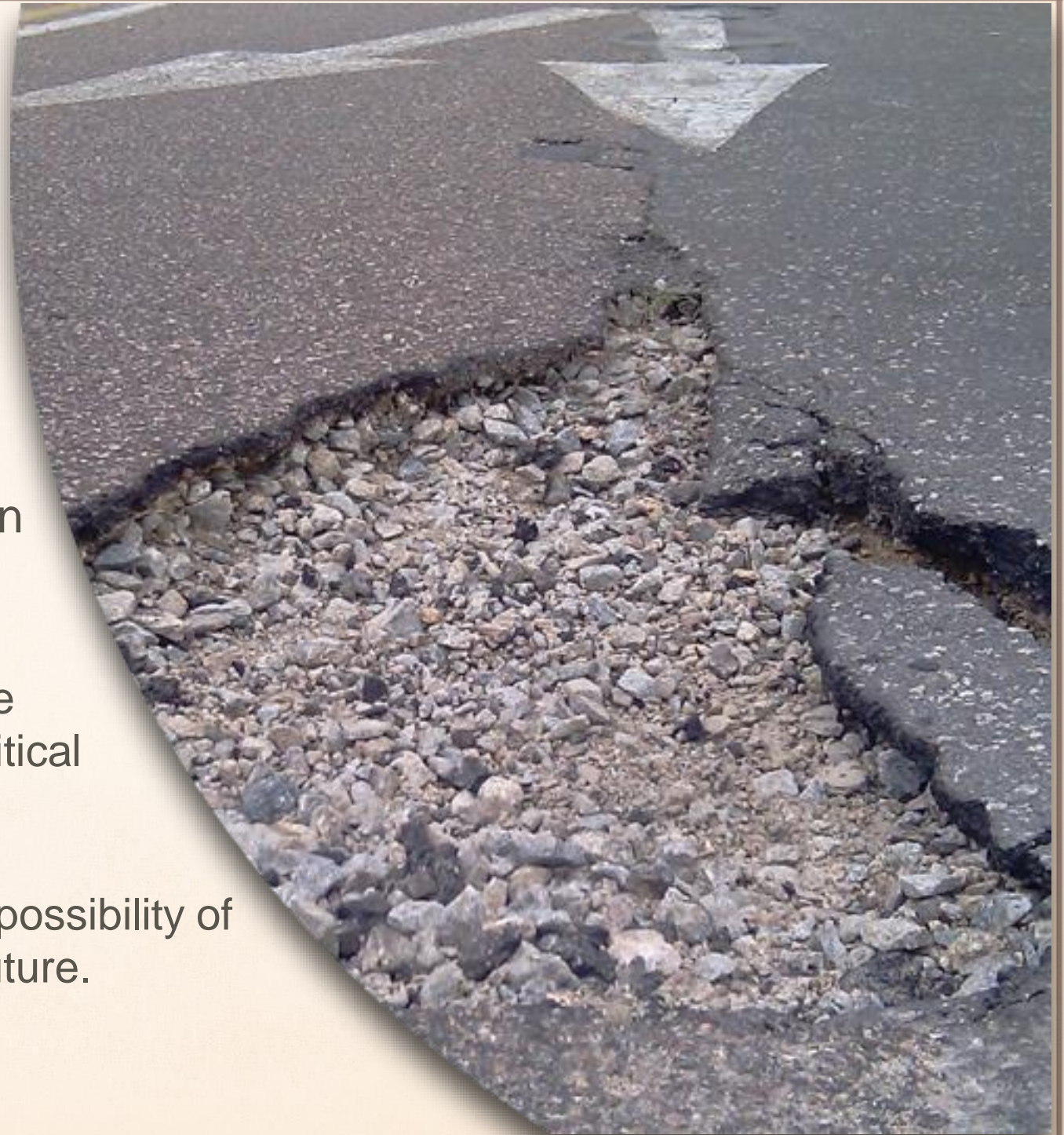
❖ Smooth roads → Smooth mobility

❖ Bumpy Rides → Frustration

❖ Large Road Anomalies → Damage Vehicles
→ Traffic Congestion
→ Accidents

- Repairing these large anomalies requires large amount of monetary investment, planning, political & governance support etc.

- ❖ Therefore, we need measures to minimize the possibility of these large anomalies appearing on roads in future.



MOTIVATION / RATIONALE (CONT'D)

According to literature review:

- ❖ Large anomalies originate from small cracks.
- ❖ Crack detection is important at an early stage.
- ❖ Expenses to repair cracks exponentially increases with the size of the cracks.
- ❖ Different types of cracks needs different types of repairing mechanism.

EARLY CRACKS CAN BE REPAIRED EASILY AT A LOW COST



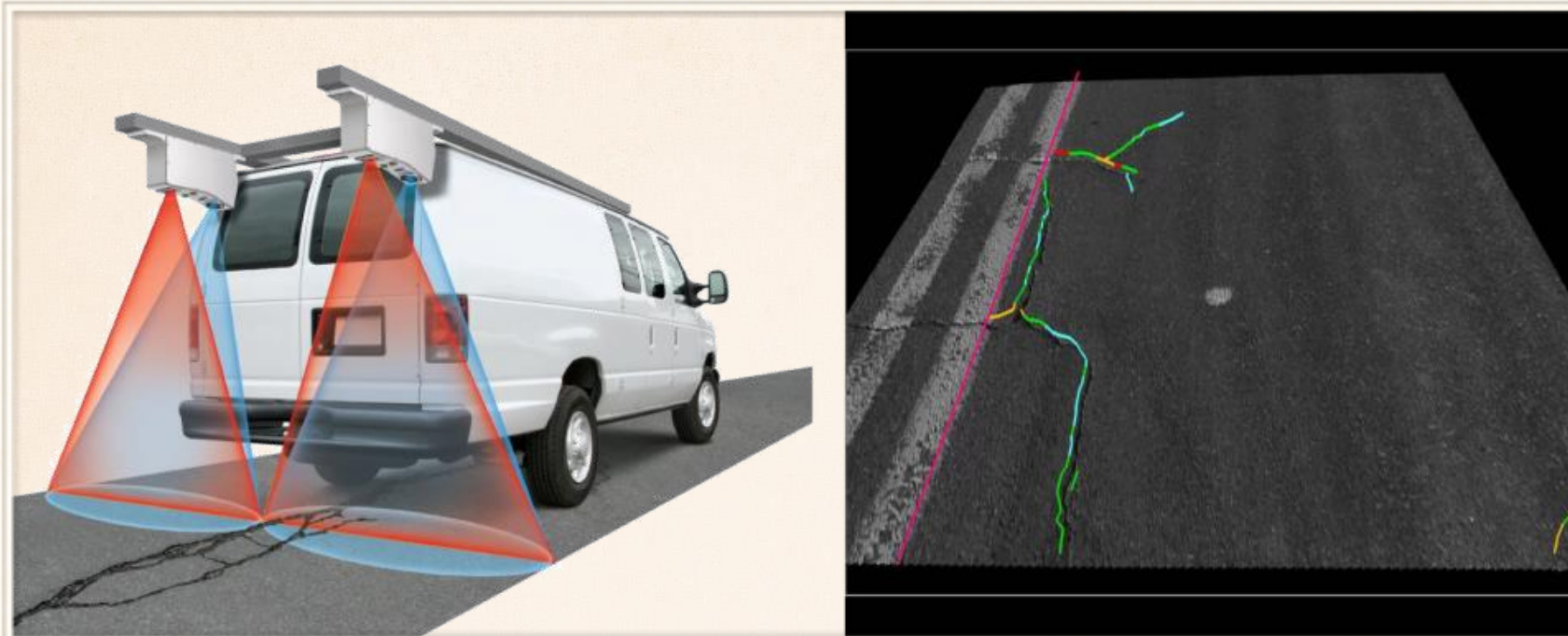
MOTIVATION / RATIONALE (CONT'D)

Current Process:

- ❖ Manual Inspection by naked eye
- ❖ Practical since easy to detect cracks from naked eye

Drawbacks (Since roads are thousands of km long):

- ❖ Large amount of work force required
- ❖ It is expensive
- ❖ Slow and tedious
- ❖ Dangerous especially on high speed roads like highways



PROBLEM STATEMENT

HOW MIGHT WE improve the road anomaly detection by automating the manual inspection **FOR** relevant authorities (that monitor and repair roads e.g. KMC, DMC) **SO THAT** they have a faster, cheaper, safer and less labor-intensive process.

EXISTING SOLUTIONS (1)

ROAD CRACK DETECTION USING DEEP CONVOLUTIONAL NEURAL NETWORK,

(Zhang, Yang, D. Zhang, and Zhu, 2016),

Published in: [2016 IEEE International Conference on Image Processing \(ICIP\)](#)

- ❖ Pictures are taken manually at the Temple University Campus and classified into crack and non-crack using deep convolutional neural networks

Proposed Future work:

- ❖ Image acquisition and transfer to the system for detection of cracks should be automated

EXISTING SOLUTIONS (2)

DETECTING ROAD CRACKS USING CONVOLUTIONAL NEURAL NETWORKS,

Report by Kazim Raza Rizvi, Sakina Maskawala and Ambreen Aslam, 2018:

- ❖ A rover that takes images (along with their GPS coordinates) stored in an SD card which are manually transferred to a pc which has a detection system that can-do binary classification as crack or no crack.

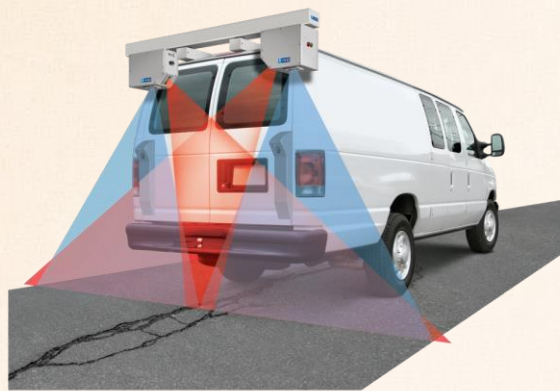
Proposed future work:

1. Further classification of cracks need to be done
2. Framework of rover can be adopted and fixed on a road vehicle for better coverage and robustness

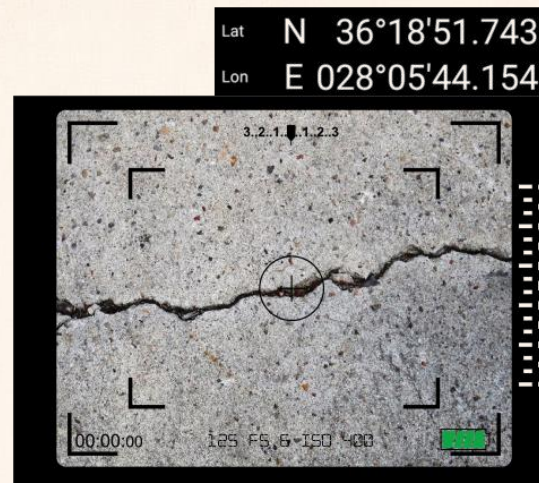
“Contribution towards the existing solution”

– *Crack Detective*

PROPOSED SOLUTION



On board camera module



Images with GPS coordinates



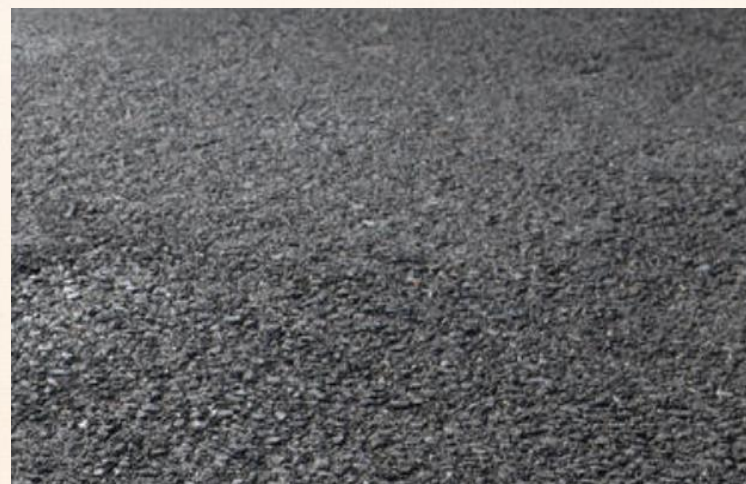
Images stored on server



Data acquired for processing



Crack



No - Crack

CLASSIFICATION OF CRACKS

(Tentative)

Alligator Crack



Transverse Crack



Longitudinal Crack



ADVANTAGES OF THE SOLUTION

Compared to manual inspection:

- ♦ Is fast and reliable instead of slower traditional human inspection procedures and manual reports
- ♦ Less labor-intensive
- ♦ Safer method when monitoring high speed roads like highways.
- ♦ Cheaper since less workforce is required.

Compared to existing solutions:

- ♦ Automated image acquisition and transfer to the system
- ♦ Classification of cracks into further categories
- ♦ Practical on live roads since no need to block roads for inspection

DELIVERABLES

- ◆ Image Acquisition with GEO tagging with automatic online transfer of images
- ◆ Detection and classification of cracks into different categories

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THANK YOU !