

Progress Presentation-II

e-Yantra Summer Internship-2016

Automatic Theme Evaluation From Videos

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Overview of Project

Overview of
Project

Overview of Task

Analysis of Task
Accomplished

Sound
Processing.

Homography

Path Evaluation

Thank You

- **Project Name:**Automatic Theme Evaluation from Videos
- **Objective:**
 - Automatic evaluation of black/white following robot from videos.
 - Automatic evaluation of Puzzle Solver theme from videos.
- **Deliverables:**
 - Matlab code for automatic evaluation of black/white line following robot from video.
 - Matlab code for automatic evaluation of Puzzle Solver Theme.
 - Reports and results.

Overview of Task

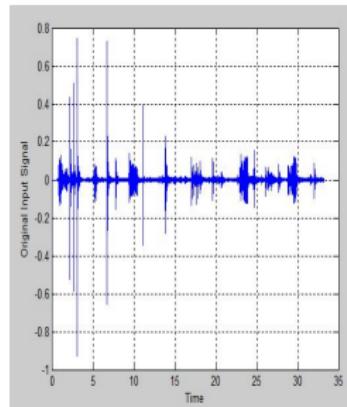
Key Tasks	Status	Deadline
Corner Detection	Accomplished	-
Object Detection for tracking	Accomplished	-
Homography	Accomplished	-
Path Evaluation(Predefined Path)	Accomplished	-
Integrating above tasks	Accomplished	15 June
Automatic Path Evaluation	Accomplished	22 June
Detecting picking via buzzer and led	Accomplished	28 June
Deciding marking scheme	Pending	30 June
Documentation and reports	Pending	05 July

Analysis of Task Accomplished

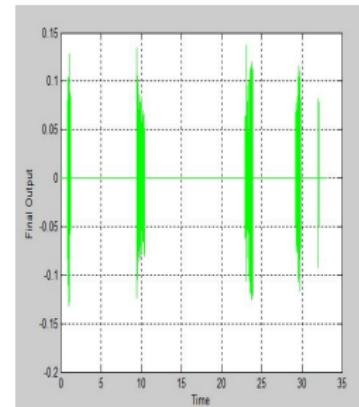
- Integration of corner detection and homography with object tracking algorithm through mean-shift.
- Sound Processing to identify buzzer beep.
- Path Evaluation(Predefined Path)
 - Object Tracking using Mean Shift Algorithm
 - Calculation of deviation from specified path.

Sound Processing.

The task was to identify buzzer beep from various other sounds in the video and record the time frame of beeps.



(a) Input

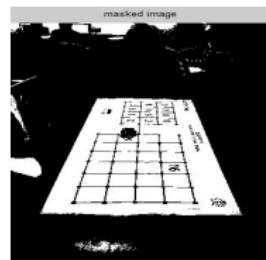


(b) Output

Techniques Employed

- Time- Domain Analysis
 - Successful in videos which were shot in predominantly quiet environment.
 - Failed miserably where there were even small noise or disturbances.
- Frequency- Domain Analysis
 - Fourier Transform of time domain gives us the required Frequency Domain of the signal.
 - Immune to outside noise and worked very well.
 - All robots had frequency between 2.7kHz to 3 kHz.

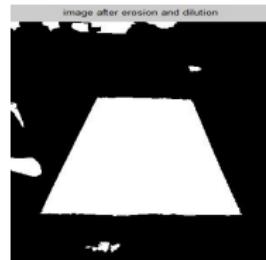
Intermediate Stages



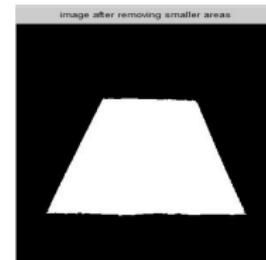
(a) Image after thresholding



(b) Image after filling holes



(c) Image after erosion and
dilation



(d) Image after selecting the
patch with max. area

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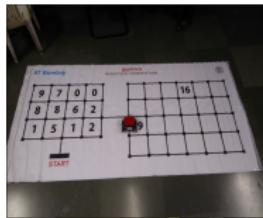
Thank You

Challenges

- Designing of filters was bit of a task.
Choosing the order of filter and determining the type of filter as in butter filter or various other filters offered by matlab was quiet confusing and challenging.

Robot Detection Techniques

- Using filtering and masking.



(a) Original Image



(b) Image after filtering



(c) Robot Identified

- Machine Learning.

Corner Detection Techniques

- Using Harris-Corner Detection.
 - Not sure that it will only give four corners.
- Detection using polar-coordinates.
 - Not efficient method and does not give desired output for our images.
- By dot product of two vectors.
 - Absurd results since the edges of the masked images are not smooth enough.
- Using markers.
 - Results somewhat accurate and meaningful.

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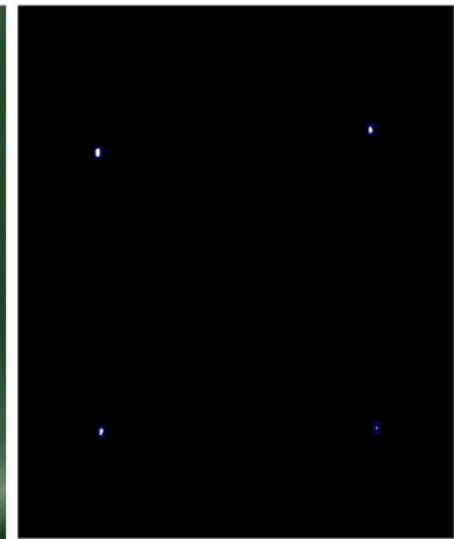
Path Evaluation

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Results after using methods with marker



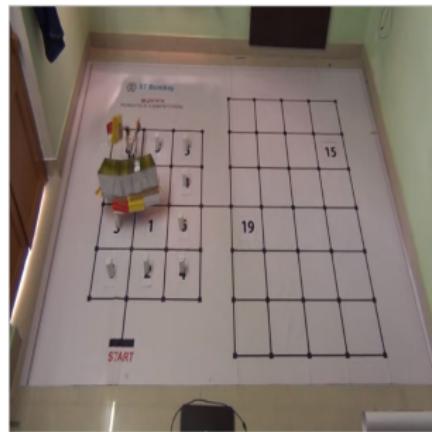
(a) Input



(b) Output

Challenges

- Due to varying lighting conditions.



(a) Input



(b) Output

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(b) Output

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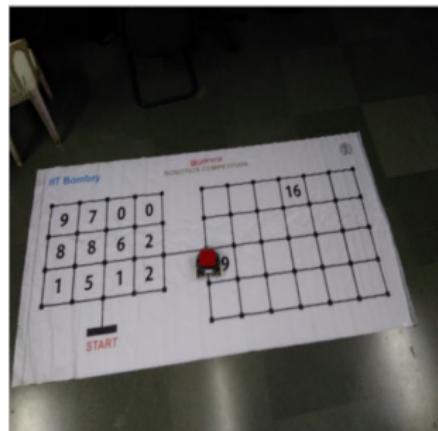
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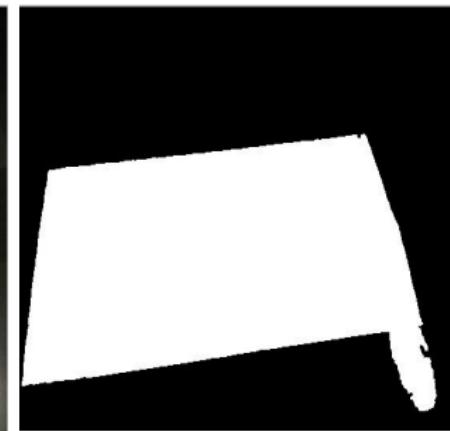
Path Evaluation

Thank You

- Due to kinds of surfaces.



(a) Input



(b) Output

Homography

Now the next big challenge was to bring all the videos taken from different angles to a similar viewing angle so that evaluation is easier. This is done by method known as homography. For instance we have these images for theme Puzzle Solver 2 taken by different teams.

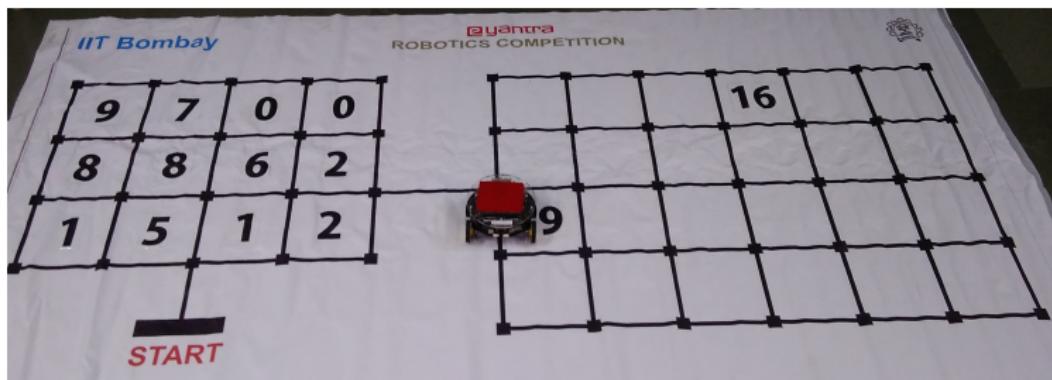


Figure: Testing Purpose

Progress
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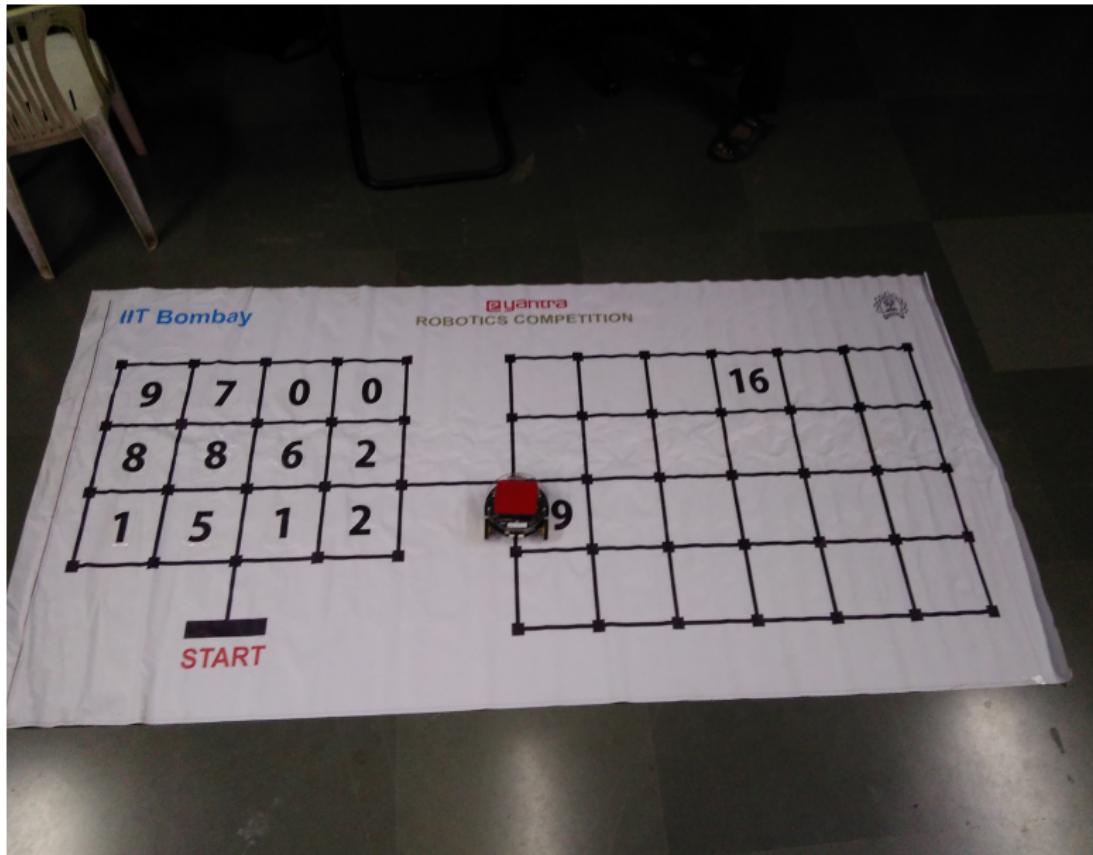


Figure: Testing Purpose

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Figure: Team:PS2#1096

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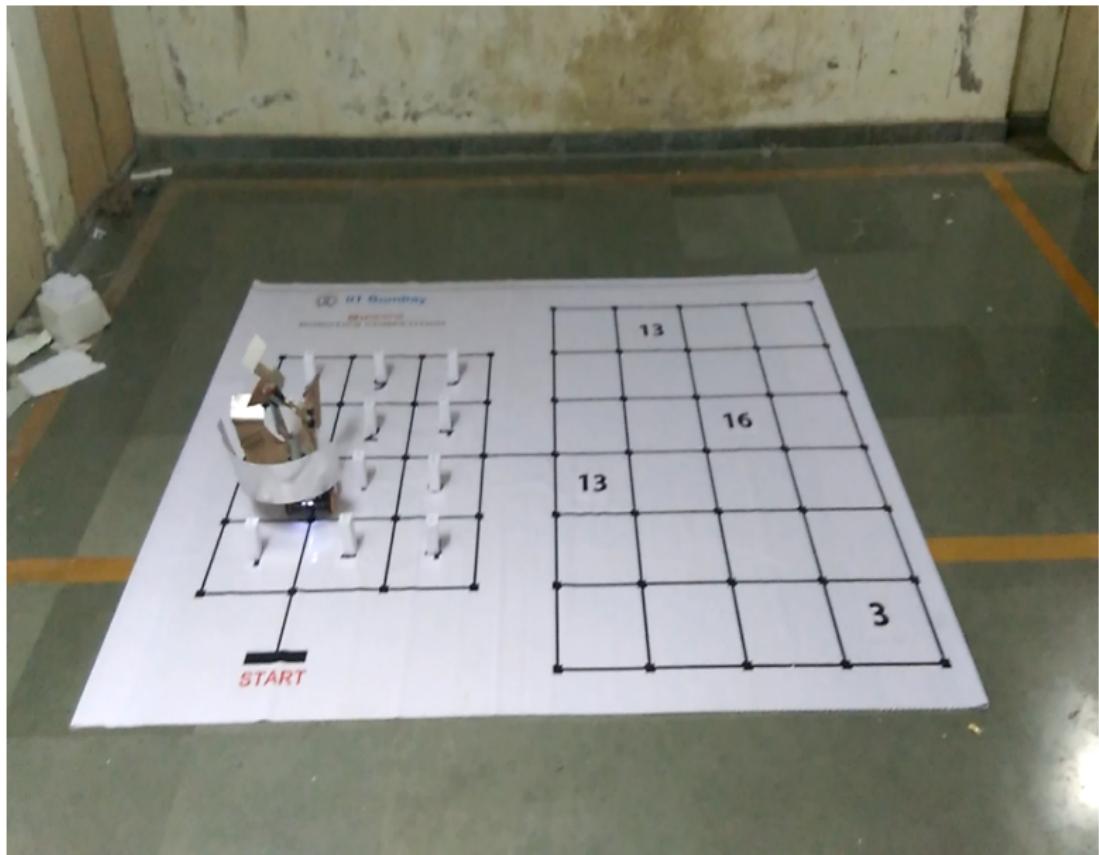


Figure: Team:PS2#1504

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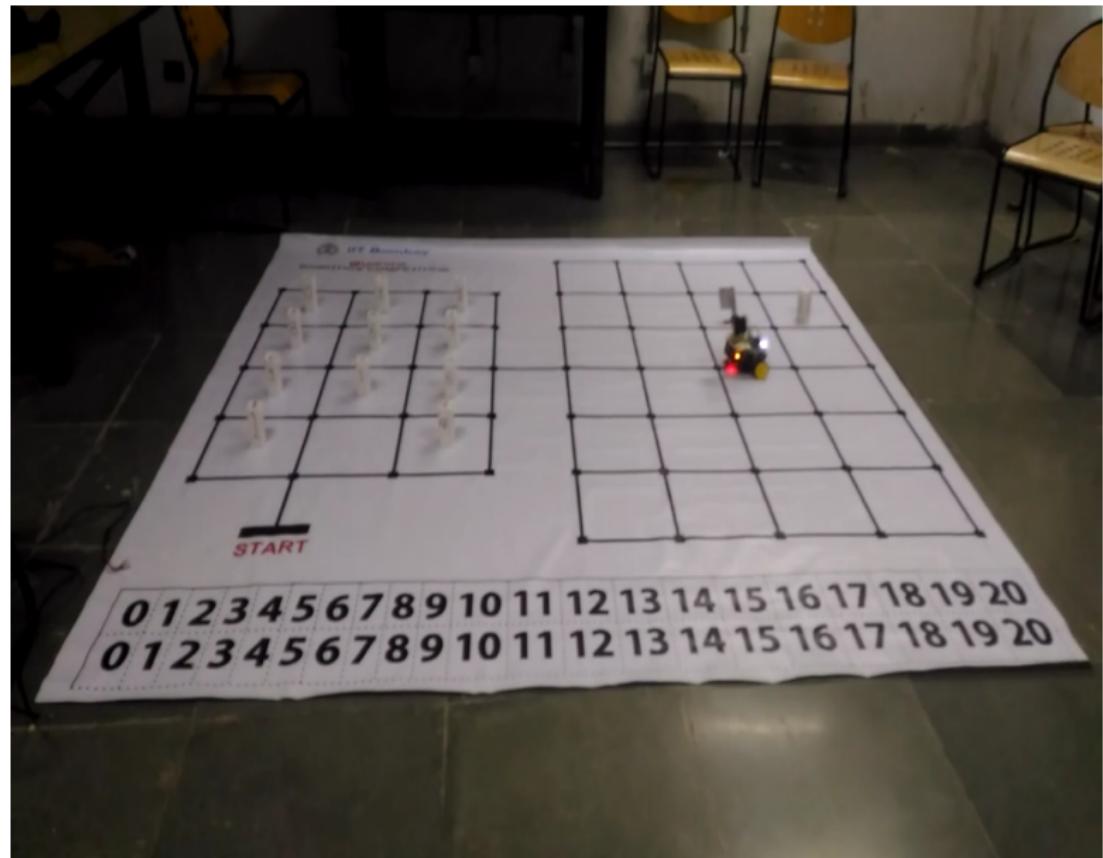


Figure: 5

Result after homography.

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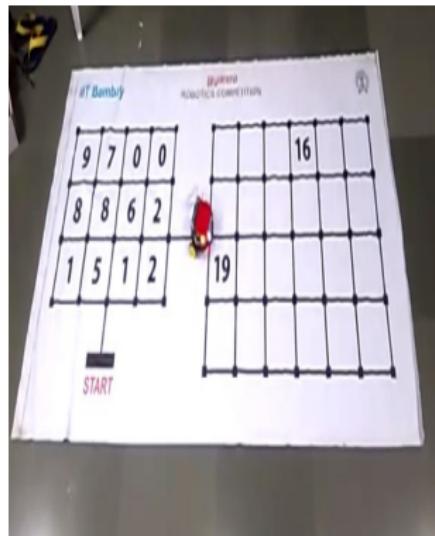
Analysis of Task
Accomplished

Sound
Processing.

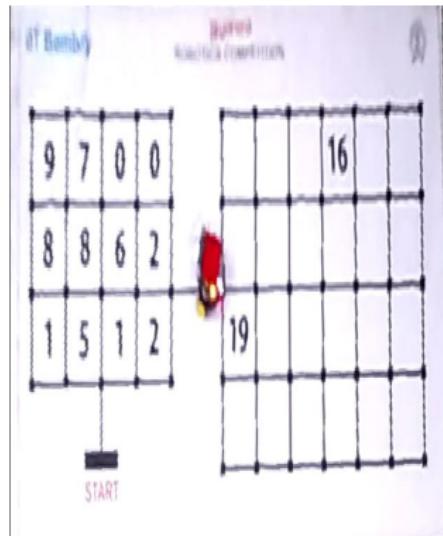
Homography

Path Evaluation

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(a) Input



(b) Output

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Path Evaluation

(Loading Video...)

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Analysis of Task
Accomplished

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Thank You

Thank You.

THANK YOU !!!

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