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HEALTH CARE AND INTERNET OF THINGS

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***Abstract*—Internet of things shall be able to co-operate the complex system including health care in India. Today we are talking of digital India. Then why not digitalize the health care problem in India where there is one hospital for every sixty one thousand, one bed for two thousand people even the ratio is more in some other state where children are dying of starvation, poor maternal health. The health care expenditure is out of pocket here IOT brings some hope if implemented in the following way. The paper will present the major health care problem in India and discuss the technical solutions and best practical guideline adopted under the concept of E doctor OR doctor-R using the advance communication technology which is flourishing with leaps and bound in India.**

***Index:* near field communication (NFC), emergency health care services (EHS), low power wireless personal area network (low pan)**

I . INTRODUCTION

The internet of things is a recent digital technology paradigm which is buzzed all around and will rule the near future in which objects of day to day life are smart and can communicate to other objects using suitable protocol becoming the integral part of internet .the concept of IOT brings the internet more challenges and makes it pervasive. Enabling easy access and interacting with wide variety of devices such as, for instance, daily use appliance, health care instruments, sensors, actuators, display connecting all this to the lifeline of modern man (mobile). The IOT will foster the development of number of application for health care issues. The basic health care statics presented as there is one bed for every two thousand people and no major hospitals in villages.

Due to lack of poor health care in the villages and those living below poverty line in urban cities could not avail costly health care facilities services provided by private bodies .the major health care problem in India for example malaria, TB, dengue, diarrhea (second leading cause of death in India of children under five years old), anemia (20% -40 % of pregnant women are anemic)[2], breast cancer etc. In most cases early medical assistance is not provided, lack of proper sanitation, proper nutrition, and lack of awareness .the best way to get rid of this problem is best sanitation. but we cannot keep waiting for good sanitation .here IOT plays a role in tacking these problems .if simulating all health raw data under the concept of IOT .it brings the concept of DOCTOR R which is a analogues to ATM machine in health care .if we could get all the data of patient not directly approaching the hospital but just sitting at home or approaching to the nearby machine station and feeding all the required data.

II . HEALTH CARE ANALYSIS

A *BLOOD TESTING*

blood is a liquid responsible for transmission function carrying oxygen supplies .blood test reveals approx 70% of medical decision for different purpose various tests are followed .
complete blood count (CBC)[3] it includes a count a WBC ,RBC,PLATLETES .for example low WBC count (leucopenia) may point toward a bone marrow .high WBC signify infection in blood , low RBC count signifies anemia ,low platelet may be the cause of prolong bleeding .high blood platelet count (thrombosytoysis) may point towards a severe inflammation [3] .

B Sugar level detection: It is a way of testing glucose of blood particularly important in the care of diabetes biochips are available that measures glucose and saliva, new laser techniques are also trending for same.

C. Saliva testing

Appreciating the reliability of saliva testing is based on understanding the difference between steroid hormones in saliva and in serum. This difference is based on whether or not

the hormones are bound to proteins in the medium used for testing. The majority of hormones exist in one of two forms: free (5%) or protein bound (95%). Only the free hormones are biologically active, or bio-available, and available for delivery to receptors in the body.

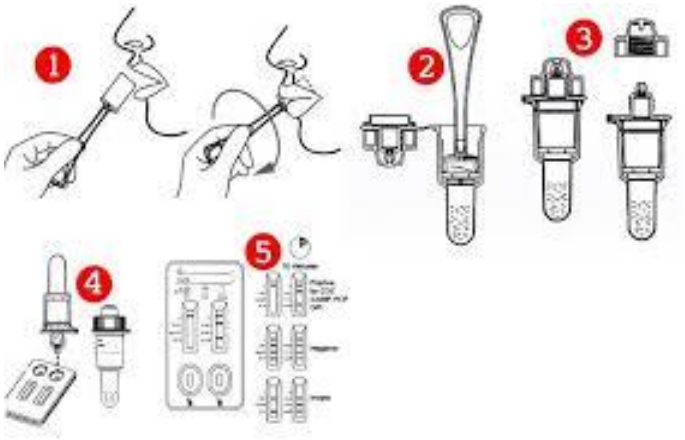

FIG 1: SALIVA TEST KIT

D. HORMONE TESTING

Hormones are powerful molecules essential for maintaining physical and mental health. We frequently think of estrogens as being a female hormone, and testosterone as being a male hormone. But men AND women make both, plus several more that need to be in balance for optimum health. An imbalance of any one hormone can throw your physical and mental health out of balance, causing aggravating and even serious health problems.

Hormone testing is applicable for:

- Men and women concerned with changing hormone levels as a result of age.
- Cycling women experiencing PMS symptoms, perhaps related to a hormonal imbalance.
- Peril- and post-menopausal women concerned with their estradiol and progesterone levels for replacement considerations.
- Those wishing to monitor their hormone levels following replacement therapy (oral, sublingual or topical), and subsequently regulate their supplement levels.
- Anyone with symptoms involving fatigue, insomnia, stress, immunity problems, blood sugar problems, and an overweight body should be tested for cortisol levels as well as "sex" hormones.

III .DOCTOR R

Accronym for robot doctor is an automated robot equipped with all instruments that are in detection of health related problems. The raw data is fetched to it for further analysis which can be then send to advance hospitals for expert advice .it made the process of routine checkup, vaccination control easy and cheap. Here the major problem is antifictation of patient as their maybe one or more user of the same machine. This can be achieved using the RFID tags .the machine automatically identifies the user and hence could feed the data in his identification number.

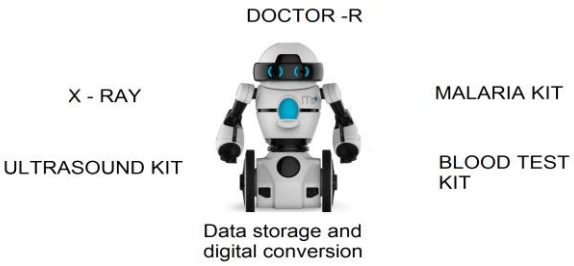

FIG 2: DOCTOR R MODEL

*1. INSTRUMENTATION**

X RAY : hand held x rays is a major technique for diagnosis of tuberculosis ,fracture detection in bones ,hand held x rays are already available by TRIBOGENESIS.

MALARIA KIT: malaria antigen detection test, a group of commercial available test that allow diagnosis of malaria. Which can be achieved by local manufactures in India?

Malaria test kit is an immunochromatographic assay for the initial detection and/or confirmation of Plasmodium falciparum (Pf), vivax (PV), ovule (Po) and malaria (Pm) antigen. Infection usually occurs from 7 days after being bitten by an infected mosquito

FIG 3: *MALARIA KIT*

ULTRASOUND: it is a cheap and provides easy solution for integral diagnosis of many problems for instances ulcer, kidney stone, and breast cancer.

***FIG 4:** ULTRASOUND TEST KIT*

2. IDENTIFICATION TECHNIQUES

RFID product tags can also be used in patient identification. These RFID[5] products, in the form of ID cards, wrist or ankle bands, or labels applied to patient records, can greatly aid in assuring that the right procedures and medications are applied. In addition, the RFID products enable data system to call the correct record for the patient who is scanned, and aids in the reducing errors associated with data entry. Finally, RFID products can be used to track patient movements within a facility. Patients with afflictions such as Alzheimer's can be tracked within a facility to ensure they do not get lost or enter an area where they might harm themselves.

- **125 KHz** (*low-frequency*) tags are write-once/read-many, and usually only contain a small (*permanent*) unique identification number.
- **13.56 MHz** (*high-frequency*) tags are usually read/write, they can typically store about 1 to 2 kilobytes of data in addition to their preset (*permanent*) unique ID number.
- **860-960 MHz** (*ultra-high-frequency*) tags are typically read/write and can have much larger information storage capacity (I think that 64 KB is the highest currently available for passive tags) in addition to their preset (*permanent*) unique ID number.

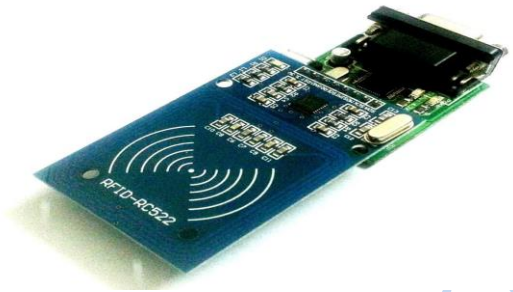

FIG 5: RFID RECEIVER

3. DIGITAL VIRTUAL ASSISTANCE

Mobile Android Devices contain the near field communication technology , data from sensor from various medical devices could be easily accessed using android devices using the available virtual assistance for instances (VLINGO)[4] which turns your words into action based on voice to text technology using this the patient could easily get the health care analyzed data directly from sensor. and this data could used to make any further medical decision for instances taking doctor's opinion on what to do next.

Digital vaccination care: Knowing a child by his RFID tag will help update parents about the vaccination period, health care workers to locate the unimmunized children from basic vaccine like polio etc .this will work as

- RFID tags for new born child.
- update of regular vaccination
- Keep track of child body temperature.

IV *ARCHITECTURE*

It guides the network of physical network of functional organization and working techniques and principles after collecting the patient data .the next step is to transmit the data following the general internet protocols, collecting the machine data and sharing with other medical machine tool via M 2 M communication and zigbee protocols. receiver

A. IPV6, 6LOWPAN:

Due to large numbers of users under health care services a large platform for communication protocol that provides identification and location system of various medical health care machines, IPV6 provides a large (128 bit) addressing system. Which is advance version of already existing IPV4 protocol?

Now if we want to set the communication among the smallest sensor nodes and medical health care devices we need allow power communication protocol which is provided by 6LOWPAN

B. M 2 M COMMUNICATION:

IT refers to the direct communication between devices using any communication wired or wireless in modern time the communication by the IOT.[6]

ZIGBEE COMMUNICATION AMONG SENSORS

ZIGBEE is a low cost and low power consumption radio communication based on IEEE 802.15.14 WPAN. The main main features of zigbee are

SIZE	NETWORK SIZE (2^64)
RANGE	1 to 100 METERS
BANDWIDTH	20 TO 250kbps

TABLE 1: ZIGBEE SPECIFICATIONS

Which suites our requirement of communication or sensor to sensor communication
This allows direct communication among various medical devices if result of devices is alarming (example low RBC count data, detection of breast cancer, malaria symptoms etc.)Will directly fed into RFID address which then can be retrieved by user early and appropriate action can be taken.

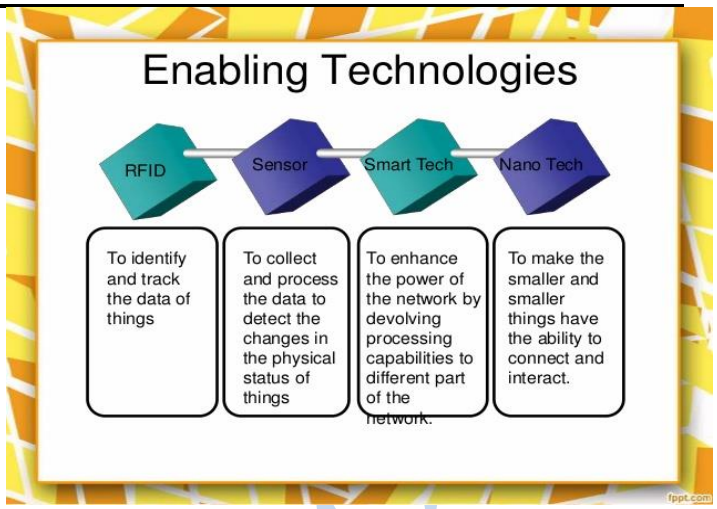

FIG 6: RFID WSM

V *APPLICATION*

- **health care check up :**

  Medical machine (DOCTOR R) can be used for regular check up of patients suffering from general health care problems like sugar, asthma tuberculosis, malaria etc.

- **mammography :**

  One of the major modern day problems of women is breast cancer if not traced in early stages could be a severe problem in lateral stages. X rays of breasts have been shown to save lives of patients by 50 to 60 %. If monthly X ray is diagnosed preventive measure can be taken.

- **emergency healthcare services (EHS):**

  Road accidents, heart attacks, leprosy, natural disaster etc are also the major problem which needs instant medical care. RFID tags can be easily traced and instant medical care can be provided.

- **drug delivery**

  The overall drug consumption and side-effects may be lowered significantly by depositing the active agent in the morbid region only and in no higher dose than needed. Targeted drug delivery is intended to reduce the side effects of drugs with decreases in consumption and treatment expenses. This could be achieved by nano RFID sensor capsules which help by image guidance thus delivering the drug to the effected part of the body.

These RFIDS sensor could emit radiations and thus treating tumors and sending the imagery to the external medical instrument for further analysis.

- **Maternal care**

Maternal deaths are similarly high. The reasons for this high mortality are that few women have access to skilled birth attendants and fewer still to quality emergency obstetric care. In addition, only 15 per cent of mothers receive complete antenatal care and only 58 per cent receive iron or tablets or syrup using the DOCTOR R concept distant medical care can be availed.

VI. CONCLUSION

In this paper, we analyzed the solutions currently available for the implementation of HEALTH CARE IOTs. The discussed technologies are close to being standardized, and industry players are already active in the production of devices that take advantage of these technologies to enable the applications of interest, such as those small X-ray, handheld portable ultrasound, RFIDs .in fact the range of design option for IOT systems is rather wide, the set of open and standardized protocols is significantly smaller. The enabling technologies, furthermore, have reached a level of maturity that allows for the practical realization of IOT solutions and services, starting from field trials that will hopefully help clear the uncertainty that still prevents a massive adoption of the I0 paradigm in "HEALTH CARE".

Acknowledgment

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