

RDU 150343

**DEVELOPMENT OF AUTONOMOUS VEHICLE FOR
ROAD MARKS PAINTING**

MOHAMMED ABDO HASHEM

**RESEARCH VOTE NO:
RDU150343**

**Fakulti Manufacturing Engineering
Universiti Malaysia Pahang**

2017 FKP Mohammed Abdo Hashem Development of Autonomous Vehicle for Road
Marks Painting

UMP
2017

DEVELOPMENT OF AUTONOMOUS VEHICLE FOR ROAD MARKS PAINTING

(Keywords: Road Mark painting, Robotic System, Autonomous Navigation, Control)

The painting marks on the road in the existing system includes two main tasks that are accomplished separately and in respectively during the road marking painting; firstly, the pre-marker is used to draw a field sketch in advance to avoid faulty marking. The road surface is pre-marked by a line using an auxiliary equipment pre-marker which determines the exact position of the road that will be painted later like in the middle, at the right or left sides of roads, etc. In the second task, the user will move the thermoplastic or cold paint machine over the pre-marked lines that have been prepared in the first step and spray or throw the paint onto the road. These tasks of the road painting that have been manually done in the above-mentioned system was accomplished in the autonomous robotics system using a small mobile robot prototype that was equipped with components of a painting system mounted on its platform. In this system, the autonomous navigation system is used to detect the exact position of the road that will be painted such as in the middle, at right or left. Based on the types of the road lane marks, the painting system is able to control the time periods for spraying the paint on the road. The control of the spray time is done using the main controller as a sharing component for the navigation with the painting systems. Experimental results for both road navigation and painting show the capability of the proposed algorithms to robustly drive the robot in given the road environments. The benefit of autonomous robotics system in comparison with manual two-machines system are to minimize blocking of the roads during painting and repainting of the faded marks; to shorten the time needed to perform the painting and to ensure high accuracy and reliability, since the process is performed autonomously with minimal human intervention.

Key researchers :

Dr. Mohammed Abdo Hashem
Prof. WAN AZHAR BIN WAN YUSOFF
Dr. NG LIANG SHING
Mr. ZULKIFLI BIN MD. YUSOF
Dr. ZAMZURI BIN HAMEDON

E-mail : ***hashem@ump.edu.my***
Tel. No. : **5912/0137362921**
Vote No. : **RDU150343**

1. DESCRIPTION OF PROJECT

This system is attached to the mobile robot platform to produce autonomous robotic system for road marks painting. In this system, the autonomous navigation system will be used to detect the exact position of the road that will be painted such as in the middle, at right or left. Based on the types of the road lane marks, the painting system will control the time periods for spraying the paint on the road. The time of spray will be controlled using the main controller with the same program in the navigation system as it is a sharing component between the navigation and the painting systems. The objectives of this projects are:

- To develop an unmanned vehicle for road environments detection and road marks painting.
To apply autonomous navigation system together with motion control for driving the vehicle autonomously in roads

The final product of the project is a prototype for autonomous road marks painting

2. APPLICATIONS

This project has developed an autonomous Road marks painting prototype to apply automatically painting on roads without human interference.

3. RESULTS, OBSERVATION AND CONCLUSIONS

The prototype is constructed as in Figure 1:

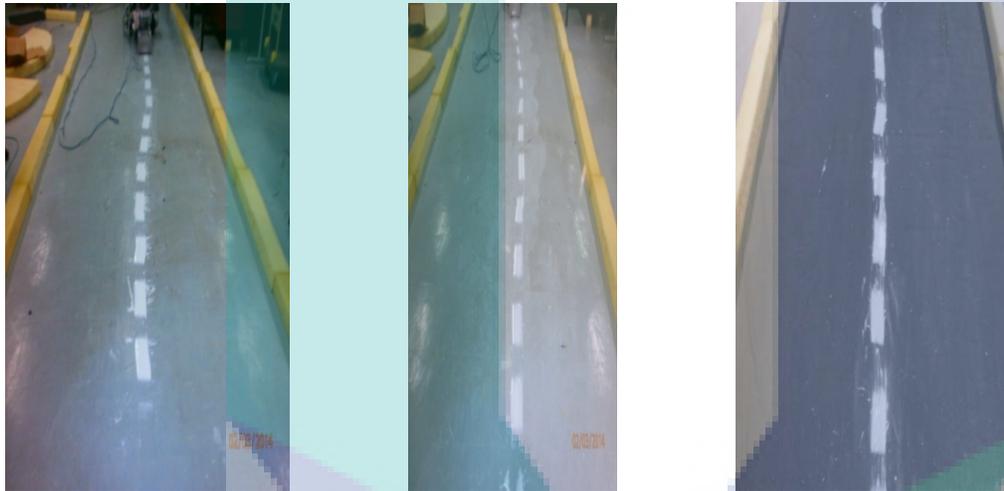


Figure 1 Components of the painting system on the mobile robot platform

The road following algorithm was applied to the road painting with two curbs as shown in Figure 2. The results show the ability of the platform to carry out the road painting system and perform the painting in the proposed path with some deviation as shown in Figure 2. This is due to the effect of the LRF accuracy (between 10-30 mm) and encoder errors.



(a) without using template



(b) with using template

Figure 2 Road mark painting by autonomous robotic road painting platform

4. KNOWLEDGE OR TECHNOLOGY CONTRIBUTIONS

- This platform is the first in its kind to make autonomous road marks painting which is already filled with patent IP 2017702569. It is replaced the current manual painting machines by robust and high efficient robotic systems.