

Supreme Testing Lab & Forensic Evidence Protection Technology Pvt. Ltd. (STEP)



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Innovations So Far

- Smart Alcohol Breath Analyzer.
- Arson Evidence Containers.
- Analysis of Soil Nutrients and their simultaneous effect to human health in terms of toxicity: A Pilot Study. Vatsal Chopra, Abhijay Pandita, Rushil Bhairok , Mahua Chakraborty , Purushottam Sharma. International Journal of Forensic Medicine and toxicological Sciences, July-September, 2018:3(3):50-59.
- Environmental fate of insecticides on the Biological matrices as a function of temperature: A pilot study. Poulomi Saha, Shailendra Sharma, Suryansh Shukla, P. Sharma. International Journal of Forensic Medicine and toxicological Sciences, October-December, 2018:3(4), 80-84.

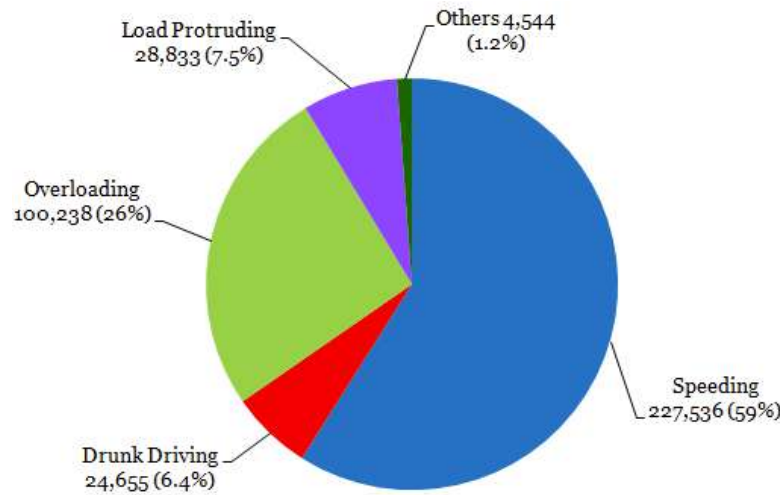
Smart Breath Analyzer for Blood Alcohol Concentration (BAC) Measurement: In collaboration with:



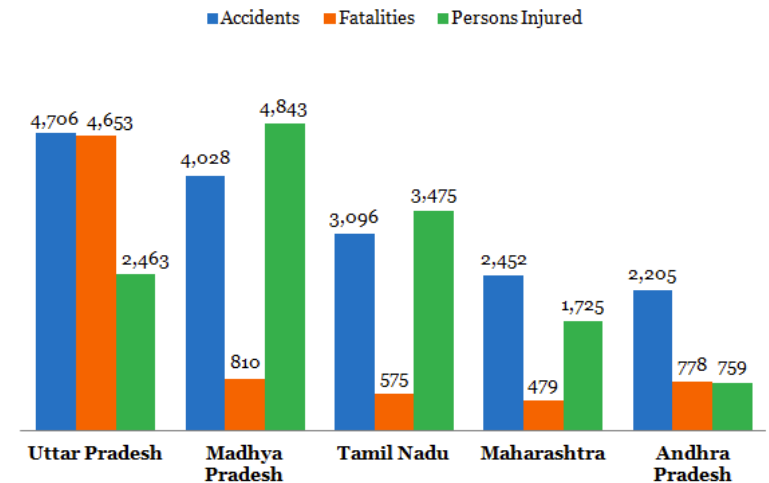
**CSIR-Central Electronics Engineering
Research Institute Pilani, Rajasthan, India**

Road Accidents: Problem & Causes

- India Spend had earlier reported that 77% of road accidents were due to the fault of the driver. One of the main reason is drunk driving.



Causes of Road Accidents



Five Highest Drunk Driving States

- Available alcohol testers are imported from outside India and all of them are costly, complex to calibrate and not suitable according to Indian conditions.
- CSIR-CEERI developed a Smartphone based breath analyzer system for blood alcohol measurement, which is very handy and low cost
- System is highly sensitive (can detect $\leq 0.01\%$ BAC) with low response time (1~2 Sec).
- Developed system has ability to integrate with Smartphone and also has various data transfer options with location information, System also has options to capture drunk drivers information (Photo, ID, Name).

Smart Breath Analyzer: Features



Standalone type Breath Analyzer System



Plug & Play type Breath Analyzer System



Smartphone type Breath Analyzer System



Keychain type Breath Analyzer System

- Form Factor: 3.5x5.5x2 (c.m.)
- Power Consumption: 1.0 Watt
- System supports BLE and USB based communication to communicate with Smartphone based Android app
- Data transfer to cloud and provide Google map view with location information
- System has option to capture drunk drivers information and share through Gmail and WhatsApp (Photo, ID, Name).
- System has audio based Interactive Voice Response System (IVRS) for the new user
- System measures alcohol concentration in breath (PPM) and predicts BAC (%) and Breath Quality Index (BQI)
- System provides baseline, 2-point, 3-point, 5-point, quick and automatic calibration feature along with threshold adjustment and past system history

Smart Breath Analyzer: Applications & Advantages

Major Applications:



Automobile Applications
Traffic police for drunk driver detection



As a personal device

Advantages:

- Handy and easy to carry due to its low form factor
- Equipped with state of art features
- One of the most advanced system for BAC measurement
- Low cost for batch fabrication (cost per system (BOM) = 600-800 INR)
- Rapid and easy to use

Designing and manufacturing of evidence collecting packages

- Based on the fact that evidences are most important to investigate cases, it is important to maintain the integrity of the same.
- In the present Indian scenario, standard evidence collecting packages are not used.
- This often leads to either false positive or false negative results.
- So, STEP is targeting to design standard evidence collecting packages

ARSON EVIDENCE CONTAINERS

DESIGNED BY STEP

Description: These containers offer a method of preserving arson investigation evidence. Fire Debris are collected and 2/3rd of these containers are filled with the collected fire debris. When the lid is placed, an airtight seal is formed preventing flammables and hydrocarbons from evaporating into the atmosphere. The vapours containing the flammables and hydrocarbons fill up the empty space. The rubber stopper placed on the lid serves the purpose of injectable forms of needles to be inserted, in order to collect the vapours formed and inject it directly into the instruments viz. Gas Chromatography (GC), Gas Chromatography Mass Spectrometry (GC MS).



Analysis of Soil Nutrients and their simultaneous effect to human health in terms of toxicity: A Pilot Study.

Abstract: Soil contains a wide variety of mixtures including organic matters, minerals, nutrients required by plants. These nutrients are directly or indirectly related to human health. Soil is an important source of nutrients in our food supply. These types of imbalances in nutrients can cause negative effects on health. Soil provides many of the nutrients we require and can pass on harmful substances through the intake of food. Supply of any element may result in human toxicity even though the elements are essential for life. For any essential element there is an optimal range of concentration in humans, falling below this optimal range results in deficiency, whereas concentrations above the optimal range create toxicity. Soil mostly found near the industrial areas is dangerously contaminated with minerals like Sulphur, Boron, and Phosphorus etc. Also uncontrolled use of high quantity of fertilizers without having awareness and knowledge of their negative effects would also lead to toxicity. So, production of fruits, vegetables and crops on such contaminated soils prove to be dangerous to human health. Soil samples from twenty different areas (industrial as well as non-industrial areas) where native people grow plants for production of food were targeted, analysis of which have resulted in the extraction and detection of high levels of minerals. Chronic consumption of food from plants grown in such contaminated soils is one of the important and main reasons for negative health effects leading to toxicity and eventually increases the chance of mortality rates in humans.

Environmental fate of insecticides on the Biological matrices as a function of temperature: A pilot study

Abstract: Toxicology division of Forensic Science Labs (FSLs) frequently receives samples containing insecticides. Due to pendency of medico legal cases, biological samples are often stored for some time i.e from the time of collection until analysis. The role of temperature and putrefaction that may inevitably interfere with analysis results which is often ignored in such cases. In the present study, an attempt has been made to produce evidences by differentiating Thin Layer Chromatographic (TLC) results of the insecticides- Carbofuran and Carbaryl (1-naphthyl methylcarbamate) as a direct consequence of changes in the preservation methods of samples. Research must be extensively done taking into consideration of the factors like temperature, humidity, duration of time etc. so as to support studies on better preservation methodologies of Forensic samples.