# A Monitoring System for Carbon Footprint in A Small Scale Area

Ermeey Abd Kadir
Universiti Teknologi MARA

***Abstract*—This paper described the development of a monitoring system for carbon footprint in a small scale area. Healthy environment is very important to the people and also to the plant. Healthy environment influence human health and for growth of the plant. Nowadays, many people in the university uses their vehicles to move everywhere in the campus. So , the vehicles released the carbon dioxide to the surrounding. In this research, Carbon Dioxide Mg811 (CO2) and Carbon Monoxide Mq7 (CO) sensor detector is used to detect the carbon dioxide in the surrounding, so that the people in the campus can know the level of carbon dioxide. This project is developed due to the problems of air pollution and global warming because of carbon released by vehicles. The main objective of this research project is to develop carbon dioxide sensor to detect the carbon and give awareness to the people by display the level of carbon reading and to test the functionality of the system. The proposed project also followed the approach highlighted by Malaysian government which is trying to decreasing the rate of carbon dioxide by 2020. Therefore, this project is using Carbon Dioxide Mg811 (CO2) and Carbon Monoxide Mq7 (CO) sensor detector as input to detect the carbon .These input will send the data to Arduino Uno microcontroller. The operational of this monitor carbon footprint is when Carbon Dioxide Mg811 (CO2) and Carbon Monoxide Mq7 (CO) sensor detector detects carbon dioxide gases , LCD will display the level of carbon dioxide and gives the different warning sign on the screen. Led Bar is used to show the level of carbon dioxide reading. For the supply, battery 9v is used. In conclusion, this system is designed to make a clean environment and creating a green university in this campus.**

## 1.0 Introduction

## 2.0 Methodology

This is the methodology part

## 2.0 Methodology

This is the methodology part

## Equations

### Simple equations

A simple equation:

$$f(x) = (x+a)(x+b)$$

An equation with text:

$$50 \text{ apples} \times 100 \text{ apples} = \textbf{lots of apples} \qquad (1)$$

One including subscripts and superscripts:

$$k_{n+1} = n^2 + k_n^2 - k_{n-1}$$

### Greek Letters

$$\alpha, \beta, \gamma, \Gamma, \pi, \Pi, \phi, \varphi, \mu, \Phi, \xi, \zeta$$

$$\cos(2\theta\phi) = \cos^2\theta\phi - \sin^2\theta\phi$$

### Delimiters

There are many types of delimiters one can use:

$$(a), [b], \{c\}, |d|, \|e\|, \langle f \rangle, \lfloor g \rfloor, \lceil h \rceil, \ulcorner i \urcorner$$

See how the delimiters are of reasonable size in these examples

$$(a+b)\left[1 - \frac{b}{a+b}\right] = a\,,$$

$$\sqrt{|xy|} \leq \left|\frac{x+y}{2}\right|,$$

even when there is no matching delimiter

$$\int_a^b u \frac{d^2v}{dx^2}\,dx = u\frac{dv}{dx}\bigg|_a^b - \int_a^b \frac{du}{dx}\frac{dv}{dx}\,dx.$$

whereas vector problems often lead to statements such as

$$u = \frac{-y}{x^2+y^2}\,, \quad v = \frac{x}{x^2+y^2}\,, \quad \text{and} \quad w = 0\,.$$

### Multiple Fractions

Typesetting continued fractions is easy:

$$x = a_0 + \frac{1}{a_1 + \frac{1}{a_2 + \frac{1}{a_3 + a_4}}}$$

However, as the fractions continue, they get smaller. If you want to keep the size consistent, use the display style; e.g.

$$x = a_0 + \cfrac{1}{a_1 + \cfrac{1}{a_2 + \cfrac{1}{a_3 + a_4}}}$$

## ARRAYS

Arrays of mathematics are typeset using one of the matrix environments as in

$$\begin{bmatrix} 1 & x & 0 \\ 0 & 1 & -1 \end{bmatrix} \begin{bmatrix} 1 \\ y \\ 1 \end{bmatrix} = \begin{bmatrix} 1 + xy \\ y - 1 \end{bmatrix}.$$

$$\begin{pmatrix} 2 & 3 & 4 \\ 5 & 6 & 7 \\ 8 & 9 & 10 \end{pmatrix} v = 0$$

Case statements use cases:

$$|x| = \begin{cases} x, & \text{if } x \geq 0\,, \\ -x, & \text{if } x < 0\,. \end{cases}$$

Many arrays have lots of dots all over the place as in

$$\begin{matrix} -2 & 1 & 0 & 0 & \cdots & 0 \\ 1 & -2 & 1 & 0 & \cdots & 0 \\ 0 & 1 & -2 & 1 & \cdots & 0 \\ 0 & 0 & 1 & -2 & \ddots & \vdots \\ \vdots & \vdots & \vdots & \ddots & \ddots & 1 \\ 0 & 0 & 0 & \cdots & 1 & -2 \end{matrix}$$

## GREEK LETTERS

$$\alpha, \beta, \gamma, \Gamma, \pi, \Pi, \phi, \varphi, \mu, \Phi, \xi, \zeta$$

$$\cos(2\theta\phi) = \cos^2\theta\phi - \sin^2\theta\phi$$

## DELIMITERS

$$(a), [b], \{c\}, |d|, \|e\|, \langle f \rangle, \lfloor g \rfloor, \lceil h \rceil, \ulcorner i \urcorner$$

## ACCENTS

Mathematical accents are performed by a short command with one argument, such as

$$\tilde{f}(\omega) = \frac{1}{2\pi} \int_{-\infty}^{\infty} f(x) e^{-i\omega x}\, dx\,,$$

or

$$\dot{\vec{\omega}} = \vec{r} \times \vec{I}\,.$$

## MULTILINE EQUATIONS AND ALIGNED ENVIRONMENTS

New lines (
) do not work in equation environments. To achieve alignment of equations, use the aligned package to produce multiline aligned math, such as:

$$\begin{aligned} \mathrm{F} = \{ & \mathrm{F}_x \in F_c : (|S| > |C|) \\ & \cap (\mathrm{minPixels} < |S| < \mathrm{maxPixels}) \\ & \cap (|S_{\mathrm{conected}}| > |S| - \epsilon) \} \end{aligned}$$

and also:

Table I. TEST TABLE

| | | | | |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 |

Table II. TEST TABLE

| Animal | Description | Price ($) |
|---|---|---|
| Gnat | per gram | 13.65 |
| | each | 0.01 |
| Gnu | stuffed | 92.50 |
| Emu | stuffed | 33.33 |
| Armadillo | frozen | 8.99 |

$$\begin{aligned} \mathrm{A}_0 = & \; 1 \frac{}{(\alpha+t_x)^{r+s+x}\, {}_2F_1\left(r+s+x, x+1; r+s+x+1; \frac{\alpha-\beta}{\alpha+t_x}\right)} \\ & - 1 \frac{}{(\alpha+T)^{r+s+x}\, {}_2F_1\left(r+s+x, x+1; r+s+x+1; \frac{\alpha-\beta}{\alpha+T}\right)}, \end{aligned}$$

**Note**: the above multiline equations have math mode defined per line, not globally at the equation level.

## THEOREMS AND SETS

*Theorem 1:* For any nonnegative integer $n$, we have

$$(1+x)^n = \sum_{i=0}^{n} \binom{n}{i} x^i$$

The Taylor series expansion for the function $e^x$ is given by

$$e^x = 1 + x + \frac{x^2}{2} + \frac{x^3}{6} + \cdots = \sum_{n \geq 0} \frac{x^n}{n!} \tag{2}$$

$$\forall x \in X, \quad \exists y \leq \epsilon$$

$$\frac{n!}{k!(n-k)!} = \binom{n}{k}$$

*Theorem 2:* For any sets $A$, $B$ and $C$, we have

$$(A \cup B) - (C - A) = A \cup (B - C)$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \tag{3}$$

| | | |
|---|---|---|
| 1 | 2 | 3 |
| 4 | 5 | 6 |
| 7 | 8 | 9 |

Figure 1. This is a test caption.