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Carbon Emissions Caused Due to Electronic Mails

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Abstract— Electronic mail has become a widely used communication tool, but it also has an impact on the environment due to the energy required to run servers and transmit messages. In this study, I aimed to quantify the carbon dioxide emissions associated with email and understand the factors that contribute to these emissions.

"The aim of this research is on the problem of unsolicited emails which are getting stored in data centres that consume huge amount of energy to run continuously so that data can be easily can be fluently penetrated at anytime from anywhere in the world and solves the issue using the system of flash emails".

Keywords— Emails, Carbon footprint, Spam emails, Flash emails

I. INTRODUCTION

Electronic mail, or email, is a method of exchanging digital messages between computers. Email allows users to send and receive messages over the internet, and it has become a widely used communication tool for both personal and professional purposes.

To send an email, a user must have an email account with a service provider, such as Gmail or Outlook. The user composes a message and enters the email address of the recipient, and then the message is transmitted over the internet to the recipient's email server. The recipient can then access the message by logging into their email account and reading the message in their inbox.

I conducted a literature review of existing studies on the environmental impact of email and analysed data on the energy consumption of servers and other factors that influence the carbon footprint of email. According to a study published in the Journal of Industrial Ecology, carbon dioxide emissions from email account for approximately 0.3% of global emissions. This is equivalent to the emissions from about 2 million cars.

II. OBJECTIVE

The objective of researching the carbon emissions caused by electronic mail is to understand the environmental impact of this communication tool and identify ways to reduce its carbon footprint. By understanding the carbon emissions associated with email, we can determine the relative contribution of email to global greenhouse gas emissions and take steps to mitigate this impact. This could involve using more energy-efficient servers and data centres, implementing carbon-neutral practices, or finding other ways to reduce the energy required for email communication.

In addition to reducing carbon emissions, research on the environmental impact of email can also help identify ways to make email more sustainable and reduce its overall environmental footprint. This could involve using more efficient methods of transmitting messages, reducing the amount of data transmitted, or finding ways to reuse or recycle electronic devices used for email.

Overall, the goal of researching the carbon emissions caused by electronic mail is to minimize the environmental impact of this communication tool and find ways to make it more sustainable.

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III. CARBON FOOTPRINT

A carbon footprint is a measure of the total amount of carbon dioxide (CO2) and other greenhouse gases emitted by an individual, organization, event, or product. It is typically expressed in units of carbon dioxide equivalent (CO2e), which allows for the comparison of the global warming potential of different greenhouse gases.

The carbon footprint of emails is the amount of carbon dioxide and other greenhouse gases emitted as a result of sending and receiving electronic messages. The carbon footprint of an email can be affected by a number of factors, including the energy consumption of servers, the distance the message travels, and the amount of data transmitted.

There are several factors that can affect the size of an email:

1. The size of the text in the message body: The more text an email contains, the larger the message will be.
2. The number and size of attachments: If an email includes attachments, such as images, documents, or video files, the size of the email will increase.
3. The formatting of the email: Using bold, italics, or other formatting options can slightly increase the size of the email.
4. The resolution of images: Higher resolution images will be larger in size and will increase the size of the email.
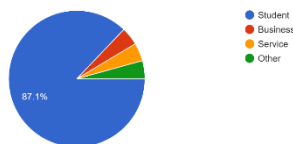
IV. SURVEY

I have conducted a small survey comprising of 9 questions gathering 70 responses through google form from students and teachers to analyse the amount of communication done through email by general public and based on the study one can estimate the effect of emails on the environment at large.
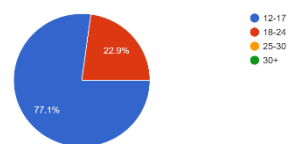
These were the questions asked during survey:

- Occupation
- At what age you have started using email facility?
- How many email addresses you have created till today?
- How many email addresses do currently use?
- Number of emails sent by you on monthly bases.
- Number of emails you receive per week (excluding promotional and advertisement)
- Number of promotional and advertisement emails received per week.
- Number of emails received which is not needed after reading once per week. (thank you email, verification email, account activation email etc.)
- Number of emails currently left unread in inbox till today [1]
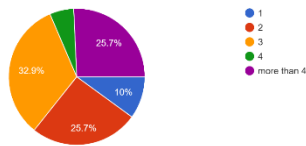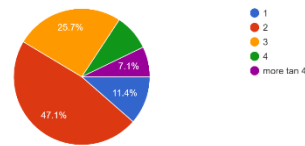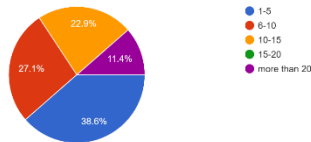
The results of the study are as follows:

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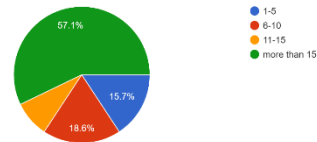How many email addresses you have created till today?
70 responses

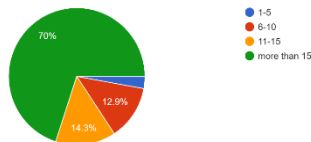How many email addresses do you currently use?
70 responses

Number of emails you send per month.
70 responses

Number of emails you receive per week. (excluding promotional and advertisement)
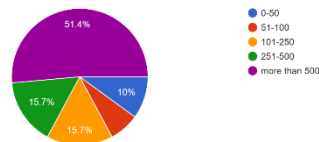70 responses

Number of promotional and advertisement emails received per week.
70 responses

Number of emails received which is not needed after reading once per week. (thankyou email, verification email, account activation email etc.)
70 responses
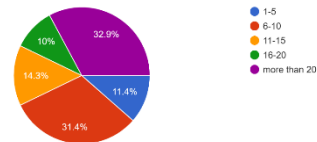
Number of emails currently left unread in inbox till today.
70 responses

The survey was conducted on a very atomic level compare to actual number of mail users and number of mails sent and received per day. At real scale the numbers will be large and results will be much vaster.

V. SPAM EMAIL

Spam emails are unsolicited messages that are often sent in large quantities and can contain malware or phishing attempts. They are typically sent by individuals or organizations with the goal of promoting a product or service, or obtaining personal information from the recipient.

Spam emails can be difficult to distinguish from legitimate emails, and they can be a nuisance for users who must sift through large numbers of spam messages to find their legitimate emails. Spam emails can also pose a security risk, as they may contain malicious links or attachments that can infect a computer with malware or attempt to steal personal information.

The electricity consumption by various human factors on a decade basis is shown in Fig.1 below:

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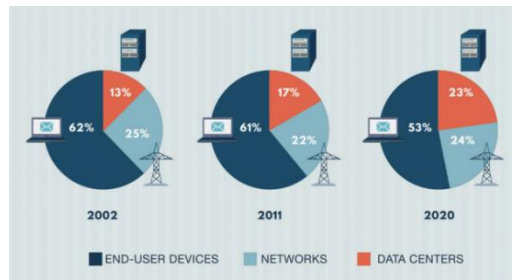
[2]

Fig. 1 Electricity Consumption by various human factors.

We can infer that the electricity consumption by data centers has increased drastically leading to more carbon emission in the environment

Most of the data stored at these data centers is generated through spam emails.
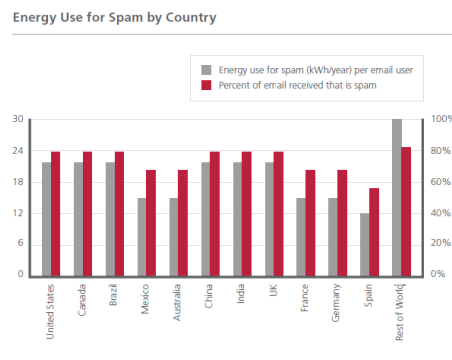
The yearly CO2 emissions per email type, which is shown in Fig. 2 below:

	number of emails in trillion	CO_2 in million tonnes
Spam	108.4	32.52
Regular	7.2	28.80
Attachment	2.3	115.00

[3]

Fig. 2 Yearly carbon dioxide emissions per email type.

The following graph (Fig.3) depicts energy use for spam by country:

[4]

Fig. 3 Energy used for spam by country.

VI. PROPOSED SOLUTION

The problem of spam emails can be solved using flash emails.

Flash emails are typically delivered via a subscription service and can be accessed through a smart speaker or other device with a virtual assistant. This means that users must opt-in to receive flash emails, which can help reduce the risk of spam.

In contrast, traditional email is vulnerable to spam because it is easy for anyone to send an email to any address. Spam emails are unsolicited messages that are often sent in large quantities and can contain malware or

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phishing attempts. Flash emails, on the other hand, are delivered to users who have specifically requested them, which can help reduce the risk of receiving spam messages.

Overall, the subscription-based nature of flash emails and their brief, summary format can help reduce the risk of spam compared to traditional email.

Features of proposed system (Flash Emails):

This will be most effective for the type of emails which are used just once for example: OTP mails, thank you emails, verification emails, account activation emails etc.

1. All the commercial email, thankyou mail, verification email, account activation emails should arrive with a header tag "this is a flash mail" and two option:

(i) Save (ii) Do Not Save

2. If user selects the save feature. then the mail will get permanently saved.

3. If user selects the Do not save feature. then the mail will move to flash message section where it will exist for two days and then it will get deleted from the users id.

4. For unread emails:

If user doesn't open an email for 12 months it will be deleted automatically with 30 days prior notification that email is getting old and will get delete since it is not used from past 11 months

Also, while sending the email the company or individual can set and define the email that it is a flash mail or not.

Using flash mails, we can reduce the number stored emails on server drastically which decrease the amount of energy used in storing mails and maintain server's temperature. As a result, carbon footprints will also get reduced.

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Dr. Simon J. Preis
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https://www.siskinds.com/wp-content/uploads/carbonfootprint_12pg_web_rev_na-1.pdf