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A Comprehensive Review of the Influence of Technology on Psychology

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Abstract- Psychology is the logical investigation of the mind and its behavioral activities. Analysts are effectively engaged with contemplating and understanding mental cycles, cerebrum capacities, and conduct. The area of Psychology is considered as a "Hub Science" with solid associations with the clinical sciences, social sciences, education, and much more. Technology is the branch of knowledge concerned with the development and application of specialized tools, as well as their interactions with life, society, and the environment, drawing on areas such as mechanical engineering, applied science, and pure science. This study aims to shed light on the relationship between the field of psychology and technological progress nowadays. This paper also provides a detailed investigation of the effect of technology on the discipline of psychology.

Keywords- Psychology, Technology, Machine Learning, Artificial Intelligence, Nanotechnology.

I. INTRODUCTION

Psychology is the coherent examination of how people act, think, and feel. Sometime before 400-500 years B.C., Socrates, Plato, Aristotle underscored the philosophical direction. Freedom of thought versus determinism, memory; nature versus support, the fascination was their spaces of conversation. In the early days, there were two predominant viewpoints: structuralism and functionalism. It is said that the name 'structuralism' was spearheaded by Wilhelm Wundt (1832-1920). The methodology predominantly centered on the breaking of the psychological cycles into the most fundamental parts. Wundt's idea was huge because it recognized psychology from theory, considering a more coordinated examination of the psyche's activities. Then again, William James, an American psychologist, fostered one more methodology which came to be known as 'functionalism'. Both structuralism and functionalism were repudiated. Our brains are continually changing, as indicated by William James, so searching for the construction of mindful experience is awkward; all things considered, he focused on how and why a creature performs something, for example, the mind's motivation.

Sigmund Freud, who was the father of psychology, gave us psychoanalysis. He accepted that individuals might be treated by acquiring an understanding of their oblivious thoughts and inspirations and making them cognizant. Sigmund Freud's therapy was the first psychodynamic hypothesis, yet it envelops different speculations dependent on his ideas, including Jung, Adler, and Erikson. Afterward, different methodologies made a gigantic commitment to the area of psychology, specifically the behaviorist methodology and the humanistic methodology. The behaviorist technique, regularly known as 'behavioral psychology', is a hypothesis that affirms that all practices are instructed through some type of contact with the climate named molding. Behaviorism just spotlights improvement practices. Afterward, the humanistic methodology turned into one more methodology in which the essential spotlight is on emotional experience and self-awareness.

During the 1960s and 1970s, an intellectual upset dependent on lab tests started in the discipline of psychology, with applications to memory, discernment, and intellectual turn of events, mental sickness, and significantly more. Analysts focus on everything about the human experience, from the basic activities of the human brain to insight, memory, thinking, and language to the character and enthusiastic prosperity. At whatever point any individual is managing any sort of mental pressure, confusion, or any type of human conduct change, clinicians partake in tackling issues in our day-to-day routines. As a piece of science, psychology not just deals with the means of human reasoning and conduct, but additionally assists with taking care of the issues confronted and managing the imperative cycles. As technology grows from day to day, major research areas

are now focused on presenting the needs of human behavior to match them with the rehabilitation of devices or machines. A major hot topic which is the cup of tea of our daily lives is 'Engineering Psychology' or 'Human Factors Engineering'. 'Engineering Psychology' is the study of human behavior and capability, which applies to the design of any device or system, or technology upbringing [1]. It is an application of ergonomics that states the relationship of human beings and machines by reforming types of equipment, interactions, or environments they can take place.

Technology nowadays takes a great step towards making an impact in the field of psychology through computer simulations, algorithms, and applications. Different treatments are nowadays being provided to patients with the help of technological growth or advancement. New issues have been created to get further inspection of the research areas through the help of technology in this immense field.

II. RELATED WORK

Some definite objectives or intentions can be said in the area of psychology that does not just guide in molding the conduct of one just like others. It is shown that describing, explaining, predicting, and changing others' manner and mental cycles are the four fundamental motivations behind psychology.

- **To describe:** The main objective of psychology is to describe and assist scientists in fostering certain overall laws of human conduct.
- **To explain:** After describing, analysts will generally clarify the course of the conduct, hence clarifying how or why this happens.
- **To predict:** Through exact exploration, psychology plans to foresee future behavior.
- **To change:** Once the entirety of the objectives have been met, endeavoring to change or control conduct is conceivable. The four points have a wide scope of utilization in our regular routines, including business, marketing, education, medication, and self-improvement.

Technology isn't simply changing how individuals interface with the world; it's additionally changing how researchers concentrate on human conduct and also the brain. San Francisco is a world-popular center of innovation and a fitting area for a discussion on research on tech and the human experience. In a Cross-Cutting Theme Program at the 30th APS Annual Convention, speakers introduced interdisciplinary work on how innovation shapes learning, consideration, conduct, and our public activities from youth through advanced age. In-person treatment, for example, is not available nowadays. Several apps are available through which patients and analysts can converse with the help of websites, applications, and teleconferencing, which is ultimately the growth of modern-day's technology. Moreover, treatments or detection of any kind of stress or disorder nowadays is available using technological instruments invented with the help of Artificial Intelligence, Deep Learning, and Machine Learning Protocols.

In this current world, we as individuals are turning out to be more careful about our emotional well-being and, along these lines; we are offering significance to our state of mind, which, in another way, assists us with acquiring compassion towards one another. With the improvement of this field or this subject, we can comprehend or we can realize that individuals can experience the ill effects of mental torment, enthusiastic agony, and not simply actual torment. Many psychological applications focus on protecting people from emotional and physical risks while also giving them the basic mental transmission capacity to deal with the mental threats that many people experience daily. An analyst can assist an individual with further developing their dynamic, their capacity to think, and in particular, they can allow the patient to discuss whatever they feel like. The investigation of psychology is far-reaching today, and various parts of psychology are generally perceived and oftentimes utilized in many pieces of business.

The rise of computer technology has characterized this mental function as information processing. This gave rise to the cognitive dominant model of the mind, which is combined with the internal mental beliefs and study of the mind. With the progress of technology, neuropsychology and cognitive neuroscience have taken an immense part in the most active areas in modern-day psychology. With the involvement of different fields like computer science, philosophy, and neuroscience, cognitive science has created a great impact on such studies in a positive way [2].

In [3], it has been stated that technology has turned into a crucial power in forming the personality, intellectual, and full of feeling measures, and social exercises of our understudies, customers, and exploration members. Though the family was once, by a wide margin, the most significant climate for molding mentalities and convictions, today's teenagers are exposed to a lot more good examples, values, perspectives, and decisions than at any other time. Computer games permit individuals to build and experience augmented realities unconstrained by the standards and upsides of general society (Gentile, Saleem, and Anderson, 2007). The Internet upholds the framing of elective networks (Turkle, 1996) around shared thoughts as opposed to as if they were through actual contact. Virtual people groups can provide friendship for people who are unable to connect with others in their immediate surroundings.

Psychology has never been held back by technology; rather, it has always attempted to apply itself to everyday practices. If we look into the history of science, we can find out that many psychologists, psychiatrists, and neurologists created devices based on technological evolution over time. Many scientists, analysts, and

physicians have used magnets, sensors, and computer programming languages to detect several mental disorders. For example, Frank Mesmer, an Australian physician, used magnets to detect human mental disorders in the eighteenth century. Then, he created his famous "health tanks" and they were used by the patients to apply one of these points to the aching side.

III. METHODOLOGY AND THE BACKGROUND

Technology makes it possible to get numerous sets of data in real-time, including self-report, physiological data, observed behavior, and so on. Scientists are always attempting to bridge the gap between human feelings and technological advancement. Why do we need computers to comprehend humans, when we're talking about technology and psychology? For example, if a system does not recognize that the user is becoming annoyed, the user may find it more difficult to use the system. According to studies, when dealing with humans and robots, robots who apologize more are significantly more likely to be favored than robots who do not apologize.

Cell phones and wearable devices (e.g., smartwatches, fitness trackers) make it simple to collect data as it happens, rather than relying on self-reporting later. Human memory is fallible, and therefore the quicker the knowledge is entered, the more likely it's accurate. Some software systems mechanically enter data, like programs that measure exercise and sleep habits. Alternative data must still be entered manually (for example, a food log), but it can be done more quickly and conveniently on a phone we carry with us all the time. Technology additionally permits researchers to perform measurements in natural settings instead of being confined to the research laboratory.

Sensors in little devices that we use every day play an important part in tracking and measuring human behavior, such as blood pressure, heart rate, sleep tracking, dozing, skin conductance, and much more, but the issue remains as to what we will do with all of this information. According to Dr. Eric Topol, author of "*The Creative Destruction of Medicine: How the Digital Revolution Will Create Better Health Care,*" when information about something is constantly returned to a person, he or she becomes aware of stress or health abnormalities that they were previously unaware of.

Technology has introduced new ways of accumulating data, some of which are tremendous upgrades over more seasoned techniques. One of the most challenging aspects of psychological research is repeating the results. So, as technology is moving ahead, scientists have created some special instruments which can obtain précised measurements from the larger samples. The bigger the number of samples, the higher the measurement capacity. For example, computer-generated reality tech permits analysts to assemble information without really going to a particular climate. In addition to the fact that this is less costly and more helpful, it likewise disposes of certain moral concerns and dependence on self-report. Capacity innovation has permitted the advancement of immense data sets of data. A large number of these index human conduct that can be utilized in the investigation of psychology. For instance, data sets have data on everything from wrongdoing measurements to lack of sleep. Moreover, these data sets gather data from a huge and varied population, making them ideal for fulfilling legitimacy concerns. This presents clinicians with colossal stores of data in which to investigate.

Nowadays, several methods have been used to detect various disorders or changes in the human psyche or behavior. Some of them are Artificial Intelligence, Machine Learning, Deep Learning, and much more. Using these technological instances, nowadays, psychologists, scientists, and analysts have been creating different devices to detect different conflicts in the human mind or behavior. These innovations have stepped up with a great movement in recent years to detect several disorders, stress, and changes in humans. Recognizing emotional information necessitates the collection of data and the identification of various patterns, which is accomplished with the use of machine learning, which processes voice recognition, facial detection, and other tasks. ‘Affective computing’ comes into play here. Rosalind Picard's 1995 work on emotional computing gave birth to the more contemporary area of computer science. It's the study of machines and systems that can detect and analyze human emotions. Changes in a user's language, tone of voice, and variations in facial expression are detected and responded to by affective computing-enabled devices. They do it by gathering data from users via physical sensors such as video cameras and microphones and evaluating it using past experiences and data sets. As a result of its activities and growth in recent years, technology is revolutionizing the area of psychology.

Source: “How is Technology changing Psychology?” (2021)
Figure 1: The effect of Technology on the Human Mind.

IV. IN-DEPTH DISCUSSION OF PSYCHOLOGY IN RELATION TO TECHNOLOGY

In [4], the authors have stated that throughout the nineteenth and twentieth century, a wide range of technologies has been created to check the human state of mind. The authors also gave an example of a subject that is whether telling the truth or lying using technology. Furthermore, several computing technologies have recently been developed which use different computer algorithms and face recognition software to detect the state of the human mind.

Big Data is the arrangement of innovations made to store, dissect and deal with this mass information, a large-scale apparatus made to recognize designs in the disorder of this blast in data to configuration keen arrangements. It is now used in fields as diverse as medicine, farming, gambling, and environmental insurance. In [5], the author has stated the use of 'Big Data' upon psychological science. The author also stated an example relating it to the daily crime statistics to the environmental state. Data sets exist that consider detailed investigations of the impacts of conventional mental ward factors like lack of sleep, cold, and abundance levels on wonders identified with everything from working memory to hazard perspectives — and at just remarkable scales.

In 1956, a small group of experts from diverse areas, including mathematics, psychology, engineering, economics, and political science, founded the subject of artificial intelligence study. They started talking about creating an artificial brain. Neurological studies have recently revealed that the brain is an electrical network of neurons that fire in all or nothing pulses. Artificial intelligence systems prefer to make choices based on real-time data. The objective of artificial intelligence is to give programming that can reason and include and clarify output. Artificial intelligence helps in furnishing human-like connections with programming and proposition choice help for explicit undertakings, but it's not a replacement for the human mind and behavior and will not be at any point shortly. Forms of Artificial Intelligence are classified into four parts, such as reactive machines, limited memory, theory of mind, and self-awareness. In [6], the authors state that the need for artificial intelligence towards the lifestyle of human beings. In contemporary times, Artificial Intelligence has utilized its methods to create systems that can act, think, and learn just like human beings. It is stated that artificial intelligence is an integral part of our existence. For example, starting from our phone, whenever anyone searches for any music videos on any music streaming platform, the system, which is specialized in those Artificial Intelligence methodologies, recommends other music videos related to that person's preferences. So, using artificial intelligence, a machine can perform the same task as the human thought process.

Mainly, artificial intelligence is very much related to human psychology. It mainly focuses on human neurological functions. A new form of psychology that was established in the late 19th century is known as "Artificial Psychology" [7] and it is with the recent utilization of Artificial Intelligence. In [8,9], the authors have analyzed human psychology methods with the help of information science research methods and artificial intelligence to investigate more deeply human mind philosophy. In 1963, Dan Curtis considered artificial intelligence, which approaches the level of complex analyzed intelligence is measured based on two conditions:

The first condition is:

- Makes all of the decisions independently.
- Makes any decision based on data that is new, abstract, or incomplete.
- Capable of reprogramming the new data.
- It is capable of solving its programming disputes, even if the data is incomplete.

Condition II:

- All the criteria are not in line with the original operating system.

Source: "Implementing Artificial Intelligence" (2021)
Figure 2: The interconnection of Artificial Intelligence with the human touch.

Now, the facts about how machine learning is helpful in the field of psychology. Machine learning is nothing but a sub-field of artificial intelligence through which it entertains any system or device which can learn from data, identify patterns, and make decisions with minimal human intervention. In [10], the authors have shown the possibilities of some prediction of Internet addiction based on a set of predictor variables. The indicator variable set was chosen with the end goal of ensuring that there exists a solid connection between the boundaries considered to have an impact on tricky Internet utilization.

Bipolar disorder is a mental illness with lots of mood swings and emotional highs and lows. Whenever any person becomes depressed, he or she faces instant mood highs and lows and loses interest in any activities. The authors of [11] used a random Forest Algorithm with Magnetic Resonance Imaging (MRI) data to detect this disorder. The author had also shown that CNN-MDRP (Multimodal Disease Risk Prediction) had higher accuracy in predicting than other algorithms using machine learning for Bipolar Disorder detection.

Web-based intellectual conduct treatment has shown positive outcomes for an assortment of mental problems, including misery, uneasiness, and post-awful pressure issues (PTSD). There is a blast of web-related psychotherapeutic treatment. Quite a bit of this is gotten to through sites and applications. Although some applications are just conductors to teletherapy administrations, many are crossovers that offer education, self-improvement, and online help on a case-by-case basis. Most web-based treatments utilize intellectual conduct standards.

Several apps in today's technology world are available to help people with their mental disorders, behavioral changes, and many more. Some surveys have been conducted on a daily or monthly basis to detect the changes in human behavior, to detect their stress and depression with percentages. For example, an application named "Code Blue" was created to help teenagers suffering from depression and bullying with support whenever they need it. As the commonness of psychological instabilities like depression and anxiety keeps on developing, clinicians have gone to versatile applications as instruments for helping their patients' treatment. These applications can be particularly useful for teens and youthful grown-ups experiencing psychological instability because of their incessant utilization of innovation as a method for correspondence.

[From an internet source of the "Top 10 Mental Apps"]
Also, in 2018, Melina Uncapher of the University of California stated in a report "Technology meets Neuroscience" that it's not possible to bring an MRI scanner to every classroom, but they have turned it into a mobile technology so that everyone can access it. The Neuroscape Center at UCSF has created 'ACE', a tablet-based intellectual evaluation, which has permitted Uncapher and her partners to concentrate on leader work inside a gathering of more than 1,000 rudimentary and center school understudies across nine diverse Bay Area schools. These tweaked Neuroscape computer games utilize versatile calculations to change the degree of game trouble, permitting analysts to utilize similar precise intellectual assignments for offspring of any age across tests, and across time. Fundamentally, this permits high-accuracy, high-dimensional estimation of insight across improvement.

In this modern era of technology, the relationship between machines and humans is very diverse and emergent in all fields. The authors of [12] have reviewed the effects of technology on humans. The authors claimed that the situational changing of human behavior affected most of the interactions between machines and humans. The authors showed that the branch of Engineering Psychology helped to improve the relationship between humans and machines by interacting with each other. The authors also reviewed the existing research in the field of Engineering Psychology.

The authors of [13] developed a mobile application that can analyze mental illnesses based on lifestyle and psychometric data from people of all ages. The authors also proposed an ideology on how Artificial Neural Networks (ANN) can be applied to the dataset to analyze and detect the type of mental disorder it contains.

In [14], the author has utilized a dataset comprised of substance abuse patients from the United States and the Convolutional Neural Organization characterization comprised of opioid addicts to get the precision of the psychological issue forecast framework. The author has also proposed a new method for detecting mental disorders using data mining.

Another field that has recently attracted the attention of the contemporary field is "Nanotechnology". "Nanotechnology" is the study of matter at the nanoscale, with dimensions ranging from 1 to 100 nanometers. Nanotechnology involves imaging, measuring, and modeling. Nanotechnology encompasses disciplines such as physics, biology, chemistry, and nanometer-scale technology. In psychiatry, nanotechnology has a wide range of uses. Pharmacology, living analysis, and central nervous system modeling are the three most common applications. If properly used, nanotechnology and quantum physics can be used to create artificial intelligence and mental disease models [15]. Psychology is linked with several areas, or we might say that it incorporates every significant technological advancement [16]. The National Science Foundation has invested heavily in building a foundation on which nanotechnologies can be further developed. The National Institutes of Health, on the other hand, is putting in a lot of effort because of the potential for medical applications. The National Nanotechnology Initiative, on the other hand, involves more than a dozen agencies. With the advancement of nanotechnology, psychologists interested in the dissemination of innovation, decision-making, and social impact should dive right in. Certain psychological groups have identified nanotechnology as a powerful tool for addressing challenges related to human cognition, perception, emotion, and activity. Day by day, new technologies emerge, which will ultimately aid the study of psychology. Psychophysiological recording, for example, accurately supplies visual and auditory stimuli as well as response time assessment.

V. CONCLUSION

The exploration of this article is an entry through which the greatness of technology can be moved forward through its innovations in the field of psychology. Starting from the usage of smartphones, applications, websites to the concept of using technology for medical as well as mental illness treatments of human minds, technology has created a greater impact and it is also progressing daily through several innovations and research. Different methodological innovations provide scientists with fresh ways to deal with the mysteries of human minds in

research labs everywhere on the planet. These days, various medications are being given to patients with the assistance of mechanical development or progression. As a whole, we are welcoming this immense innovation for the growth of the field of psychology in several spheres every day. It has prompted advancement in treatment, education, estimation, and exploration. Technology, as a rule, gives a more advantageous and less expensive elective when utilized for assessment and treatment purposes. Perhaps most importantly, it has enabled more people to acquire data and access emotional wellness administrations. The major goal is to develop new technologies that will help psychologists work more correctly and efficiently in the future.

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