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FACULTY OF ENGINEERING

DEPARTMENT OF MINING AND WATER RESOURCES ENGINEERING

FINAL YEAR PROJECT

AN AUTOMOBILE CARBON EMISSION ANALYZER

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A final year project submitted to the Department of Mining and Water Resources engineering as partial fulfillment of the requirements for the award of a Bachelor of Science degree in Water Resources Engineering

ABSTRACT

Fossil fuels are being continuously used in the transport sector. The burning of this fuels produces gases like carbon dioxide, methane, and nitrous oxides which lead to global warming. Most people are still unaware of the global warming contributed by automobiles thus, do not consider it to be a big problem in years to come especially in least developed countries. Many people have very little knowledge of automobile carbon emissions caused by them in Uganda. For example, almost 99% of the vehicles in country use products of fossil fuels. Since Uganda doesn't manufacture or assemble vehicles, the country highly depends on reconditioned or used cars that are majorly imported from Asia. Currently, there is no measure of automobile emissions for the vehicles that are imported into the country. The current standing control measure, is a ban on importation of automobiles that are more than 8 years old. Notwithstanding, is control measure applies to a category of automobiles. This doesn't guarantee that automobiles imported in the country that are less than 8 years old, less carbon emitters. With the ever-increasing road traffic in the cities and highways, automobile emissions are evident. Uganda being one of the least developed countries in the world, the country will still depend on used car imports in both short, medium and long terms. This implies that it might take quite a considerable time and efforts to phase out automobiles that use fossils. This severely affects the ecosystems and disturb ecological balance. Because of this treacherous effect of global warming, some solutions must be devised for control and measure. The proposed carbon emission analyzer device can be used by customs, traffic officers and automobile insurers. It is estimated that transport sources in developing countries contribute about 4% of the global fossil carbon dioxide versus 18% by industrialized countries. The cost of urban air pollution is estimated to be 2% of GDP in developed countries and more than 5% in developing countries. With an annual vehicle registration growth of over 30% in 2008 and a population growth rate of 6%, the number of automobiles in Kampala city of Uganda is expected to continue growing exponentially. Most of the vehicles used are imported into the country when quite old with worn out engines and low energy efficiencies. As a result, such vehicles profusely emit exhaust gases which may be harmful to both human health and the environment. Controlling pollution from the transport sector is vital to improving the quality of air and protecting public health. The main types of exhaust gases from the automobiles were CO2, NOx, CO, NO and HC.

DECLARATION

I **CHEN CHEN CORNELIUS, BU/UP/2017/1483** hereby declare that this report is the work of my hands and this research has never been presented by any person or institution for an academic award.

Signature: … 

Date: 13th/03/2022

APPROVAL

This work has been compiled with guidance and consultation from my supervisors:

Mr. David Kimera

Signature 

Date 11th March 2022

Mr. Maseruka Bendicto Sajjabi

Signature…….

Date…….

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DEDICATION

This dissertation is dedicated to my Late Grandmother **Mrs. ATEO MAGRET** for her constant love and dedication to my education and her desire for the fulfillment of my life dreams and my crush.

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Abbreviations

CE-Carbon Emission Analyzer

AFOLU: Agriculture Forestry and Other Land use

CO Carbon monoxide

CO2: Carbon Dioxide;

DAQ Data Acquisition system

EPA Environmental Protection Agency

GDP Gross Domestic Product

GFEI: Global Fuel Economy Initiative

GHG: Green House Gas;

GKMA Greater Kampala Metropolitan Authority

GPIO General-purpose input/output

GPS Global Positioning System

GSM Global System for Mobile communication

HC HydroCarbon

HC: Hydrocarbon;

HDV: Heavy Duty Vehicles

ICE internal combustion engines

JEVIC Japanese Export Vehicle Information Certificate

KCCA Kampala City Council Authourity

LCD Liquid Crystal Display

LDV: Light Duty Vehicle

MEMD Ministry of Energy and Mineral Development

MoW&T Ministry of Works and Transport

NEMA National Environmental Authority

NEMA-National Enviroment Management Authourity;

NMT Non-Motorized Transport

NO: Nitrogen Monoxide

NO2: Nitrogen Dioxide;

NOx Nitrogen oxides

NOX: Nitrogen Oxides;

NPA Non Performing Assets

NVM Non-Motorized Vehicle

O3: Ozone;

OECD: Organization for Economic Co-operation and Development

PIVOC Pre-Export Verification of Conformity to Standards Program

PM particulate matter

PM: Particulate Matter;

Ppm: Particulates per Million

SDG Sustainable Development Goal

SGS Société Générale de Surveillance

SIM Subscriber Identity Module

SO2: Sulfur Dioxide;

UNBS Uganda National Bereau of Standards

UNEP: United Nations Environment Programme

UNFCCC: United Nations Framework Convention on Climate Change

URA: Uganda Revenue Authority;

USB Universal Serial Bus

USD United States Dollar