

## Integration of Emerging Technologies into Social Networks

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*Social networks provide solutions to more and more everyday needs of people. Appearing as a solution to people's need to communicate through technology, they have developed and integrated more and more features. In this paper a qualitative research based on the study of the existing articles is carried out. Thus, a series of statistical data on the impact and penetration of the Internet and social networks within society will be presented, and some of the benefits that social networks offer to people or businesses and a series of various functionalities and emerging technologies that presents a particular interest for future development, having the capacity to innovate in this field; electronic payments and emerging technologies such as artificial intelligence, Internet of Things devices or biometric technology to increase security.*

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### 1 Introduction

Since its advent, the Internet has forever changed the way people communicate. Due to the many advantages it offers, the Internet has become one of the most widely used services worldwide. Beginning as a research project, the Internet currently includes all interconnected global networks operated by governmental organizations, industry, academia or other private entities [1]. Among the factors that favored the accelerated development of the Internet are both the development of web / mobile technologies and the development of telecommunication infrastructure. Therefore, the Internet became accessible to 55.1% of the world's population in the middle of 2018 [2].

People's need to communicate has favored the appearance and development of social networks. Since the beginning, people have included social networks in their daily habits. Most new emerging social networks integrate specific functions and help people connect on the basis of common interests or on the basis of their activities. Certain social networks are addressed to the general public, while others address racial, sexual or religious minorities. Social networks are new information and communication tools such as mobile connectivity, blogging and photo/video

sharing. So today, platforms like Facebook, Twitter, Instagram, WhatsApp, Skype or Pinterest are always present. Depending on the geographical area or the cultural specificity, social platforms have been imposed in certain areas of the world. Therefore, Facebook is a leader in America, Europe, Africa, Australia and South Asia, while platforms such as VKontakte (Russia) or QZone (China) have targeted a geographical area (Figure 1).

Currently there is a lot of social networks that offer various services to users, from managing personal profile and friends list, distributing content (text, images, video content) to friends or a wider audience within communities, messaging and to product and business promotion, service or product purchases. In this paper, a qualitative research is carried out, analyzing various resources such as present research articles, scientific communications or online resources that address the proposed topic for research.

The analysis presents the benefits that social networks bring to both people (communication, information, education etc.) as well as business (promoting products and services, communication with clients etc.). Since their appearance, the main advantage of social networking has been to support people's

communication. In addition to previous advantages, social networks also have disadvantages, one of which is the emergence of fake news and their rapid spread in the

online environment, influencing people's opinions.



**Fig. 1.** World map of social networks [3]

In section 2, this article aims to statistically follow the evolution of the number of users of social networks, the devices they use, and the activity they carry out; statistics will be tracked both at international level and at the Romanian level, in particular. Section 3 presents the features and benefits that social networks offer to both individual users and businesses that are present in the online environment. The benefits of social networks will be pursued at the conceptual level as well as the interpretation of various existing statistics at the moment.

Section 4 aims to address the opportunities and directions of development of social networks; a number of features will be developed whose implementation is at an early stage and new development directions will be proposed within social networks through which both users and companies benefit. This article also explores a series of emerging technologies such as artificial intelligence, IoT devices, or security solutions (facial recognition or biometrics). The analysis will also propose a number of new functionalities that can be integrated into social networks. The paper ends with a conclusions section that presents and interprets the results obtained and creates the context for further research.

## 2 Social Networks

With the increasing impact on users, social networks have become an important subject in the field of research. Therefore, we can define social network sites as “web-based services that allow individuals to construct a public or semi-public profile within a bounded system, articulate a list of other users with whom they share a connection, and view and traverse their list of connections and those made by others within the system” [4]. According to the study presented in [5], the greatest benefit of social networks is the exchange of information and communications.

The beginnings of social networks are linked to 1997 when the first site called Six Degrees appeared. It allowed users to create a personal profile and the ability to create friends in the virtual environment. This was also the beginning for instant messaging and blogging services. Although it was the first such service, Six Degrees failed to maintain and develop, so it was closed in 2000. Then, around 250 million people had access to the Internet [1], and social networks were beginning to grow as the number of Internet users grew. Later, the founder of the network states that the main cause for which the network did not develop was the fact that it appeared too early [4].

LinkedIn was created in 2002. Compared with other social networks that occurred in the same period, the novelty that emerged was the

fact that it was intended for professionals and is one of the social networks that still work today. Currently, this is a social network for companies, but also for individual users who can create a profile to present their experience and professional qualities. In this way, the social network brings together millions of professionals from around the world.

Two years later, Mark Zuckerberg has launched Facebook, the world's most important social network today, with 2.38 billion active users at the end of 2018 [6]. In

2006, Twitter was created with around 335 million users in 2018 [7], and in 2010 Instagram, a photo sharing service, was released.

Figure 2 shows the evolution of the number of users of the global internet network since 2010, the values representing the number of users measured at the beginning of each year. According to the chart, it can be seen that during this period, the number of users increased 2.23 times, from 1.802 billion users to 4.021 billion users.

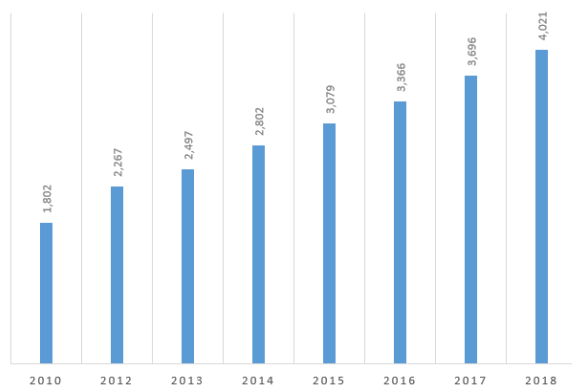


Fig. 2. Number of Internet users [1]

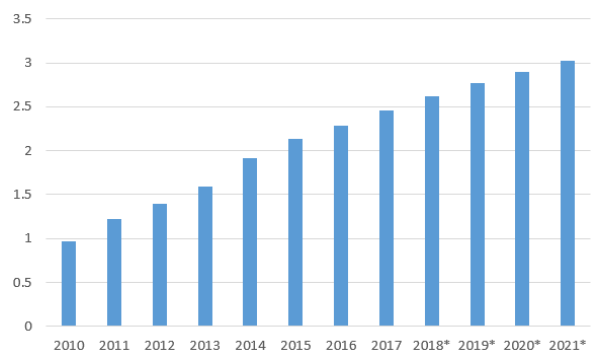


Fig. 3. Number of social networks users [8]

Figure 3 shows the evolution of the number of users of social networks between 2010 and 2017, estimating the evolution of the number of users in the period 2018 - 2021. Thus, we can note that in recent years, the number of users of social networks has increased by about 150 million of users annually.

To analyze the context in which social networks have evolved, as well as future opportunities in terms of number of users and

actual development, we can make an analysis of statistics on "social media".

Social Media can be defined as a set of communication channels through which users create communities and share information, ideas, personal messages and other content (photos, videos, music, etc.). Among the various types of social media, we can list dedicated sites and applications for social networks, forums or microblogging.

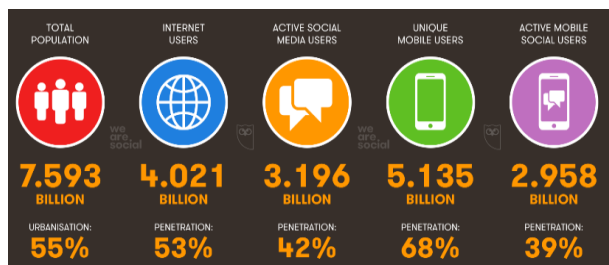


Fig. 4. Worldwide statistics [9]



Fig. 5. Romania statistics [9]

Figure 4 can be interpreted as follows: out of a total population of 7.59 billion in January 2018, about 4.021 billion people had access to the Internet, or 53% of the total population of the globe. It can also be noticed that 3.19

billion (42%) of the world's population has an account on at least one of the social networks. In terms of phone use, 5.13 billion people (68% of the world's population) own such a

device, and 2.95 billion people interact online using mobile devices.

Figure 5 shows the same scenario but customized in Romania. Thus, of the total population of 19.63 million people (of which 55% live in urban areas), 13.74 million have access to the Internet, accounting for 70% of the total population. Of the total population,

about 10 million people (51% of the total population) have at least one account on Social Media platforms.

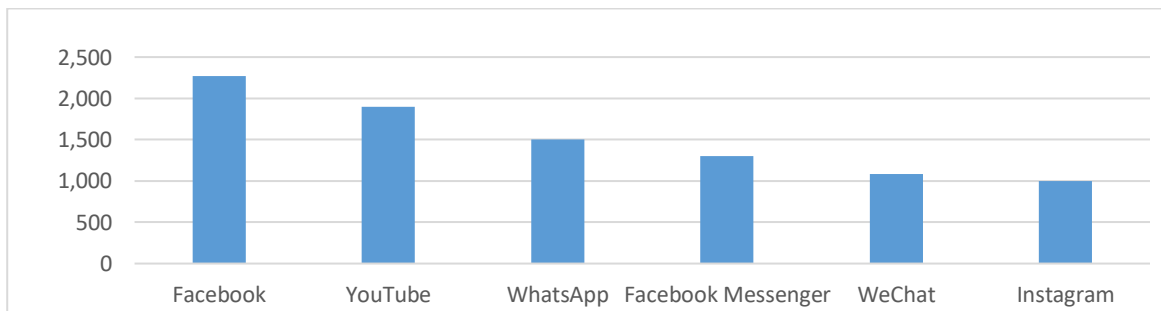
It can also be noticed that 15.97% (81% of the total number of inhabitants) own a mobile device and 9.90 million (or 45% of the number of inhabitants) also use it to interact within social platforms.

**Table 1.** Comparative analysis worldwide - Romania

	Number of users worldwide (billions)	Penetration rate worldwide	Number of users Romania (millions)	Penetration rate Romania
Total population	7.593		19.63	
Internet users	4.021	53%	13.74	70%
Active social media users	3.196	42%	10.00	51%
Unique mobile users	5.135	68%	15.97	81%
Active mobile social users	2.958	39%	8.90	45%

By making a comparative analysis of the statistics in Figure 4 and Figure 5, we can state that in Romania the relative indicators indicate a better rate of adoption of the

technology by the population (Internet, number of social media users, telephony users and social media use on mobile device).



**Fig. 6.** Social networks users worldwide [7]

As for the global social networks in January 2019, as presented in Figure 6, Facebook was used by 2.271 billion users; almost a third of the planet's inhabitants have a Facebook account. Facebook is followed by YouTube (the video sharing platform) with 1.9 billion users, WhatsApp (messaging platform) with 1.5 billion users worldwide. Facebook Messenger, the Facebook's messaging platform has 1.3 billion users and the messaging platform WeChat has a little over 1 billion users worldwide. Instagram, the image sharing platform had 1 billion users in

October 2018. Therefore, out of the total of 6 platforms, it is noted that 3 of them are specialized in the provision of messaging and communications services.

#### 4 Benefits of Social Networks

Social networks have grown enormously in recent years; as we have shown before, the annual growth rate is very high, and networks such as Facebook or WhatsApp have grown rapidly and attracted millions of users in just a few years. The way technology evolves helps social networks become more and more

present in people's lives, and their advantages attract more and more users, both individuals and companies interested in business growth.

**Table 2.** Comparative analysis worldwide – Romania

For individuals	For business
connectivity from anywhere	communication channel with clients
fast communication	customer support
information and communities based on interests	promoting the content to the interested audience
sharing information in real time	brand growth on the market
voice and video streams	customer data source

Among the benefits offered to users, one can highlight fast connectivity from anywhere in the world, fast communication with friends, creating communities based on interests, sharing information in real time, viewing information based on interests, and more.

Quick connectivity ensures that users are always present in the online environment, even if they are in any part of the world. Internet network development has supported this social networking benefit, and networks such as Facebook, LinkedIn, Instagram help people stay up-to-date with the latest updates. Each of these networks helps people increase their number of friends, build new business connections, and find new opportunities (personal, business, etc.).

Communicating quickly with anyone, anywhere and anytime has become a basic need of modern man. The barriers related to physical distance have disappeared and the development of technology and social networks made it possible to communicate with family and friends from anywhere, free of charge. The simple opening of mobile devices offers the possibility of sharing opinions, distributing various information privately and securely.

Instant messaging services and VoIP systems implement real-time communication between the users. Instant messaging allows the exchange of information between two people or a group of people, and their development has allowed the exchange of voice and video streams. The environments that use VoIP systems (Skype, Ventrilo) increase the social presence [10].

The appearance of communities within social networks facilitates access to information based on common interests (habits, lifestyles, activities, passions, etc.), cohesion being a common value. Communities of social networks also support information sharing within the group. Within communities online, influence is shown on others. It is considered that the influence is a bidirectional concept: the opinion of a member can influence the rest of the members and the general opinion of the members influences the individual opinion of a member [11].

Besides the advantages offered to individual users, social networks also address to business. Whether we are talking about commerce, banking, education, health, social networks are the most important communication channel with clients because of the easy communication and permanent interaction with them. According to statistics [12], 80% of social network users are looking at least at one business page and 75% of them visit the business site after viewing the post. Also, through social networks, companies can provide remote customer support in various situations, and unlike traditional media that provides unidirectional communication (from company to client), social networks offer a bidirectional interaction (from company to client, and vice versa), this advantage being manifested in the increase of the financial results.

In terms of growing a strong brand on the market, social networks increase brand awareness for new products with potential (60% of Instagram users discover new

products on the platform [13]). They also offer the possibility of increasing consumer confidence through brand promotion due to the innovative spirit that it brings on the market and can have a major impact especially in Business to Business eCommerce (B2B). Through multiple appearances on social networks, businesses can stay in the minds of users in case of future shopping and contribute to increasing traffic values on their own sites. Social networks are an important way of collecting data for various purposes. For example, real-time customer data can be collected (for example, demographics). This information can be processed in order to adapt the product promotion strategy. Data can also be collected about the company's reputation in the online environment and, depending on specific indicators, measures can be taken to improve the company's reputation in a crisis situation. Another aspect worth mentioning is the collection of data on competition, social networks providing information about both people's views on competition and their promotions, the reasons for customer satisfaction or discontent, or the launch of new products.

One of the greatest benefits that social networks offer to companies is represented by addressing to a particular segment of the population, whether they are demographics (for example, country, geography, age, sex, environment, etc.) or the specific characteristic of consumer behavior (interests, habits, desires, etc.). In this way, promoted content is distributed only to the interested audience and the success rate of promotional campaigns increases exponentially.

All the benefits offered by social networking companies have the goal of increasing return on investment, and promoting social networking leads to increased sales, attracting potential customers, increasing business awareness. Increasing site traffic and ongoing customer interaction make it easy for companies to make changes to products, services, promotions, etc., all of which can be found in a single platform.

## 5 Opportunities and Directions for Developing Social Networks

### *a. Electronic payments*

In [14], electronic payments via mobile phone are classified of in two major categories: micropayments (value below 10 euro, e.g. tickets for public transport or small shopping) and macropayments (value more than 10 euros, e.g. online shopping). Therefore, micropayments can be made directly by SMS sent from the mobile phone; merchants avoid paying through debit/credit cards due to high commissions. Macropayments are a real challenge for electronic payment providers because they need strong security to avoid fraud.

Integration of electronic payments within social networks brings a number of benefits, among which we can enumerate increased security due to the increase of security levels, merchants having no access to card data, very low fees for users, universality due to functioning on any platform or growth of consumer satisfaction [15].

Major social networks are trying to keep pace with technology development and integrate as many functionalities to improve users' lives. Therefore, social networks begin to include various payment systems: whether they are social networking purchases or payments made through related transfer systems.

In order to capitalize on the opportunities offered by social networks, providers of electronic payment services are allied with social networking companies. In this way, they provide the latest technologies to simplify the acquisition, transfer, payment processes and social networks ensure the promotion of new services and bring new users. At present, there is a tendency for hardware components to be used in payment processes, such as camera (photo capture and using applications for Optical Character Recognition (OCR), QR Codes etc.), NFC (proximity of the compatible mobile device and making payments) or fingerprint sensors (to authenticate and authorize transactions) [16].

With the growth of communication through social media, the possibility of distributing

commercial information and developing Web 2.0 technologies, the concept of "social commerce" also emerged. It is a form of commerce and allows for the exchange, sale, purchase, sharing of products and services through social networks. According to [17], social commerce includes 4 key elements: business, technology, people and information, and the combination of these four factors in the online environment brings benefits to all parties involved.

Increasing social commerce has enabled consumers to actively interact, to provide reviews of previously purchased products, with the goal of increasing consumer awareness [18]. Similarly, social commerce has created new communication channels between companies and customers, a much faster way of communication, based on customer needs and direct interaction with them.

Electronic payment systems are being tested by large social networks and instant messaging services. Companies such as Facebook, Snapchat or Microsoft are using this functionality on certain markets. For example, in Australia, Facebook Messenger has a payment service that allows users to transfer money to friends, making payments within 1-3 days. Snapcash also works with Visa or MasterCard cards issued in the United States (payments are limited to \$ 250, and after verification of identity, the amount is extended to \$ 2,500). Skype users in the US, UK and Canada can use Skype Money, the functionality obtained following a partnership between Microsoft and PayPal.

The WeChat social network also offers facilities for money transfer, goods and services payments or bill payments. WeChat allows users to transfer money without commissions between friends, but it applies various fees for withdrawals or for operations involving cross-border transfer; transactions are made within one day. WeChat Pay services can be integrated for QR Code payments (Quick Pay), on eCommerce sites or on mobile applications [16].

The development of mobile devices and the need for users to use financial functions in

everyday life has led to the emergence of e-wallets [19]. They work either as an integrated application or can be installed by the user and store information about credit or debit cards, discount coupons, rewards received, etc. Among mobile wallets developed by renowned companies, we can list Google Wallet, Apple Passbook, Venmo, PayPal.

Besides the big companies that are developing electronic payment solutions, a number of fintech companies are developing that offer easy-to-use financial products and services at low cost. They deliver application programming interface (API) components. APIs allow startups to develop quickly innovative products that involve electronic payments. With the introduction of the PSD2 directive, financial institutions are required to provide information to third parties through these components, so fintech companies have a great opportunity to develop and market innovation. API products can include Dwolla, Stripe or Payoneer and on the Romanian market we can notice PayU, 2Checkout or Orange Money [16].

The electronic payment revolution integrates payments using NFC (Near Field Communication) technology, a fast, secure and easy-to-use technology that grows both in Europe and the United States. The way NFC technology works is to bring together two NFC-enabled devices that can change payment information (details of the payer, payment amount, details of the payee, etc.) via radio waves when they are at a small distance from each other. NFC is one of the safest ways to pay because a biometric verification is performed to authenticate payment and the risk of fraud is completely eliminated [20].

In addition to the high security it provides, NFC technology offers the ability to make payments even in remote areas without Internet access. Thus, in areas where electronic payment engines such as Google Pay or PayPal can not be used because they need Internet access, the NFC has the advantage of running on radio waves. Another advantage is the speed of making payments, avoiding agglomeration and reducing waiting times.

A disadvantage of NFC technology is that not all mobile devices include NFC technology (for example, low-priced or medium-sized devices). Thus, there is a backup option by which these devices can be used to make payments through electronic wallets by phone number authentication (for example, PayPal mobile wallet) or the use of QR codes (eg LevelUp mobile wallet).

According to McKinsey & Company's global report [21], revenue from electronic payments will exceed \$ 2 trillion by 2020, after an increase of about 11% in recent years and more than \$ 3 trillion over the next five years. Increasing the number of transactions creates growth opportunities for all the actors involved due to the advantages described above.

#### *b. Artificial intelligence (AI)*

AI is considered by most social networks to be the way forward for business progress. Facebook social network has invested in artificial intelligence since 2013 and research results are based on automatic tagging of friends using neural networks and recognizing images, making it easier to find new friends. Facebook also uses artificial intelligence to better filter news streams within the network. Following the recent scandals involving Cambridge Analytics, artificial intelligence has been identified as a way to solve many of the issues with fake news [22].

Besides Facebook, other social networks like LinkedIn or Pinterest have integrated artificial intelligence into their own functionalities. For example, LinkedIn uses artificial intelligence algorithms to estimate which candidates are best suited to open jobs and highlights who are more likely to answer or who are looking for new opportunities for professional development [23]. Twitter also recently released an update to its service that uses artificial intelligence and crops an image using face detection. Using neural networks, Twitter can decipher which portion of the image is of interest to the user [23]. Pinterest can identify objects within the image and make recommendations about products. Based on previous searches, Pinterest retains user preferences and future searches will be

personalized based on them so that the results are as relevant [24].

Artificial intelligence within social networks is becoming more and more present. Even if it never replaces the human interaction between companies and customers, it helps create a link. Thus, the chatbots are emerging as a new means of interaction between customers and service providers and may result in increased customer engagement in new product or service launches. Chatbots may be available in a relatively short time in court massaging services, and due to the Natural Language Processing (NLP) techniques they integrate, technology barriers are overcome [25].

#### *c. IoT devices*

The exponential increase of the amount of data provided by social networks and the Internet has led to the emergence and development of new information technologies, Internet of things (IoT) [26]. Information flows across social networks and sensor networks can be integrated to look for correlations and make various associations to expand the diversity of information and services provided.

The Internet of Things is an interconnected network of entities such as sensors and embedded devices used to provide a digital image of real-world data and have a number of features that model the real world. Sensors have the ability to collect a large amount of data from one or more users, data that needs to be stored and processed continuously. Due to the large number of users, there is a problem of storage of information, so it is not recommended to store raw information [27] (information collected from users).

The benefits of using information resources provided by social networks and information flows generated by many Iot devices are obvious: availability for widespread use, sensors are compact, inexpensive and intelligent [28], having the ability to transmit data to another system or to process them. The addressing system also provides a unique idea of the various objects and allows the recognition of thousands of devices as well as the ability to control them remotely. IPv6 protocol with extended addressing space can



be used to connect to the network and provide new unique addresses for IoT devices. It is compatible with state-of-the-art devices and technologies, offering versatility, stability, scalability, manageability and ease of use when used in devices with limited resources [29].

In the digital world, integration of social networks with IoT devices is becoming more and more visible, allowing automatic posting and distribution of them to connected smart devices [30]. In turn, this integration will pave the way for new social monitoring tools to harness the information transmitted by millions of interconnected smart objects. Among the various currently available objects, we have WiFi Routers, WiFi or NFC tags, motion sensors, gesture recognition sensors, etc.

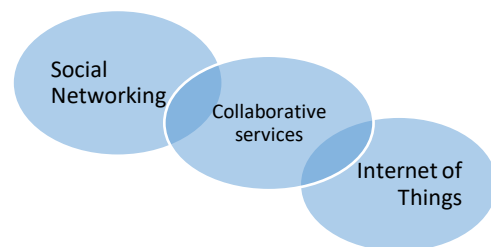
Currently, large companies are trying to integrate more and more the use of IoT to monitor user activities and habits. Thus, Visible and Radian6 service providers are working on a social media monitoring project to collect consumer data with connected IoT devices and deliver them in real time to customers. Also, in order to automate retail, N & W is working on a project that uses customer facial recognition based on past choices and orders, with relevant food habits and demographics collected through social networks. Disney uses Internet of Things technology to provide visitors with access to their parks and pay for purchases without wallets, bookings, etc. through RFID-based devices. Also, by taking customer data through social media, Disney aims to increase the visitor interaction with immediate surroundings within the theme parks [30].

In terms of large social networking companies, Tencent develops an interconnected smart device operating system to provide consumers with the ability to control their surroundings only with the WeChat application. Also, the creator of another messaging application, Life360, focuses on connecting family members and works to integrate its application with security devices [30].

Recent advances in technology allow the integration of **motion sensors** within social networks, so each use of social networks gives them information about activity in the online environment, ranging from the length of time spent to daily habits or passions. Motion sensors detect objects and people's movements and automatically transmit information to adjacent systems. Through motion sensors, it is possible to collect data about physical activity, time spent at home or at work, managing your favorite activities, etc.

In the recent period, the Social Internet of Things paradigm has become increasingly popular. This is defined as an IOT system in which objects are able to establish relationships with other objects in an autonomous manner. In general, Social IoT is an ecosystem that allows people and intelligent objects to interact in a relationship-based structure [31].

Figure 7 presents this ecosystem in which an adjacent social network allows an individual to obtain the various information that is collected and forwarded for further processing.



**Fig. 7.** SIoT Ecosystem

SIoT will bring diverse online and offline social experiences. In the future, SIoT is expected to increase the performance of object discovery, service composition, and object trust assessment [32]. Also, SIoT requires efforts in several directions, such as defining interobject relationships (semantic models representative of social networks, solutions to autonomously simulate other objects and information exchange), network analysis algorithms for SIoT after creating a social network, architecture adapted to SIoT that

allows the establishment and exploitation of social relations, resources and services [33].

## 6 Security

With the increase in the number of social network users and their spread across the world, security becomes a challenge for companies that have social networks. Thus, besides the threats that strictly target their own social network, they also face threats at the level of the internet network.

Millions of people use social networks in different ways, whether we talk about private conversations or the distribution of media content (pictures, videos, or other content). Users distribute a huge amount of personal data on social networks, and these data can be various threats, such as identity theft, spam, phishing, Internet fraud, and other cyber attacks.

Identity theft is the most common threat to social networks, with attackers taking personal information of users (full name, phone number, personal code, etc.) without their permission for other cybercrime.

According to the source [34], threats existing at the social networking level are shared in :

- threats to media content (common exposure and manipulation of shared multimedia content, use of steganography, transmission of metadata, links to multimedia content, static links, labeling, etc.) ;
- traditional threats (phishing, malware, spam, etc);
- social threats (harassment on the Internet through repeated sending of messages, espionage).

To prevent threats within social networks, there are a number of modern solutions capable of rejecting cyber attacks. Thus, watermarking techniques can be used (method for incorporating data in media content in order to prove media content ownership), steganalyse (mechanism for finding dangerous information within the media content), storage encryption (allows users of social networks to store and recover phishing information (including antiphishing based on machine learning algorithms for phishing

prevention and detection), detection of duplicate profiles (Facebook has built-in functionality to retrieve false profiles created based on profiles real, functionality that uses facial recognition techniques).

In addition to the techniques mentioned above, there is the possibility of using commercial solutions developed by security companies to protect against social networking threats or to integrate technologies that offer increased security (facial recognition or biometrics).

*Biometric identification systems* are automated recognition systems for models that provide physical or behavioral characteristics of individuals for authentication or authorization solutions [35]. Among the biometric identifiers for a person's physical characteristics we can list fingerprints, face features, ear or eyes patterns (iris or retina), hand geometry, etc while among the biometric identifiers related to a person's behavior we have the voice, the way they type, the signature, etc [36].

One of the current approaches is the multimodal biometric system and combines multiple biometric features to overcome the deficiencies of a one-dimensional biometric system such as variability, similarity, quality of data taken, noise sensitivity, etc. The multimodal biometric system has proven to be more efficient and safer than the one-dimensional biometric system precisely because of this combination of factors that are being considered.

One of the challenges in the design and implementation of biometric systems is the lack of quality data so the results are constantly raised. Thus, data on physiognomy, voice, walking have a great variability in the lighting conditions, the distance from the camera, the technical characteristics of the equipment, the way of use, etc [36].

Biometrics authentication has been implemented within social networks to facilitate user connectivity, much faster and safer than using text passwords. It also enhances privacy and security without compromising the benefits of sharing information through social networks.

Biometrics provides some identifying rules using biometric schemas and it is only allowed to connect the user correctly to his / her account. Therefore, this helps prevent theft of information, eliminating the possibility of taking advantage of other people's accounts or accessing personal information [37].

Implementation of biometrics contributes to increasing the security of social platforms. Biometric techniques can provide correct access to personal data through the multiple ways listed above. Additionally, it is easier than password-based authentication because biometric features can not be lost or forgotten. Among the benefits of biometric authentication are convenience due to the speed of authentication or authorization operations, lack of costs, increased security compared to classic user authentication and password authentication. It is also very useful for the elderly or with certain deficiencies. In addition, the accelerated development of biometric technologies offers jobs for the production, testing and implementation of security solutions.

At company level, the main biometric authentication issues relate to the confidentiality and security of biometric data. Often, biometric technology is associated with individual surveillance, biometry of the face creating a biometric profile from associated pictures on social networks, the person being identifiable in a lot of people quickly. Also, the security of biometric data is another issue because of the theft of information or its use for other purposes. However, it is unlikely that a user will reject digital content using biometric elements, and in the future we can expect biometrics to replace classic authentication on social sites.

One of the most common biometric authentication methods is facial recognition. *Facial recognition* is the feature of a system which is capable of checking any person by comparing an image stored with a real-time image or another digital image. Currently, facial recognition systems are used to increase security, but also to provide support to social network users in recognizing friends. In order

to increase security, companies like Apple, Samsung, LG have introduced the smartphone unlocking feature through facial recognition. The facial recognition process consists of two steps: face detection (detecting pixels in the image that contain information about the person's face) and face recognition (analysis of the part of the image detected at the previous stage). For face detection, algorithms like Haar Cascade [38] can be used (an algorithm that uses the change of contrast values between the adjacent pixel groups). Face recognition raises a number of issues, including illumination (any change in light can lead to the loss of information in each pixel), position (rotation of the person's face can affect the precision of recognition), passage of time (a person's physiognomy changes over time)[39].

## 7 Conclusions

Social networks have become indispensable nowadays. Technological development, the Internet coverage in the world, access to increasingly powerful devices, the need to communicate quickly and anywhere have supported the development of social networks all over the world. Whether it's Facebook, Twitter, LinkedIn, WhatsApp, WeChat or other networks, each has attracted a certain segment of the world's population. Also, statistics show that social networks are the most used applications on mobile devices. For example, on April 2018, 88% of Facebook users accessed the social networking platform on mobile devices and at the US level the percentage of mobile users was 68% [13].

Also, the exponential growth of the number of social network users is due to the many benefits they bring to people, including increasing awareness, communicating with friends, keeping up-to-date on the latest information about friends (benefits for people) or promoting products and services, providing customer support and information in a faster way and through a direct interaction (business benefits).

Existing social networks currently provide the basis for developing and integrating new functionalities within them. We can mention

features that include electronic payments (whether we are talking about shopping through social networks, managing your own cards or accounts or transferring money through instant messaging applications). Also, the integration of emerging technologies such as artificial intelligence, IoT devices or biometrics is still at an early stage, with great potential for development.

With regard to social network security, there are still many threats, including identity theft, spam, phishing, internet fraud and other cyber attacks. At the level of social networks there is a tendency to increase these threats. A number of solutions such as watermarking, steganalyse, storage encryption, phishing detection have been developed against them. Emerging technologies such as facial recognition or biometrics also help to increase security across social networks.

The research will continue with several studies related to electronic payment systems integration within social networks, as well as the technologies by which the development of a functional prototype could be possible.

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