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[A Review of Iot Applications and Strategies in Medicine and Healthcare]

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Abstract:

The Internet of Things (IoT) is a rapidly growing ecosystem that connects hardware, soft ware, physical things, and calculating devices to interact, gather, and share data. The Internet of Things (IoT) gives a seamless platform for people to connect with a range of physical and virtual objects, including personalized health care domains. Lack of obtain to medical resources, the growing geriatric population with chronic conditions and their need for monitoring from afar, rising medical expenditures, and a need for telemedicine in developing nations all make the Internet of Things (IoT) an intriguing topic in healthcare. The Internet of Things can reduce the burden on sanitary systems while also offering customized health services to improve people's the standard of living. As a result, the current study concentrates on Internet of Things (IoT) applications in the healthcare areas and medical. It also underlines the technique's great potential as well as future research fields.

Keywords: Smart City, Smart Home, Healthcare, Modern Technology, IoT applications.

الملخص:

إنترنت الأشياء هو نظام بيئي سريع النمو يربط بين البرامج والأجهزة والأشياء المادية وأجهزة الكمبيوتر من أجل التفاعل وجمع ومشاركة البيانات. يوفر إنترنت الأشياء (IoT) نظامًا أساسيًا سلسًا للأشخاص للاتصال بمجموعة من الكائنات المادية والافتراضية ، بما في ذلك مجالات الرعاية الصحية الشخصية. إن الافتقار إلى الوصول إلى الموارد الطبية ، وتزايد عدد المسنين المصابين بأمراض مزمنة وحاجتهم إلى المراقبة عن بعد، وارتفاع النفقات الطبية ، والحاجة إلى التطبيب عن بعد في الدول النامية ، كلها عوامل تجعل إنترنت الأشياء (IoT) موضوعًا مثيرًا للاهتمام في مجال الرعاية الصحية. تتمتع إنترنت الأشياء بالقدرة على تقليل العبء على الأنظمة الصحية مع تقديم خدمات صحية مخصصة لتحسين نوعية حياة الناس. نتيجة لذلك ، تركز الدراسة الحالية على تطبيقات إنترنت الأشياء (IoT) في المجالات الطبية والرعاية الصحية. كما يؤكد على الإمكانات الكبيرة لهذه التقنية بالإضافة إلى مجالات البحث المستقبلية.

مصطلحات الدراسة: المدينة الذكية، المنزل الذكي، الرعاية الصحية، التكنولوجيا الحديثة، تطبيقات إنترنت الأشياء.

1. Introduction

The world's population is quickly expanding in the twenty-first century. Cities with more population are under a lot of strain from life of cities [1]. Even though facilities and medical resources in the cities are being extended daily, the city's adequacy level has yet to be attained. Massive demand on city healthcare administration has prompted technical advancements to seek acceptable answers to quickly developing challenges. The services of Post-stroke rehabilitation for the elderly, for example, are new difficulties that need a dedication from medical and human factors over a lengthy period of time [2]. Therapeutic rehabilitation is a relatively recent concept that plays an important role in maintaining health services for individuals, notably the elderly and those who suffering from recurrent infections, to enhance their life quality. Nevertheless, there are several roadblocks in the way of expanding the scope of medical rehabilitation. To begin with, the majority of rehabilitation therapies need long-term and comprehensive therapy. Second, more help facilities are required to make rehabilitation treatments more accessible to patients. Third, rehabilitation resources are limited due to the growing population, this is especially true among the community's elders at this period [3]. The IoT is a term that refers to a completely linked environment that provides enhanced technology to advance health care [4].
In the Internet of Things, "objects" may be anything from automobiles with sensors built-in to persons with devices of heart monitors, as long as the object is given an IP addresses and can gather and transport informations with little or no human interaction. The IoT also refers to modern, exciting open doors in almost every part of our lives [5, 6]. Initial papers and development activity in the IoT part in health care began with wireless sensor network (WSN) [7]. This tool assures that gadgets are accessible, low-cost, dependable, and easy to transport or assemble with patients, allowing for a seamless networks among patients, equipment of medical, and clinicians [2]. The purpose of this research is to depict the IoT technology use in the health care and IoT Applications and Strategies in Medicine and Healthcare for health of humans, as well as to provide a variety of tasks and things in the surroundings that may be linked to collaborate and perform with future orders for more study "anytime, anyplace, with anyone and everyone,"

2. Applications in the area of medicine and health care

Within the realm of medicine and health care, basic uses of the Web of Things includes [8]:

2.1. Controlling equipment of medical and medications

To ensure the safety of public medical, monitor the entire process of medical equipment and prescription manufacture, distribution, anti-counterfeiting, and tracing. The following are some of the features:

- The use of RFID tags attached to therapeutic equipment and medicine to prevent counterfeiting is unique and impossible to replicate. Patients or emergency clinics should compare labels to database records to effectively identify fake drugs if medicine data is stored in an open database.
- Real-time monitoring ensures that drugs are delivered and stored safely.
- Medical refuse data management can track medical waste from hospitals to waste treatment plants, eliminating illegal medical waste disposal.

2.2. Medical information management

The following are a few points to consider when it comes to medical information management:

- According to Patient data Management and Status Monitor [9], Electronic Patient Health Profile contains treatment history, corrective evaluations, treatment records, and medications.
- Due to sensitivities, some consultants and nurses may be required to monitor the patient's vital signs, perform testing, and prescribe therapies to prevent using inappropriate drugs or injecting the patient. Various parts of information about the patient's condition may be needed depending on the pathology. It must be regularly accessible on medical or nursing teams (movement features, breath, heartbeat, proximity to other patients, and so on.) [10].
- Patient tracking and location is valuable asset because it allows for quick response if immediate help is needed. Pathologies such as perceptual disorders, epilepsy, Down's syndrome, and neurodegenerative diseases such as Parkinson's and Alzheimer's disease are all addressed [10].
- Long-Term Care for Patients Patients' vital signs is continuously monitored, which helps to avoid hospital re-treatment by recognizing anomalies early and allowing for prompt and suitable actions [11]. The Internet of Things is essential for connecting medical equipment with video-oculography to research the brains organizational architecture and activities. Ocular alterations in Parkinson's disease is well-understood thanks to an integrated procedure incorporating an intelligent machine [12]. Because falls are such a serious health problem for the elderly, fall preventing and detecting are critical applications. Wearable gadget, ambient detector, and eyesight monitoring devices are the three types of accident detection. [13, 14] presented a detection systems of real time fall using sensor of wearable to monitor body motion and position in 15 activities, including 10 deliberate falls and five regular activities.
- Management of Medical Emergency can help with RFID innovation by storing and reviewing data reliably and efficiently [15].
- Management of Medication Storage, R.F.I.D can be used in the storage, use, and medicine review, making drug review more useful and avoiding the similar confusion prescription dosage form and name, as well as strengthening drug management and protecting convenient medicine supplies [14].
- Blood data management can effectively escape the small limit disadvantage of bar tags and recognizable proof of acknowledging non-contact to decrease blood pollution, achieve multi-target ID, and increase effectiveness of data collection [15].
- Mechanisms for preventing errors in pharmaceutical preparations[16], by developing error prevention mechanisms for buying and prescribing medications, as well as pharmaceutical data management for prescriptions, doses, medication distribution.
- Medical Tools and Medication Tracking, which contains the essential data about item use, the specific data about the item linked with the unfavorable event, the source of the object with quality issues, the patients who have utilized the item with quality problem, and the districts where the item with quality problem has not been utilized. For drug management, IoT-based smart wrapping techniques for pharmaceutical boxes can be used [17].
- Information Sharing: utilizing this system, authorized experts may appear to be at patients' records of medical, therapy accounts, medicinal prescriptions, and health insurance; Patients, on the other hand, have the freedom to modify or select. their primary healthcare clinics or consultants [17].
- Neonatal Anti-theft System: The Neonatal Pro System combines identification administration, Anti-theft measures for newborns, and route preventive access the arbitrary coming and departing of strangers, providing practicable and strong security for newborn newborns [18].

- A monitoring and alarm device for clinic treatment equipment and patients [19].

2.3. Ambulatory medical treatment and telemedicine

Telemedicine is a sophisticated kind of medical assistance that combines computers, media, communications, and medical technology [20]. Developments in remote communications networks for effective communication inside a patient's Set of Sensors [21], the goal is to improve the degree of analysis and therapy, lower the cost of medical services, and satisfy people's health demands [22]. Furthermore, telemedicine is progressively providing life-saving information and enabling medical program interchange. The telehealth architecture is depicted in Figure (1) [23, 24].

There are six primary reasons why the growth of telemedicine is being stifled [22]. First, the transmission quality of media messages is poor. The most significant constraint is data transfer and bandwidth. Second, the communication in general for telemedicine systems is not yet compatible with that of the adjacent hospital; there is no universal standard. Third, it's difficult to analyze large medical images. Fourth, there is a concern of security with the long-distance connection, which is vulnerable to virus and hacker attacks. Fifth, there is still a lack of telemedicine penetration. Sixth, the remote discussion center's notoriety is dictated by the system development costs. True telemedicine is capable of achieving a unified standard. It's usually top-notch, flawless, open, and secure, and it happens anytime, wherever, there's a change of medical personnel.

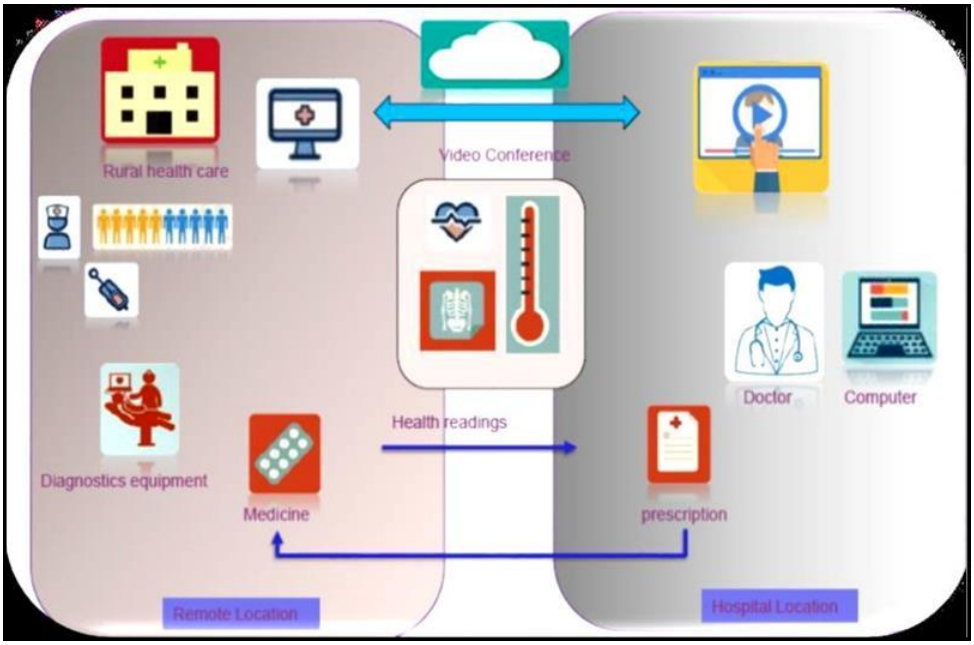

Fig. 1. Architecture Telemedicine.

2.4. Management of health

Because chronic infections have a lengthy course of malady, a procedure whose goal is to control and prevention the emergence and progression of illness, decrease treatment cost, and enhance life satisfaction [18, 23]. Understanding self-administration is given more weight in the new wellbeing management approach under intelligent healthcare. It emphasizes patients' continual self-observation, rapid entry of health data, and favorable intercession of medical action. The emergence of implantable/wearable smart devices, smart homes, and intelligent health data stages linked to IoT innovation provides a remedy to this problem. Third-generation wearable/implantable equipment can combine propelled sensor, chip, and remote module to continuously detect and screen various physiological pointers of patients in an intelligent manner, while decrease power consumption, enhancing comfort, and allowing the information to be combination with wellbeing data from various channels. This approach comprises a transition from situation observation to constant judgment and deliberation. It also decreases the associated risks posed by the illness while making it simpler for medical facilities to follow the infection's spread [24].

3. IoT healthcare implementation strategies and approaches

The use of WiFi and R.F.I.D-based short-range radio communication methods, as well as G.P.S-based position, unique identifier (UID)-based identity, and service-oriented architectural (S.O.A)-based architectural techniques, all contribute to the IoT of rehabilitation systems [25, 26]. Viable methodologies and methods play a crucial role in strengthening the system's capabilities and viability in an services system of IoT based health care. The capacity to respond rapidly is one of the main issues, as is the danger of maintaining a strategic distance from knowledge, which is highly connected to quality of recovery [3]. The semantic links between the key strategies of I.o.T-based rehabilitation programs are depicted in Figure (2) [27].

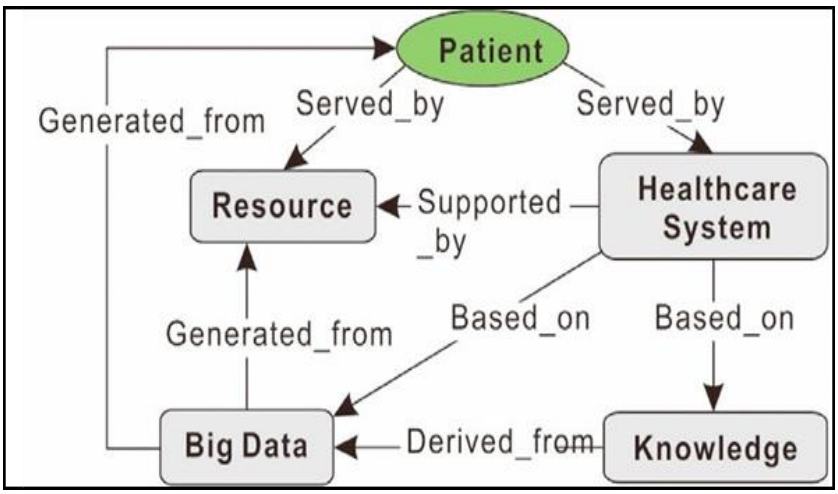

Fig. 2. The semantic relationships between the main techniques of IoT-based treatment systems.

Medical resources support the vocational rehabilitation system. The basic material for analysis during rehabilitation is a vast amount of data. Medical knowledge is always accumulating as a result of it. The recovery therapy and systems operation are based on big data and information. It focuses on the evaluation of Parkinson's patients' motor status and the advancement of an around or to objectively measure the magnitude of motor disruptions using motion detectors based on a study of various factors of sensorimotor from of the selected sensors, usually inertial measurement units and gyroscopes to help determine (EMG) or speaker analysis of the data [28-31].

Conclusion

Medical rehabilitation is a young field that plays an important roles in maintaining people's health, particularly for the elderly with chronic conditions who want to enhance their quality of life. The IoT is expanding at a breakneck pace, resulting in cultural and technical shifts for organizations, industries, and corporations as they transform a model that is more intelligent that focuses on the environment, stewardship, and social responsibility. Trying to implement IoT in monitoring of health such as surgical supplies and control of medication, medical data governance, telemedicine, and medical care on the go, and action plans and methodology, such as the embodies of the systems of rehabilitation, has significant and beneficial benefits.

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