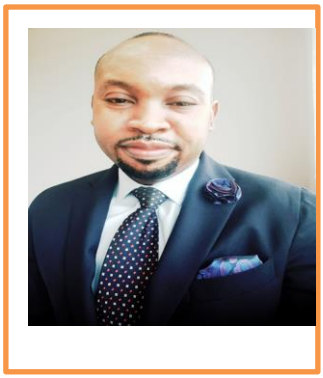
RESEARCH PROPOSAL SUMMARY



Name of Principal Investigator (Inventor): DR. UZOMA IFEANYI ODUAH

Department: PHYSICS

Faculty: Physical and Earth Sciences

Designation: ASSOCIATE PROFESSOR

Names of Other Team Members:
Mr. Olufemi Ilori
Mr. Daniel Oluwole
Mr.Abdulrasak Abdulkadir

PROJECT DETAILS (INVENTION)

Title of Project:	A Robust Road-Vehicle Flood Level Monitoring Device (Patent No: NG/P/2018/14).
Grant request Amount:	N1,143,200.00 (One million, One hundred and Forty-three Thousand, Two Hundred Naira) for the development of prototype.
Funding Agency:	Proposal to NASENI
Project Duration:	12 months
Project Objectives:	The General objectives of this invention is to develop an adaptive, affordable, robust, efficient and effective road vehicle flood level monitoring device for detecting rising flooding on roads above a user defined safe threshold to tackle road flooding disasters; to develop a device that notifies road-users of real-time flooding levels and dangerously flooded roads to enable them follow alternative routes: generate online real-time data of road flooding levels for statistical reports.
Outcomes (if completed) **OR**	The proof-of-concept of the vehicular road advanced electronic flood level caution device has been developed. A prototype needs to be developed. The device is awaiting commercialization. The device detects road flood levels and triggers alarm when the flood level exceeds a user defined safe threshold. The unique features of the

Preliminary outcomes (if on-going)	device are in the flood detection sensor architecture which enables it to function even on poorly constructed muddy roads and also on the installation technique. The next stage is to integrate the operation of the device into Google map for a wider application.
Contribution to National Development	The growing concern of the impact of global warming associated with climate change leading to the upsurge of flood on roads necessitated this invention. Existing devices that offer warning signals on safe threshold during flooding are predictive in nature and based on complex technologies that are cumbersome and rather expensive thereby affecting the attractiveness to low-economy societies of developing countries.
Relationship with any of the SDGs	The product addresses Sustainable Development Goal 13. Climate Action.
Date of completion	Initial Proof-of-concept was developed in January 2019. Patent No: NG/P/2018/14.
Attachments/ pictures	 Developed proof-of-concept of the Vehicular Road Advanced Electronic Flood Level Caution Device.

Device Operation

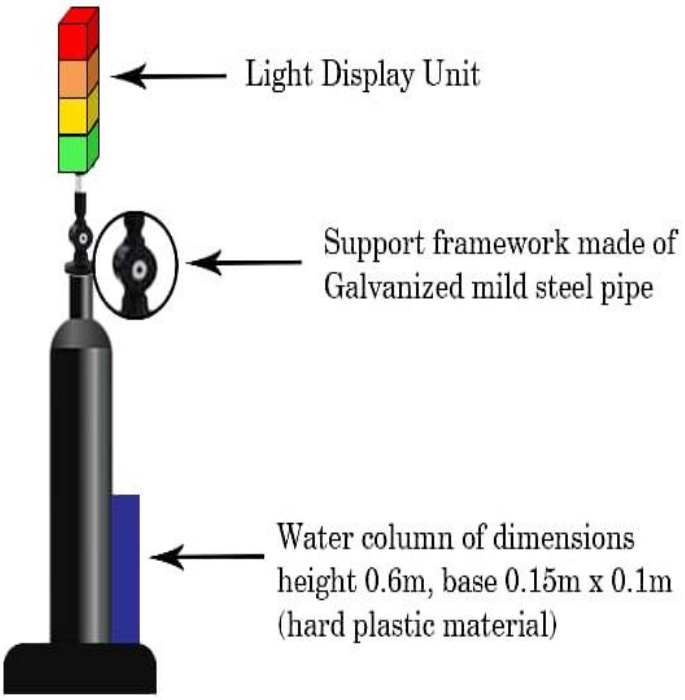
The invented Road Vehicle Flood Level Notification Device is designed to trigger alarm and flash a red light whenever the flood level on roads exceeds a permissible threshold for motorists. It also activates the GSM module to deliver SMS messages to enrolled users. The device is calibrated into four different levels and mounted on the street light/ poles with the water sensors positioned in such a manner that they detect water levels at the user determined safe and unsafe depths. The introduction of the device will reduce road hazards caused by floods on roads. The device interoperability with Google map will enable road users to view the level of flood on roads online and therefore determine the best route to take during flooding of roads.

Budget for the construction of a single unit Road-Vehicle Flood Level Monitoring Device

S/No.	ITEM/DESCRIPTION	PRICE PER UNIT (N)	No. OF UNIT	TOTAL (N)
1.	Bipolar Junction Transistors (C945).	N3,510.00	6	N21,060.00
2.	Bipolar Junction Transistors (C1815)	N125.00	10	N1,250.00
3.	Light emitting Diodes (LED indicator lights)	N100	200	N20,000.00
4.	Resistors (100 Ω)	N5,100.00 for a pack of 100 pieces	1	N5,100.00
5.	Resistors (220 Ω)	N4.450.00 for a pack of 100 pieces	1	N4,450.00
6.	Resistors (10 kΩ)	N5,430.00 for a pack of 10	1	N5,430.00
7.	Capacitors (100 µF)	N3,950.00 for a pack of 10 pieces	1	N3,950.00
8.	Relay (10ADC, 12 V, 400 Ω)	N4,910.00	6	N29,460.00
9.	Speaker (Electric Buzzer)	N2,480.00	1	N2,480.00
10.	SIM900D	N7,500.00	1	N7,500.00
11.	SIM card	N1,700.00	3	N5,100.00

12.	Arduino UNO	N12,520.00	1	N12,520.00
13.	PCB board	N2,000.00 for each	10	N20,000.00
14.	Water filter gauze	N55,550.00 fabricated	3	N166,650.00
15.	Plastic Casing for water column and Packaging the device	N256,000.00 Molded plastic	1	N256,000.00
16.	Water sensor copper wire probes	N25,450.00	5	N127,250.00
17.	Galvanized mild steel pipe framework 5 inches by 3 m	N55,000.00	1	N55,000.00
18.	Research Assistant stipend	N150,000.00	2	N300,000.00
19.	Local Transport in Lagos	N100,000.00		N100,000.00
			Sum Total	N1,143,200.00

A Robust Road-Vehicle Flood Level Monitoring Device



Research Profile of the Principle Investigator

ODUAH, Uzoma Ifeanyi holds both a Doctorate Degree (Ph.D.) in Physics Electronics (2009) and a Master of Technology Degree (M.Tech.) in Physics Electronics (2000). His B.Sc. was in Science Technology (1995). He specializes in Solid State Physics with a focus on Sensor Technologies.

He is a research scientist and Associate Professor in Physics Department of University of Lagos, Nigeria. He has over 10 years research experience garnered from various world class institutions. Dr. Oduah is a Principal Investigator to various interdisciplinary and multidisciplinary research clusters both locally and internationally.

One of his recent inventions is his research work which developed a Wearable Echolocation Goggle Device for people who are visually impaired. Dr. Oduah is the recipient of IEEE Sensor Journal Runner Up Best Paper of the Year 2016 award presented in Glasgow, Scotland. Presently, he has developed seven novel products all granted patents by the Federal Republic of Nigeria.

Dr. Oduah is a member of The Institute of Electrical and Electronics Engineers (IEEE), Corporate Headquarters, New York, USA. A member of Nigeria Institute of Physics (NIP). He is a Senior Member of International Association of Computer Science and Information Technology (IACSIT). Also, he is a member of Biometric Research Professionals and a Member of Institute of Physics (IOPs) International. A member of Nigeria Institute of Management (NIM). A Fellow of Certified Institute of Cost Management of Nigeria. Also a Fellow of Institute of Finance and Control of Nigeria.