

Human Computer Interaction And User Experience In Computers: An Assessment Of Current Approaches And New Concepts)

Bilal Olalere Ashade¹, Tarek Najjar ²¹Department of Computer Engineering, Ankara Yıldırım Beyazıt University, Ankara, Turkey

²Department of Computer Engineering, Ankara Yıldırım Beyazıt University, Ankara, Turkey
205101102@ybu.edu.tr, tnajjar@ybu.edu.tr

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Abstract—Humans have grown to love their computers, and this is without a doubt seeing the way computers and technology generally have impacted our lives and permeated every fabric of daily living. From building smart homes to getting the job done at the office, humans interact with computers every period of the day. This level of inter-action also calls for some rules and principles because the popularity of a product will be highly dependent on how usable such a product is. Previous studies have shown how human-computer interaction (HCI) can optimize user experience (UX). It has led to some specific studies by scholars who have assessed the HCI needed for phones, laptops, and even mobile applications. Now that the foundation is in place, this paper explores an interaction plan. It will look at the contrast between a great plan and a plain plan, and you will notice how an object such as hardware and software products can differ radically in their usability. The paper will also assess what and who is involved in interaction design. Finally, the paper further outlines some of the primary vectors of usability and how the vectors are used to test interactive products.

Keywords—HCI | Intelligence | Algorithms | Interaction | Human

I. BACKGROUND

The affiliation of a computing enginery gives a definition [18]. "Human-computer interaction can be an education that bargains with the plan, assessment, and utilization of natural computer systems for human use and the extraordinary ponders that encompass them since the interaction between the client and the computer at the interface of a program or device such as a computer. As reported in many articles, it can be seen as a crossroads in computer science, behavioral science, planning, and several other research disciplines [20]. HCI evolved in the 1970s due to the increasing use of computers and computing devices in work environments. Initially, centralized computers that required a lot of

preparation and support emerged, and then a single computer was created. PCs have become more and more accessible at work, during which time they have been further developed for home use. The demand for "humanized computers" has not been long, as the possibilities of computer gadgets have evolved in all areas of life, and individuals are aware of the challenges they face when using them [11]. he HCI division then began to grow in the mid-to-late 1970s, attracting analysts in various disciplines such as ergonomics construction computing.

A connected and problem-focused field of investigate [24]. HCI needs a mix of perspectives and assumptions, perspectives and strategies. More than a society of analysts from different fields than education, the 1970s and 1980s saw a growing demand for the field as a center of inquiry and advancement. Therefore, courses that prepare individuals for strategies and increase sensitivity around the complexities of understanding human-device interactions are followed. In addition, the utilization of computers in consumer hardware is a significant growth area for computers. It is one of the factors why computer companies like Apple are pursuing the "personal advanced assistant industry."

Following up on additional inquiries, We have noticed that many HCI researchers view the plane as a surface structure or an ornament. We needed a unified view of what design analysts could bring to HCI research to grow. The lack of visibility into the engagement planning investigation represents a missed opportunity for the HCI research community to benefit from the composite perspective of planning review in the context of a collaborative investigation. An inclusive design viewpoint that takes an all-encompassing

approach to address under-constrained situations can greatly teach the research community.

Since human-machine interaction studies, the combination of man and machine relies upon records from each the on both the computer and the human side [42]. PC designs techniques, operating frameworks, programming dialects, and development situations are involved on the computer side. On the human side, correspondence hypothesis, practical expressions, contemporary-day plan, semantics, sociologist, highbrow mind research, and human motion are involved. Designing and plan techniques are moreover involved. The multidisciplinary concept of human pc interplay allows people from diverse foundations to feature to HCI. HMI is sometimes known as a human-gadget association (HMI) or human-PC collaboration (CHI). Even if the human interface designer tries to avoid device-oriented tasks due to software or hardware limitations, they cannot be removed. As long as you use bank cards, they will be inserted into certain slots and will need to be removed later.

A not unusual layout approach in this example is to mandate device-orientated tasks. H. Their role withinside the manner of action is pulled forward; as a result, users' goals cannot be achieved without performing device-oriented tasks. Therefore, HCI accuses it of being essential that the product is more fertile, safer, more useful, and more useful. In the long run, meeting users will be more comfortable. Therefore, it is essential to involve people with HCI skills at every stage of improving an element or framework. HCI is also essential to prevent a complete collapse of a product or business. HCI is fundamental to creating a clear and natural framework open to individuals with a wide range of gifts and information and individuals who have not yet been officially prepared. HCI makes computer programs and gadgets more comprehensibly and valuable for everybody by leveraging our ordinary environment information.

It is pertinent to justify why HCI study is important and what challenges society can face. These include (to name a few) quality of life, well-being, security and other forms of security, autonomous living, aging, working conditions, economics, natural issues, education, digital partition closures, data access. Issues such as are included. All of these concerns are personal and relevant. Several areas are exploring these zones and regularly incorporate data and communications innovations. The HCI sector plays an extraordinary role in addressing social issues by introducing a specific perspective of human centrality. This position is envisioned not by optimizing the quality of the interaction but by explicitly developing a progressive approach to the interaction to support social challenges. Based on this translation, our field covers many things to explore social challenges. However, the term "social interface" is rarely used. It can be characterized as a progressive approach to interactions explicitly planned to

advance or elucidate a particular social perspective, using HCI as an approach to creating diverse societies.

Some of the benefits of the technology are creating methods and processes for designing interfaces in relevant styles (that is, for specific tasks and user classes, as best as possible within specific constraints. (Learning ability or efficiency) to design the interface and optimize the desired properties, such as it also helps identify methods and techniques for implementing the interface (software tool kits and libraries, efficient algorithms, etc.). Engineers are encouraged to use the HCI solution to discover techniques for evaluating and comparing interfaces.

HCI likewise assumes a significant part in improving new points of interaction and interaction technologies and in developing descriptive and predictive models and theories of interaction. Plan a framework that limits the hindrance between individuals' intellectual model of what they need to accomplish and how PC might interpret the client's undertakings. The heart of social networking is to initiate an unused HCI arrangement (for example, how we as a science field can contribute to the special questions of nature) or to consider existing work within the zone. It is to introduce a specific perspective to get in. Raising HCI's work to a social level provides a new interdisciplinary understanding and perspective. We believe that the small solution in this issues article highlights some of the previous work and illustrations from HCI and will inspire even more work in the future.

Some of the key findings in the study will include an evaluation of HCI on algorithms, artificial intelligence, smartphones, gesture-driven devices known as leap motion devices, devices built for older people, Kinect devices, radioactive robot-powered devices, cognitive-driven devices, among many others. Overall, the study exposes some of the key concepts around human-computer interaction, and the general ways in which the study of HCI can be improved, for technologies such as virtual reality and augmented reality devices. Several perspectives are provided.

The adequacy of HCI depends on significant basic boundaries, for example, convenience and similarity, which would invigorate the end-user to ask the organizations safely and more dependable. Therefore, it will be essential to get the diverse convenience factors underneath unmistakable perspectives that are significantly central to the user framework architects and the capacity to the main of our findings, we give an illustration example to be considered by the health section, assessment, and formative technique in CHI work.

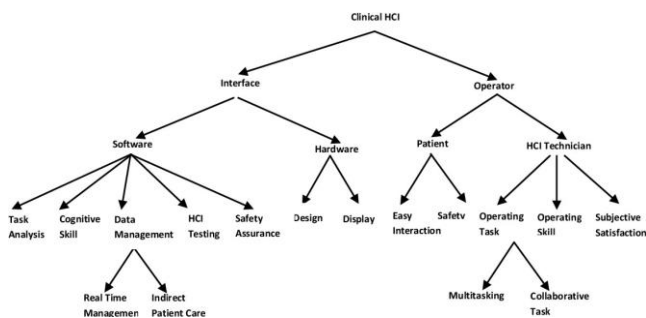


Figure 1: [16].Simplified the flow of usability and interaction with software and operators.

The clear scope for an increasingly useful approach to interacting with society is in the realm of well-being. We provide articles that analyze user experience issues and articles with virtual environments that support the individuals living. In expansion, attractive technology is important for inducing behavioral changes that positively impact social problem domains. These are some of the mosaics that shape the image of HCI as a social doctrine.

II. THE ROLE OF USER INTERFACES IN ARTIFICIAL INTELLIGENCE AND HUMAN COMPUTER INTERACTION

Several studies have evaluated the role of user interfaces and human participation in AI-assisted decision-making and their impact on human-computer interfaces. One study was conducted by [4]. The following section will assess what their findings are. Artificial intelligence (AI) is gradually becoming a central feature of humans augmenting decision-making. This study evaluated a case study of cognitive software in the telecommunication industry. Some of the key findings of this study include that people tend to withdraw from decisionmaking, and as people withdraw from decision-making, human and algorithmic intelligence become disproportionate three effects are likely to happen; namely, by deferring such decisions, having workaround to bypass such a decision, and manipulating data.

One of the conclusions asserts that creating a user interface that operates as a mediator between humans and algorithmic models is optimal for improving HCI. Research begins with theorizing the concept of an algorithm at work. As they move from unmistakable to the proactive method of information investigation, they explain the job of calculations in navigation, recommending the best decisions for operational and strategic action [43]. The article encourages clarifies that learning calculations, some of the time known as fake insights (AI) or "cognitive frameworks" [33], are increasingly being used in workplace decisions. Researchers sometimes refer to AI as data analysis automation in the workplace [3]. Machine

learning calculations upgrade making Decisionbureaucracy through the years without human mediation, coming approximately in people dropping human manipulate in their execution [26]. They note that algorithmic checking, estimation, and administration of commerce execution is the most common work of commerce insights computer programs. Research further explains that computational calculations to tackle an earlier issue are alluded to as algorithmic navigation [30]. At the point when calculations and AI are consolidated into the dynamic interaction, research suggests that individuals who are defied with routine decisions are isolated from choice creation since they forget about the information sources, assortment techniques, information investigation, and data handling that fill in as the prompt reason for information and direction [28].Social inquiries embraced touchy subjects and critical things expected to evaluate connection and separation. We utilized the large subjective methodologies of leading meetings, mentioning observable facts, and doing narrative examination to secure a feeling of the call place laborers' obligation to choices [9].

We led 28 semi-organized meetings with the organization's faculty. On a portion of its discoveries, the review uncovers an issue about interface intervention between the calculation and the specialist as the ' best' choice would almost certainly prompt whether or not the choice is as of now made before the specialist takes part. The concentrate additionally featured how UI could im- pact low human contribution in AI machines, topographical and fleeting division, objective separating, and intellectual relocation are, for the most part, instances of ways of eliminating the human chief from the independent directors. In any case, the choices introduced through the point of interaction may often bring about an undeniable degree of human cooperation. Thus, our discoveries highlight a concurrent connection to and separation from the choices that permit AI to work.

Their study likewise found the significance of relevant angles that no one but people can think about by distinguishing unintentional and infrastructural closeness to choices as an immateriality-driven sort of connection. Full of feeling grip, the third sort of human connection to choices is inspired by feeling. At long last, in light of conceded choices, workarounds, and controls, our information infer that an absence of adjusted human commitment in an independent direction has troublesome execution outcomes. In addition, the work addresses other calls by studies on exploring more subtle contrasts in the components of attachment and detachment than the simple opposition of attachment and detachment. We answer this call by characterizing the variables that make connections and separations conceivable.

The intricate programming highlights bring about low user involvement as far as spatial and fleeting detachment, normal distance, and intellectual dislodging. Future review on the algorithmic direction and the utilization of AI in computerized

information examination in organizations will profit from our worldview. These ends depend on the idea of client commitment, which has generally been related to brain science in media hypothesis [23]. The constitutive highlights of people's separation from and connections to dynamic that clients face in dominating their contribution in dynamic structure the underpinning of our idea on AI's capacity. Future investigation may disregard the persistent human consideration and go exorbitantly far in the conversation about computations as autonomous parts, assuming it doesn't consider the connection points that present algorithmic choices as middle people of explicit types of human separation and connection, and assuming it doesn't accentuate this double job of AI in work environment choices.

III. USABILITY AND THE CONCEPT OF HUMAN COMPUTER INTERFACE IN M-LEARNING APPLICATIONS

In another research, [1] assessed the concept of usability for mobile learning applications and how this affects smartphone devices. This research paper assesses the framework that describes the usability feature of the mobile learning application. The research also successfully created and implemented a design prototype for a smartphone that can test the usability features of mobile learning apps. The prototype developed used Java language and Android SDK. The prototype developed was also compared to another mobile application based on the Blackboard. The research also involved a survey of respondents in Western University, using questionnaires. The usability features tested include ease of usage, customer satisfaction, attractiveness, and learnability. In conclusion, the surveys found that the model developed was more easily usable than the Blackboard model. The research is mainly divided into the introduction, literature review, a developed theoretical framework, data analysis, a discourse, and the conclusion. The research is introduced by defining how mobile phones have become a permanent feature of societal and daily living [5]. The study sets the tone for the scope of the research by highlighting the key role mobile devices play in the conduct of education. The study also notes the relative challenges of mobile phones in terms of ease of viewing and the increasing adoption of phones by educational institutions to aid mobile education. The problem highlighted by this study is particularly important due to the emerging forms of education technology being developed in response to remote learning and other impacts of the Covid-19 pandemic. Therefore, it stands to reason that improving the usability of such devices should be a primary consideration.

The study highlights the importance of designing an attractive and user-friendly interface for mobile learning devices, including generating acceptance from the user base and creating acceptability with a wider audience. The study also highlights the current use of mobile phones in the mobile learning experience, citing many studies which have

established that students now utilize mobile technology in learning. They also highlight the importance of learning anywhere and at any time as one of the key factors driving the adoption of mobile learning. The study identified one of the key features of mobile learning technology as ease of use [44]. When a product is complex or has a confusing user interface, it would lose a degree of market share. Therefore, this consequence should encourage developers to target ease of use as a product thesis. The study further highlights the different guidelines for creating desktop and mobile applications. They emphasize that developers cannot utilize the guidelines for desktop applications in mobile learning applications. In their literature review, the work assesses the different articles and research which have assessed the concept of usability. In addition, they addressed the literature which has generally discussed the role of cell phones in mobile learning processes [2]. The research then takes a step-by-step approach to developing a framework that assesses the usability of mobile learning platforms. While their designed framework is similar to the one designed by Parsons and Ryu, they make a critical addition by considering usability, communication, and interactivity. They distinguish between the quality of use, internal quality, and external quality metrics and apply this to ISO/IEC metrics.

They assessed a case study called the Busuu Project, a mobile language learning platform, using the developed framework and found that the Busuu project is a successful and usable application as it meets all the requirements. In addition, they created a prototype for assessing the framework and created two models, the first based on the Blackboard website, while the other was created with the Android SDK recommendations and the created framework by the researchers. After this, the researchers surveyed respondents from Canada's Western University. The respondents were assessed based on the two models created [1]. The study evaluated ease of use, user satisfaction, attractiveness, and learnability from the survey findings and the data analyzed. A general validation test established that the two models do not perform in the same way and that Model B, which was built based on the authors' framework, performed more consistently than the model built based on the Blackboard website. The different tests used in the process include the T-test and the F-test to evaluate the models and the variance levels. Finally, the study establishes a reason behind building better user interface solutions for mobile learning applications, and this study has created a comprehensive framework for testing the usability of mobile learning apps. Its usefulness will be brought to bear, seeing the growing adoption of remote learning options across the globe.

IV. THE DEPLOYMENT OF USABILITY STUDY IN

LEAP MOTION DEVICES TO EVALUATE NATURAL USER INTERFACE

This work surveyed the idea of normal UI through ease of use study dependent on the jump movement gadget [14]. A leap motion device can be defined as a tool that enables users to interact with digital objects on a computer. In the heightened world of augmented reality and virtual reality, the leap motion device has become very important, and seeing how effective human interaction is with the device will enhance usability. The study introduces readers to the common device dubbed "Leap Motion" and its impact on the market, offering "touch-free" interaction based on a gestural interface. They clarified it as a state-of-the-art innovation that foregoes standard sources of info like the mouse and console for a clever graphical UI and client connection. Without using a pen or a realistic tablet, the gadget considers picture control and the formation of antiques, for example, drawing straightforwardly up high.

Their article incorporates a review to assess the intuitiveness



Figure 2: [32]. The Leap Motion Device

thought using the Leap Motion, just as the movement of a connection point architect utilizing Photoshop CS6 programming. The exploration was a convenience test with five architects who utilized the product in their everyday work yet were uncomfortable with the Leap Motion contraption. The respondents completed not set-in-stone assignments and finished a fulfillment overview. At last, the scientists found that the contraption should be adapted to a superior client experience with normal interaction points. Subsequently, the gadget's usefulness is still completely usable and could supplant the mouse and console in inventive exercises utilizing visual depiction programming.

The examine observes that regardless of technological advancements, it has grown to be a not unusual place to apply gestural interplay with gadgets that use frame actions because of the number one technique of interplay, along with pills or smartphones. The researchers referenced a study that asserted that interacting with a product through gestures and movements is insufficient [41]. The new technology must be integrated into the user experience so that engagement is as natural as feasible. The natural interface is the name given to this new mode of interaction. Their review saw that clients have searched for plans that can fulfill their needs and assist them with arriving at their objectives. In addition, graphic architects are searching for specialized arrangements to take

care of their plan endeavors in this setting. Because of the standards and idea of a normal point of interaction, the exploration announced in their paper expects to assess the connection point convenience of the Leap Motion gadget for planner movement while drawing in with the Photoshop CS6 program.

In this paper, the authors made errands for clients to finish utilizing the Ethereal application, which interfaces Photoshop CS6 programming to the Leap Motion gadget, permitting developments for the use of normal and significant devices for picture creation to be perceived. The specialists contended that it was feasible to investigate and handle the accompanying significant attributes of the Leap Motion interface dependent on the ease of use appraisal from the heuristic examinations in this exploration [39]. To sum up, the Leap Motion requires various changes to the gestural connection point and human variables actual hand development examination to diminish weariness and convey the ideal client experience. Thus, while the innovation is encouraging, it isn't yet prepared to supplant the conventional mouse and console crafted by realistic programming originators. When planning human helped gadgets, for example, Leap Motion Devices, it is basic to plan considering the clients, and this review had the option to build up that more should be possible in further developing LMDs considering AR/VR advances being utilized today.

V. IMPACT OF DESIGN ELEMENTS IN MOBILE APPLICATIONS ON CLIENT EXPERIENCE OF ELDERLY PEOPLE

Advancement in medical care has made it simpler to consistently keep up with one's well-being. With the maturing populace on the ascent, it's more vital than ever in recent memory to offer administrations made conceivable by innovative headways. Notwithstanding, it has been seen that the old are reluctant to accept present-day advancements, for example, versatile applications. With the examination of both older client encounters and UI plan of a mHealth application, just as an investigation of the connection between them, this exploration endeavored to eliminate this boundary.

The utilization of versatile innovations is turning into a pattern just as an important instrument in this day and age. Individuals in both created and non-industrial nations use them the most. A few applications are being presented in these PDAs under different classes like diversion, well-being, and way of life, among others, making them reasonable for an assortment of occupations. Versatile applications have developed progressively critical as of late, as medical care organizations have started to suggest their utilization. The contraptions that give the center stage to health administrations incorporate cell phones, tablets, PDAs, and iPads, among others. Portable well-being applications can be utilized to follow a patient's well-being, give data on different clinical themes, and advance well-

being and exercise for decent well-being. Any application's prosperity is controlled by how effectively the client utilizes it.

The survey tool employs a Likert scale in a survey

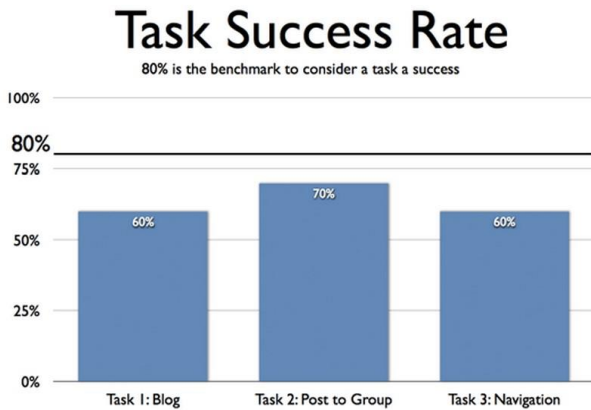


Figure 3: [25]. The success rate of Control Group participants over tasks

questionnaire that asks about many characteristics of the selected mobile application, such as content quality, availability, performance, and look. The QoE probe is a user experience tool proposed by Farnaz Fortrousi [21]. It's a portable application for Android and iOS gadgets that utilize an API to interface with other versatile applications. The objective of this apparatus is to catch the client's insight by social affair input. It helps us check prerequisites continuously and gathers use logs and QoE from clients through input. The example for the review is at first chosen from the populace involving a testing procedure in this examination. An irregular task is likewise used to partition the example into two gatherings: control and test. The current Glucosio application is utilized to test the UX of the benchmark group. The prototype is designed within the experimental surroundings relying on the modifications made. The prototype become created with the assistance of the software program Balsamiq. It's a device for developing smarter and less complicated person interfaces and cellular applications. The steps are similar to the management group. However, this time, the people are from the experimental group. The steps are similar to inside the manage group; however, the people are from the experimental group.

The essential objective of this review was to improve the senior populace's use of versatile health innovation. To set such a thought in motion, one should know the older's opinion on innovation as it is created. Therefore, a theory is proposed to research the effect of UI plan viewpoints on senior individuals' client encounters to displayed via a semi exam wherein a version for the initial is picked reliant upon the circumstance that people need to be fifty years vintage or extra

prepared. Individuals withinside the benchmark bunch had been given the Glucosio utility with the check to analyze purchaser experience, even as the ones withinside the check package had been given the Glucosio version to degree UX [21]. It has been visible that even as an extrude of any of the UI plan elements of a prosperity utility won't have a primary effect withinside the purchaser experience, while adjustments are made (UI plan) for the benefit of the extra seasoned, a huge development withinside the UX of the vintage should be significant once they use the utility.

VI. SURVEYING HUMAN POWERED GESTURE PROTOTYPES WITH USER INTERFACE

In a chunk of composing named GestureWiz [40]. A Human- Powered Motion Plan Environment for Client Through interface Models through Maximilian Speicher and Michael Nebeling, writers investigated the formation of a human-fueled plan to assist movement acknowledgment. They observed the momentum middle across the usage through fashioners and analysts relying on sincere movement recognizers for immediate UI models. Besides, they observed that maximum present recognizers are constrained to a particular information technique and pre-organized association of motions. As a result, they can not be effects joined with different recognizers. Finally, the review takes note of the prevalence of advancements and tangible gadgets, for example, AR-skilled telephones and HoloLens.

They acknowledge the need for designers to create a support system for newer forms of touch-based and gesture interactions. However, the study asserts that the current support framework for motion and gesture technology still needs more support. They referred to certain investigations that followed some of the limits for movement-based innovation [37]. For instance, recognizers are obliged by what is doable with current advancement and not constrained by customers' needs. Likewise, developments reliably change in devotion and strategy during design, and banner sets can rapidly fill in unconventionality and raise the potential for irregularity. By and large, these stances are altogether different specialized necessities. Generally, they note the utilization of in- citing end-clients to exhibit signals they might want to use in innovation. Afterward, they accumulate information on the most famous use cases controlled by the user. They also note

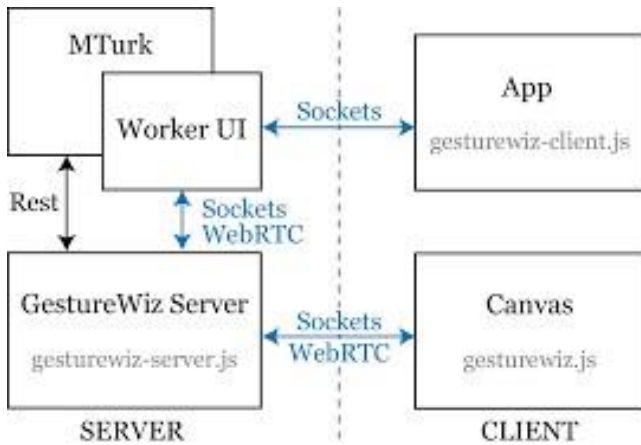


Figure 4: [40]. Shows the technical architecture of GestureWiz.

the support for a more participatory design approach and some challenges with this model. They assert that the project only elicits the information and data from users in some cases and does not implement it into designs [40]. Thus, the review suggests that work should decrease uncertainty and expand the clearness of client characterized signal sets. Furthermore, the review led to six tests to advise the plan regarding the point of interaction; they note that various information sensors might be needed for their proposed plan. They perceived the requirement for fingers and hand signal acknowledgment as virtual and actual following items.

In conclusion, they note the real-world cases in which the technology can be used. They note that it has various genuine applications, particularly in the circumstances with an absence of required equipment or blended modalities. One model is an architect who means to make a bunch of hand signals for Kinect and Leap motion; however, doesn't have the frameworks accessible that the review introduced the GestureWiz prototyping climate that gives fashioners a coordinated answer for motion definition, struggles to check, and constant acknowledgment by utilizing human recognizers in a Wizard of Oz way. It also led to tests with planners and groups to show that GestureWiz can perform with sensible exactness and inertness. At long final, they appeared the benefits of Gesture Wiz when replicating flag based association focuses from the composing and coordinating an audit with twelve affiliation originators and prototypes a multi-modal conversation with offer assistance for a colossal amount of novel activities in circular forty-five minutes

VII. LOOKING AT ADVANCED TELEOPERATION

IN RADIOACTIVE SCENARIOS FOR HUMAN-ROBOT IN USER GRAPHICS

Findings on human-robot teleoperations for the radioactive environment [25]. They tried a high-level graphical not to set in stone how robots can perform visual reviews and tel-control errands. The study recognized the need for robots that can be used in extreme and dangerous environments, thus reducing men-faced risks and hazards like oxygen deficiency, radioactivity, etc. They noticed the need for automated telework stages for CERN is expanding each year because of the improvement of the machines, which will bring, in addition to other things, an expansion of the radiation, which will make human intercessions more troublesome. The most significant drawbacks of such robots are their usability: robot operators typically require ongoing training, limiting the number of people who can use the robot. The corporation must then assemble a team of robot operators to carry out all required interventions. However, an industrial facility often contains many different components that may require robotic manipulation: the robot operator is well-trained in robot operation but lacks complete knowledge and experience of the area in which the intervention will take place, and the characteristics of the component manipulate. Therefore, it would be preferable to supply an easy-to-learn and simple-to-use robotic system to the component responsible, who understands the component and the surrounding environment to complete the operation safely. They then highlight the key requirements for Human-Robot Interface as described by [29].

- to connect the operator to the remote workspace and establish the necessary connections There are two types of connections: the operator's actuation on the distant workspace and, in the other way, information feedback to the operator.
- to make task execution easier by allowing the operator to submit high-level commands as well as direct actuation as needed;
- to provide all required workspace information to the operator with the purpose of achieving the highest level of transparency This will allow the operator to complete the operation with dexterity while also making semiautomatic task supervision easy

The study explains the importance of communication, highlighting the significance of clock synchronization and asserting that the timestamp of the messages in the communication protocol is usually already included in the GUI. The Graphical User Interface and the robot must synchronize their internal time at the start of the conversation to offer correct timestamps, as this synchronization model is based on the Network Time Protocol's standard four-timestamp technique (NTP). The study also highlights the point on Control Interface in the three key forms of control modes: joint by joint control, cartesian control, and gripper. They further discussed

input devices and the Robot 3D model. The study also assessed the System Implementation noting the GUI is expected to work on Microsoft Windows since it is the popular OS for CERN. The study required that learnability be viewed as a skill for each GUI. They tested several scenarios, and in conclusion, they asserted that some feedback has to be provided to the operator of the GUI in real-time. In conclusion, this article demonstrated that this basic Graphical User Interface already creates a userfriendly environment. The tester operators' feedback and their

post-completion errors as those which occur after one may have performed all tasks but needs to perform one more to complete the whole procedure. Applying this to innovation, they compare it to the hypothesis of Jef Raskin and the idea that "an exchange box that has no options." They note that Raskin's hypothesis fits well with a gadget direction task [7]. The paper then, at that point, proceeds to demonstrate the goal of the review as enlightening the effect of gadget direction and subtask need on client mistakes.

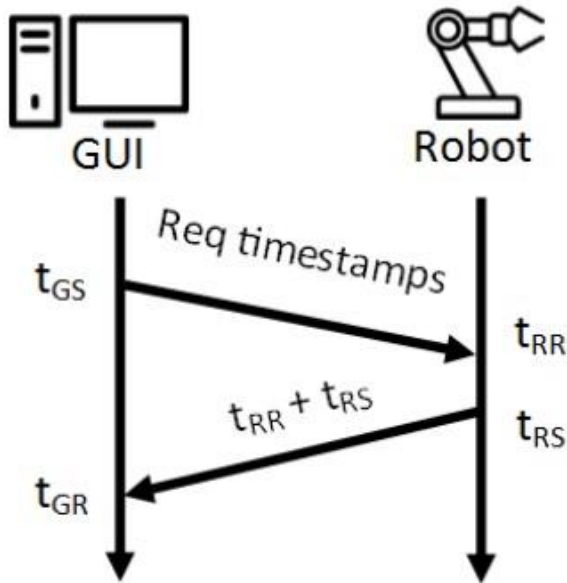


Figure 5: [25]. Synchronization model between the Graphical User Interface and the robot.

The first point concerning the concept is action control, and human error explained that skill, rules, and knowledge are three variables involved in human action control. They cited Rasmussen [15]. the meaning of these three factors. On Rasmussen's most reduced level, expertise-based conduct is created by profoundly robotized tangible engine activities that are not under conscious control. Information-based direct, then again, is characterized by intentional preparation and critical thinking in new circumstances. Finally, rule-based conduct exists between the ability and information levels. In closing, they state that after getting data, interfacing with PC frameworks, some guidance is generally centered around Rasmussen's standard level, with little commitment from the abilities level degree. As a result, the research focused our modeling efforts on rules-based behavior. On this level of active management, deviation from the programmed process is a sign of human mistake, either skipping a step or adding a new one that is not required.

quick learning time are indicated in the prior tables.

VIII. USING A COGNITIVE ARCHITECTURE TO PREDICT AND MODEL HUMAN ERROR IN USER INTERFACE DEVELOPMENT

This work assessed the differences between device orientation and task orientation and how this generally affects devices' effectiveness that adopts either orientation. [22]. They recommend cognitive modeling as a solution to predict error rates for either device or task-oriented subtasks. The work highlights the position and influence of humans' routine daily tasks. It emphasizes the repetitive way these tasks are performed and how errors occasionally still feature while performing them. The research then highlights the nature of errors we witness and points out post-completion errors as the most dominant. The authors further described the nature of

The work goes ahead to explore Model-Based User Interface Development (MBUID). They note that the Concurrent Task Tree (CTT) notation (Patern, 1999) is a commonly used approach for modeling tasks in MBUID that also supports running tasks in conjunction with UI models by defining mappings between these models [34]. In addition, CTT incorporates various administrators for sorting out undertakings into progressive designs, characterizing transient linkages, and depicting data streams between the client, the application, and the assignments [31]. The examination goes further to test the interconnection of various actual gadgets. Finally, the review analyzes procedural blunders while utilizing a kitchen help framework for encompassing helped living. With its accessible formula library, custom-fitted shopping list generator, and intelligent cooking or baking guidelines, the kitchen associate guides in the readiness of a dinner for a particular number of individuals. The review area was in Technische University, Berlin, with five men and 15 ladies in 15 and 59.

The work goes on to describe the Cognitive User Model. The CUM process was created using the ACT-R cognitive architecture provided in the study [19]. According to an earlier study, associative priming was deemed an appropriate explanation for the temporal disadvantages of device-oriented steps [36]. The research here establishes a clear correlation

between device orientation and user mistakes. In discussing the research results, they conclude that on the first note, it can be demonstrated that human error may be examined well without additional tasks or interruptions to the subjects' duties. Second, the gadget vs. task orientation idea has been demonstrated to be useful in theory.

Finally, the research discoveries show how little can be anticipated when scientists depend on hypothetical ideas to make forecasts. Just when the application's association rationale (here zeroed in on required versus nonobligatory undertaking stages) is considered do significant varieties become more significant exploring further. Although there is a growing corpus of theory and empirical study on human error, verified approaches for predicting user errors are only available in a few areas. The research provided a computational user model based on cognitive science research and predicts more generic errors. The intellectual client model can precisely replicate the aftereffects of past convenience research utilizing UI metadata during the model-based improvement of different UIs. The study concludes the need to adapt the model to new and various interfaces in the future and develop the link to MBUID to achieve greater automation. It highlights how to interface designers would be able to get error predictions early in the development cycle, making error prevention considerably easier.

IX. HUMAN-DRONE INTERACTION: ASSESSING A GESTURAL AND VISUAL INTERFACE APPROACH

This research by Cauchard et al. [8]. Evaluated the utilization instance of robots presenting the numerous manners by which robots are utilized and the strategy for use. They note that robots are helpful for photography, conveyance, observing, and search-and-salvage. They note that robots are for the most part involved outside and can work in one of two modes: independent (where the robot is altogether computerized and follows still up in the airway or uses sensors to adjust its bearing), or manual (where a pilot controls the robot progressively, typically through a controller or a telephone). They highlight a key challenge: drones do not let the mode of use be changed unless such usage is preprogrammed, and note that drone.io technology has been created to address this challenge. A new show of coordinating a projection-camera framework on a robot as a practical method for customers to speak with an assistance drone. It enjoys the benefit of being coordinated on the robot, permitting individuals to approach it or have it fly dependent upon them and interact impromptu [35]. For example, people might draw in with a robot while zeroing in on their action, without the pressure of control, by choosing a projected menu and getting fast criticism, using the drone.io foundation made under the review. The study assessed the different forms of previous literature on human drone interaction. Several methods for interacting with a drone have been proposed, including remote controls and phones, gestures and face postures, and even touch. In

addition, drones can modify their flight route or be equipped with screens, projectors, or LEDs to indicate their intentions. In comparison, most previous research has focused on either the drone's input or output, based on a similar drone. Another study created and tested an interface with both features as part of what the study aims to create in the drone.io technology.

The study also assessed mobile handheld interface devices. They noticed that portable projected connection points could be conveyed in hand, worn on the body, or embedded in robots and robots. They can be utilized to increase things or the client's climate, for example, exploring people on foot. They referred to the investigation of Sasai et al. [38]. introduced a local robot escort that extended a connection point over which the client might venture to enter their objective before being directed en route by projected data. Some goals conceptualized for the drone.io device included the ease of usage, learnability, static interaction, spontaneous short-term interaction, drone position, multiple users; on the gestural input, some of the interactions recognized for the device include the hands and feet, indirect hand interaction reference frame, and stability. The work also determined the projected output, noting the need for a projection space, menu projection, and a menu design. The research also did a user study and evaluation for the drone.io. In a first in-door test, the researchers recruited a sample audience of 15 volunteers, with ages between 18 and 26.

Three tests were designed for the indoor tests. An outdoor user study was likewise conducted on six right-handed volunteers, and in all 18 trials were conducted [12]. All in all, from the post-concentrate on interviews, the respondents' recognized that the menu had been obvious to see (6.3 out of a 7-point Likert scale) and that the framework was helpful to cooperate with (4.9/7) in post-concentrate on interviews. However, two users reported they could not see items on the periphery and would instead concentrate on the three portions in front of them. When the menu was rotating, two others found it difficult to see the icons. Some of the major challenges identified during the study were flickering and navigation. The work further discussed the interaction design, interface design, and the different limitations of the drone.io device.



Figure 6: [10]. (Cleared out) User connection with the drone.io menu amid a campus tour. (Right) The drone.io concept permits for different projection spaces including the ground, a divider, or the user's body.

In conclusion, the specialists concluded that the framework is easy to utilize, engaging, and profoundly solid when utilized outside in close to certifiable settings in three client studies with 27 people. Users may now approach a partner robot and see with their own eyes how the robot can help them, just as make demands for help, utilizing drone.io. Drone.io has a simple to-utilize UI that doesn't need any earlier information. We have the chance to foster another age of surrounding and semi-public showcases with drone.io that are not compelled by the foundation where they are constructed. The mix of the projector and the robot considers more prominent adaptability in the size, shape, and area of the presentation at any one time, just as real intuitiveness, taking into account a more regular Human-Drone Interaction.

X. BUILDING A CLOTHING-COORDINATED RFID-PRIMARILY BASED TOTALLY INTERFACE FOR HUMAN-TECHNOLOGY INTERACTION

In a study [45]. It was assessed the different forms of interaction with technology and its importance in society. They noted the limitations of handheld, screen-based, touchbased, and voice-based devices in attending to all needs, especially with people suffering disabilities and different use case environments. They noted the variations of touchless devices on being voice or body-movement-based. Demanding gadgets like this encompass linguistic coverage, conceptual failures, noisy disruptions, and the absence of usefulness in environments that call for silence. Thus, they have been capable of setting up a touchless, easy, and automatic entry required on the human-era interface, permitting the whole society to interact with the encircling Wi-Fi world seamlessly. Clothing-included and frame movement-primarily based interfaces are a handy method for revolutionizing our lifestyle.

Clothing integrated the human-innovation interface, permitting the whole society to align flawlessly with the encompassing remote world.

Clothing incorporated and body development-based connection points are an incredibly advantageous methodology for reforming our way of life. Clothing incorporated human innovation correspondence should be usable without- out view, detached, and upkeep free to be truly helpful in day-to-day existence. The paper innovates the uninvolved super high recurrence, radio recurrence ID innovation. This one-of-a-kind way is a body development-based answer for humans to innovate collaboration. They characterize clothingincorporated detached radio recurrence distinguishing proof as utilizing without battery and remote electronic labels comprised of a receiving wire and a coordinated circuit [6]. The review demonstrates that the utilization of signs and stages from on-body detached RFID labels has been shown to effectively give data on body positions and developments, showing an overall help use for attire coordinated innovation. They also demonstrated using the on-body passive RFID tags in other studies.

The study further defined what the clothing-integrated solution looked like, which featured the two imaginative elements, including solid and normal on/off actuation of contributions by straightforward hand developments and usefulness. Likewise, the research demonstrated that it comprises halfway adjusted split ring tag radio wires connected to shirtsleeves and groups encompassing the wrist. The examination portrays a bit-by-bit model for the RFID peruser to be introduced. They show that since the RFID peruser can be associated with different Wi-Fi applications, split ring labels can function as remote information associated with the body and other static things like furnishings. Using a particular ID, the creators contend that remote information can then be given to an associated gadget that permits individuals to connect with their computerized

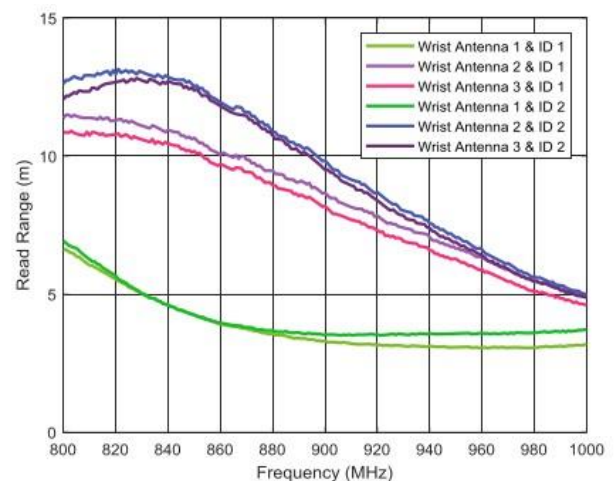


Figure 7: [27]. Simplified comparison of the three distinctive wrist receiving wires and two types of ID rings (ID 1 = ID ring manufactured from electro-textile; ID 2 = ID ring fabricated from copper tape).

environs through garments. At last, it is contended that this will add to more accommodation [27]. The work defines the different forms of antenna designs and fabrications that may be useful. They highlight the three main antenna designs. The first is an antenna that consists of a simple ring but observe that while it is a simple design, the wrist may cover the whole tag while in use, which likely affects the wireless receiver and its performance. The subsequent plan is two contrast wrist receiving wires that have groups circumventing the wrist, and it is promoted as having better remote execution, including a more extended read range.

The essay went further to explain the concepts of the tag fabrication and tested and measured using two samples of each wrist antenna type. A geared-up made blouse changed into extensively utilized to assess the advanced technology. The paintings info the one-of-a-kind case examination conducted. In conclusion, the study discussed the findings from the evaluation as encouraging. The review clarifies that considering the requests of ordinary utilization of an apparel incorporated human-innovation interface, the innovation created in the review is a stage forward [17]. The read ranges were described as long enough to provide a broad enough user interface area for the solution to be convenient and seamless to use. The study also indicated that the mobile reader gives the system complete mobility unlimited possibilities. The gadget can be flawlessly coordinated into different kinds of dress since it is savvy, inactive, and support-free. This UI can likewise be cleaned with the dress assuming it is covered with a defensive covering. At final, the author accepted that the contraction might be considered a promising inclination for fate human advancement alliance subordinate on those essential comes about. They saw that the following stage is to put the innovation through its speeds with certifiable applications like music and light control, just as creating a genuine game for recovery.

XI. VOICE USER INTERFACE INTERACTION:
 USER MENTAL MODELS IN AUTONOMOUS VEHICLES

Studying the different forms of user interaction in the different forms of technology we interface with is pertinent. In a study by [13]. The authors assessed the mental model and how it can influence interaction design and technology usage. First, they surveyed the idea of driving independent vehicles. Separating the various levels into Level zero to level five. With regards to human communication, they affirm what independent vehicles are by characterizing that the

independent driving framework, which incorporates dynamic driving assignments, stopping requests, expressway, and worker data, gets and assembles enormous information from transportation components and situations, and afterward dissects the movement course and controls vehicle versatility utilizing an AI calculation. The Human-Vehicle Interaction is comprised of the feed-forward and criticism of the human-vehicle, vehiclevehicle, and vehicle framework. The review proceeds to evaluate voice UI. They feature the arising significance of voice client connection point and how it contributes to human PC corporations. The concentrate then, at that point, proceeds to characterize what's more make various frameworks and use case for independent vehicle voice UI connection plan. They finish up on the handiness of mental models featuring how human insight and fake knowledge can communicate. The review finishes by expressing that the psychological model prompts the VUI communication plan strategy past the conventional collaboration plan technique, which opens up a universe of opportunities for association plans.

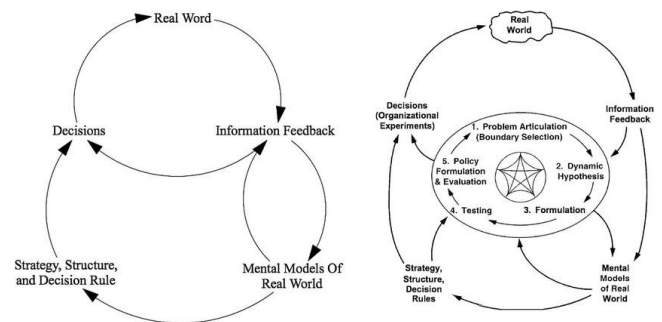


Figure 8: [13]. double-loop learning process and double intelligence mental models.

XII. CONCLUSION

This study has evaluated the different forms of technology that can be adopted in assessing human and computer interaction. Through the study, we discover different emerging ways in which our human experience of computers can be improved, from drones to the usage of voice, motion, and even clothing to better our experience of technology. In conclusion, it can be said that there are still several areas for improvement. However, this study has been able to assess diverse literature and conclude on some innovative ways in which human and computer interaction can be improved.

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