

**DESIGN AND FABRICATION OF HYBRID DIFFERENTIAL  
SYSTEM**

**A PROJECT REPORT**

*Submitted by*

**H. KRISHNA BHARATHI**

**112818114022**

*in partial fulfillment for the award of the degree*

*of*

**BACHELOR OF ENGINEERING**

*In*

**MECHANICAL ENGINEERING**



**T.J.S. ENGINEERING COLLEGE**



**ANNA UNIVERSITY: CHENNAI 600 025**

**JUNE 2022**

A handwritten signature in green ink, appearing to read 'J. Krishna'.

**PRINCIPAL**  
**T.J.S. ENGINEERING COLLEGE**  
Peruvoyal, Kavaraipettai,  
Gummidipoondi Taluk,  
Thiruvallur Dist - 601 206.



## BONAFIDE CERTIFICATE

Certified that this project report "DESIGN AND FABRICATION OF HYBRID DIFERENTIAL SYSTEM" is the bonafide work of "H.KRISHNA BHARATHI(12818114022)", who carried out the project work under my supervision.

  
22/6/22

SIGNATURE

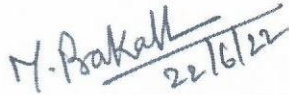
Dr.K.KAMAL BABU,M.E.,ph.D(NIT-T)

HEAD OF THE DEPARTMENT

ASSOCIATE PROFESSOR

MECHANICAL ENGINEERING

T.J.S ENGINEERING COLLEGE

  
22/6/22

SIGNATURE

Mr. M.PRAKASH. M.E.,

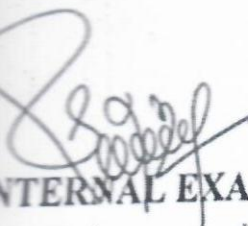
SUPERVISOR

ASSISTANT PROFESSOR

MECHANICAL ENGINEERING

T.J.S ENGINEERING COLLEGE

Submitted for project viva - voce examination held on 22/6/22

  
INTERNAL EXAMINER

22/06/22



  
EXTERNAL EXAMINER

  
PRINCIPAL  
T.J.S ENGINEERING COLLEGE  
Beruvoyal, Kavaraipeetai,  
Gammidipoondi Taluk,  
Thiruvallur Dist - 601 206.

## ABSTRACT

Differential is the large scale mechanical energy transmission system. The hybrid differential is semi automatic electric controlled system. This update differential is use to improve the efficiency of the engine., Differential Drive Assisted Steering (DDAS) technology for the independent-wheel-drive electric vehicle has gradually appeared to researcher's attention.

However, the previous experimental results show that its assistance quality cannot be fully accepted due to its caused sensitive steering wheel torque fluctuation in actual work environment.

According to the working principle of the DDAS system, it is founded that the road roughness, the front wheel alignment parameters and sensor noise are the main factors that influence the quality of assisted steering and driver's road feel.

Hence the three factors are added as interference into the ideal vehicle model. The simulation results and its comparison with the previous real vehicle tests confirm this causality between these factors considered and the steering wheel torque fluctuation of the DDAS system.

Then a robust  $H_1$  loop-shaping controller is designed to solve the issue caused by these inner interferences and outer noises. Simulations results validate the propose controller and show better steering wheel torque performance than the traditional anti-windup PID controller. It can be use also in the off-road vehicles



A handwritten signature in green ink, appearing to read "J. S. S.", written over the printed name of the principal.

PRINCIPAL  
T.J.S. ENGINEERING COLLEGE  
Peruvoyal, Kavaraipeetai,  
Gummidipoondi Taluk,  
Thiruvallur Dist - 601 206.