

# Human Health Detector System Comparison based on the Internet of Things (IoT) (Topic Area: Intensive Care Unit)

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**Abstract:-** Healthcare is given extreme importance nowadays by each country therefore, from this perspective, an Internet of Things (IoT) based on human health detector system using sensors is the ideal response to such a pandemic. Internet of Things (IoT) is the new revolution of internet which is the growing research area especially in the health care. Human Health Detector System based on IoT is the knowledge application during the academic study to resolve practical problems and improving knowledge in the software development and it is recommended to assure the safety of patients in critical intensive condition. This led to a human health detector system which is constantly monitoring the patient's heartbeat rate, body temperature and other basic parameters of the room and also provide critical information to the authorized staff. This is one of the Latest Electronics Project Ideas related to Medical applications. One more benefit of using internet of things (IoT) is that, this data can be seen using a desktop computer, laptop, using an Android smart phone using a tab or Tablet. The user just needs a working Internet connection to view this data. There are various cloud service providers which can be utilized to view this data over Internet.

## I. INTRODUCTION

**Human Health detector system based on internet of things** is very useful in taking care of the patients' state (condition) in intensive care unit in efficient and effective way. The environment of critical care unit (ICU) is highly technological, requiring the nurses to have a broad knowledge base and a high level of decision-making skills as they care for patients and their families who are in vulnerable circumstances. Intensive care is constant, complex, detailed health care provided in various acute life-threatening conditions. The therapeutic subspecialties of critical care (CC) include intensive care, coronary care, cardiothoracic care, and emergency care that the patients admitted to these areas are in a health crisis that requires the collaborative care of a multidisciplinary team. The lack of patient care with sufficient skill in hospitals and their heavy duty become a social problem in the modern Africa as the population growth every day increases the need for health care also increases with sufficient skills. Hence, everyone in this society must take proper care of their health.

In This case, preserving the patient's safety must come first in all hospitals of African countries.

## II. METHODOLOGY

### A. Data Collection Methods and Instruments/ Tools

Data collection is the process of gathering information using predetermined methodologies in order to respond to the study's predetermined research topic. In this study, the researcher make a use of a questionnaire, documentation, interview and observation as the research instrument and examine primary data. It has been stated that approaching people with questions is an obvious way to gather both quantitative and qualitative data from them. The survey method is used in this study to gather data. (Walliman, 2011).

### B. Data analysis

The process of discovering solutions through investigation and interpretation is known as data analysis. Understanding survey and administrative source results and presenting data information require data analysis. Data analysis is anticipated to provide light on the subject of the study and the respondents' perceptions, as well as to increase readers' understanding of the subject and pique their interest in this portion of the research. (Burns, 2022).

### C. Research Design

For this study, a prediction study approach was adopted to examine the link between the detected variable (the independent variables) and the detection variable (dependent variable) in addition we have intervening variable to summarize relationships between independent and dependent variables. Two or more scores were obtained from each individual in the sample, one score for each variable. In this research, both qualitative and quantitative approaches was employed.

According to Rhodes (2014) the qualitative approach was employed for gathering Information which focused on describing a phenomenon in a deep comprehensive manner. This is generally done in interviews, open-ended questions, or focus groups and therefore the researcher used qualitative approaches to collect data which was centered on the observation of the respondents. Additionally, quantitative approach was preferred to be employed to gathering information because it focuses on describing a phenomenon across a larger number of participants which can provide the possibility of summarizing in numerical.

This approach surveys a large number of individuals and applies statistical techniques to recognize overall patterns in the relations of procedures the researcher therefore employed quantitative approaches to collect information which was later quantified in numerical, Quantitative

research approach shall be employed because some gathered data analyzed numerically using statistic tools, it means that they might be expressed in amount or number.

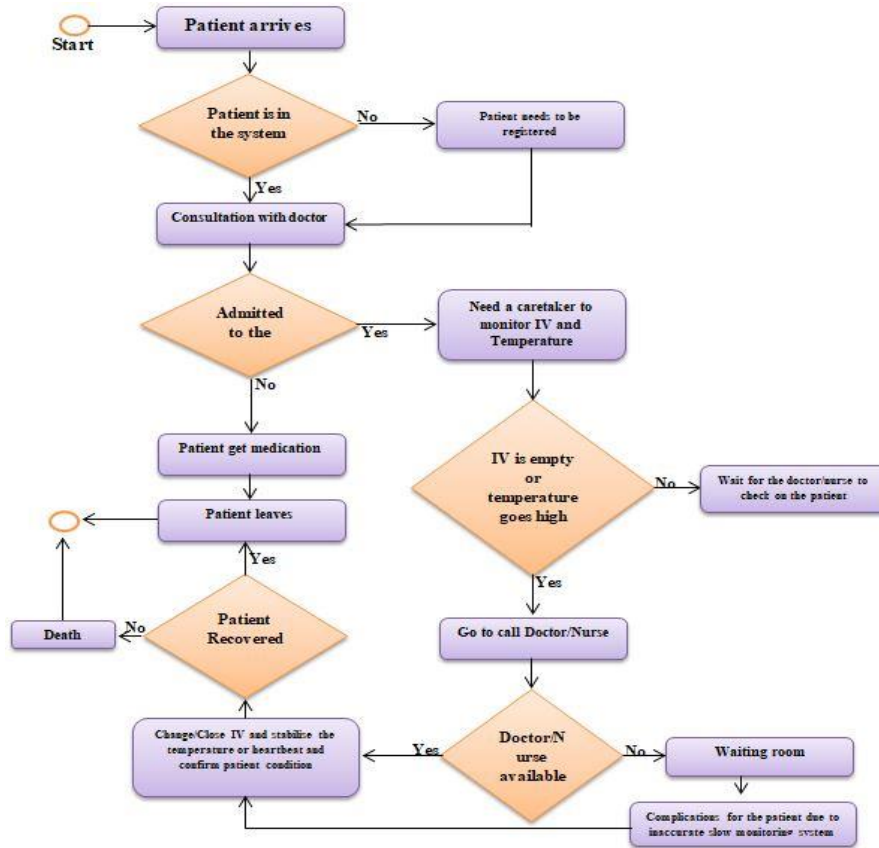


Fig. 1: Analysis of existing System

### III. CONCEPTUAL FRAMEWORK

A conceptual framework is analytical tool with several variations and contexts. It is used to make conceptual distinctions and organize ideas. It provides a general representational of relationship of things in a given phenomenon.

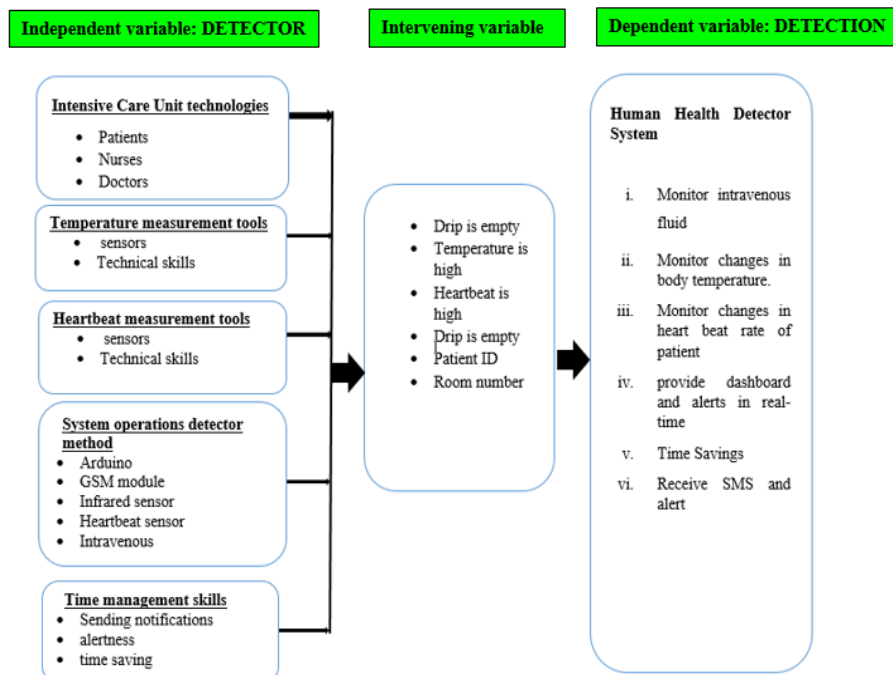


Fig. 2: Human Health Detector System Conceptual Framework

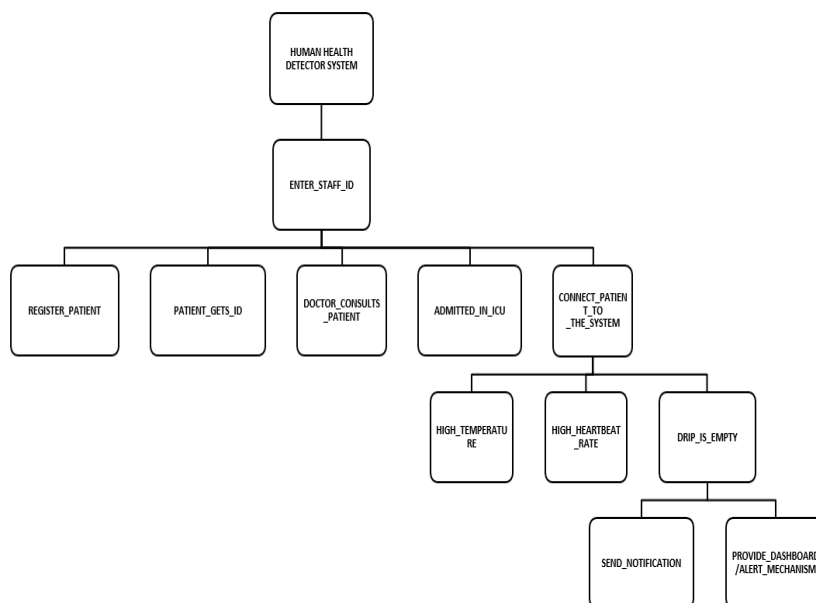


Fig. 3: Human Health Detector System Model

#### IV. DATA PRESENTATION

This images shows the whole device combines together with LCD, keypad, microcontroller temperature sensor, infrared sensor, heartbeat sensor, and battery.



Fig. 4: Describes the Human Health Detector system as a whole.

When you switch on the system it will automatically give you welcome page.



Fig. 5: Welcome Page

After opening the system you will be required to enter staff identification in way of identifying whose nurses is on duty. After entering your staff id you will be able to register a patient into the system.



Fig. 6: Enter Staff ID's page



Fig. 7: Enter patient ID's page

Patient has to be given Identification number in order to be differentiated with orders, after getting identification number the nurse insert the important instruction that the

system will follow while monitoring the patient because every person's health is different to another depending on the type of sickness.



Fig. 8: Enter maximum temperature page

Nurse has to set the maximum temperature to the system so that if the temperature sensor sense the temperature is too high it's directly send the message.





Fig. 9: Choose a number to enter Starting page

After setting the level of temperature, the heart beat level and the drop level you press start button in order to start monitoring patient status.



Fig. 10: Patient connected to the system

Patient lying on the bed at the hospital connecting to the Heartbeat sensor and temperature sensor that will sense when the temperature is too high or low and if it occurs to be below the limits provided by the nurse it will immediately trigger the message. The IV bag also that connected to the patient contains blood to direct transfer into patient body also this bag has a sensor that detect whether the blood has finished in the bag or not and this will be known when the fluid passed the minimum level of fluid and when this happen will directly inform the nurse through GSM Module that is assembled in the device box. The whole device combines together with LCD, keypad, microcontroller temperature sensor, infrared

sensor, heartbeat sensor, intravenous fluid, and a dolly symbolize the patient.

**V. FINDINGS OF HUMAN HEALTH DETECTOR SYSTEM**

*A. Findings on temperature sensors*

This message displayed on LCD display after the sensors sense that the temperature is too high beyond the limits provided by the nurse it will immediately trigger the emergency response needed as an alert message

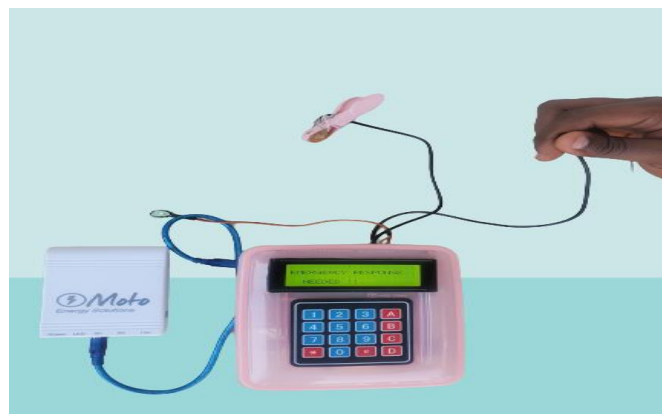


Fig. 11: Emergency Alert on Health Detector System Dashboard

When the sensors sense that the patient's body temperature is too high it will immediately send a call to the

nurse and send a message contains room number patient id number and shows the temperature is too high.

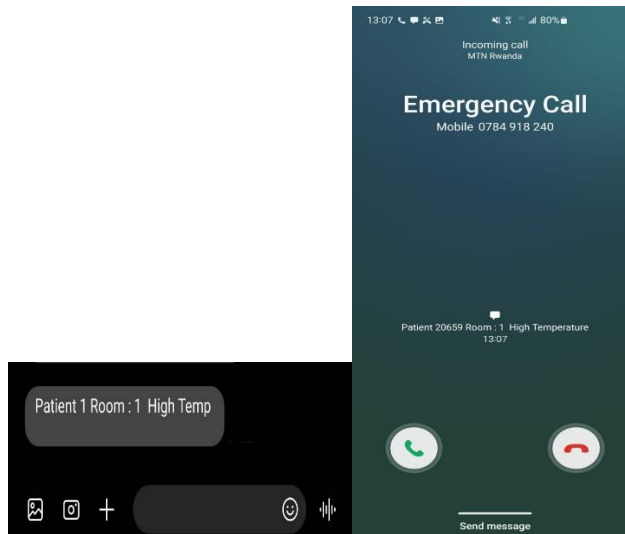


Fig. 12: Emergency alert on GSM Mobile page

*B. Findings on heartbeat sensors*

When the sensors sense that the patient's heartbeat sensors is too high above recommended by nurses (above 70) it will immediately send an alert messages.

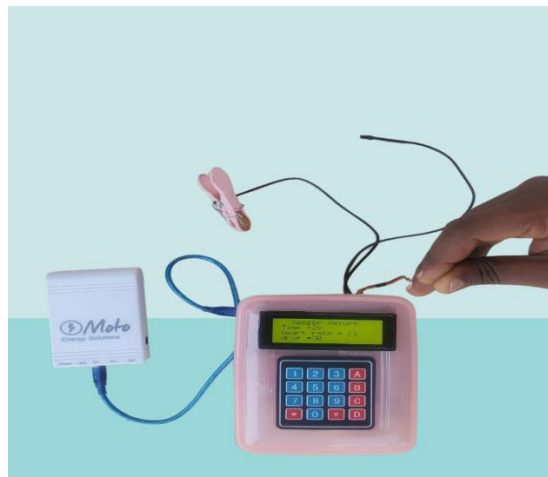


Fig. 13: Heart-Beat Sensor Values

The heartbeat sensor senses that the patient's body is above 70 degrees so it's immediately send an alert messages to the nurse.

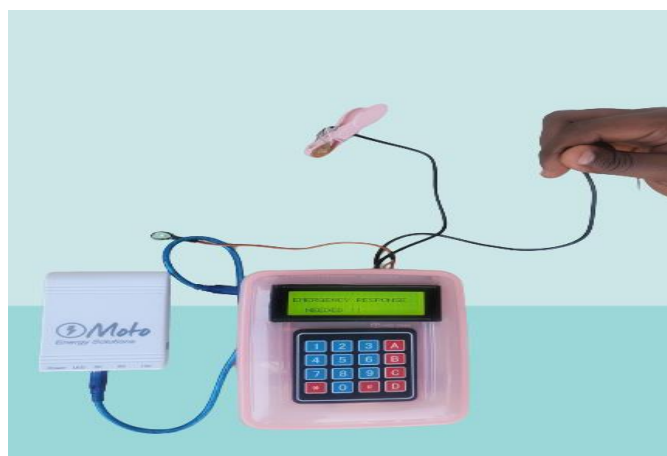


Fig. 14: Emergency Alert on Health Detector System Dashboard

When the sensors sense that the patient's heartbeat sensors is too high above recommended by nurses(above 70) it will immediately send a call to the nurse and a message

contains room number, patient id number, and shows that the heart rate increase.

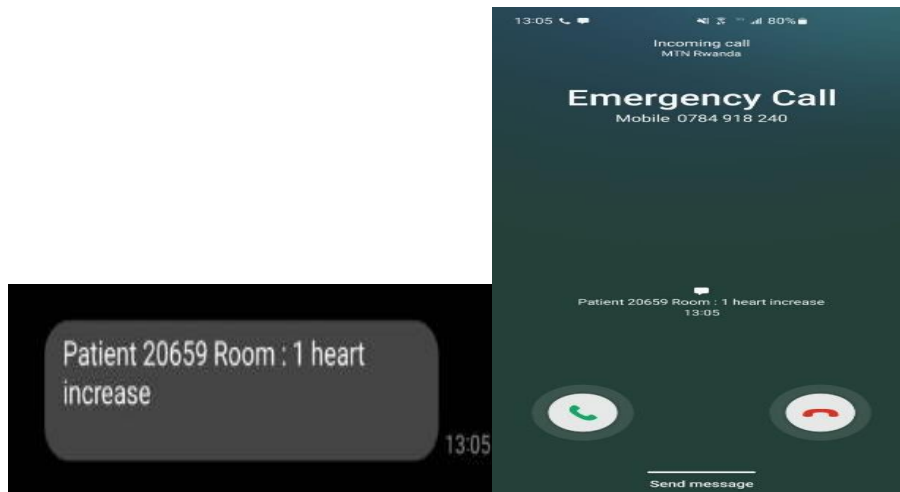


Fig. 15: Emergency alert on GSM Mobile page

C. Findings on intravenous fluid (IV) sensors

The intravenous sensors detect that the blood has finished in the bag or this will be known when the fluid passed the

minimum level of fluid and when this happen will directly inform the nurse through GSM Module by sending emergency response message.

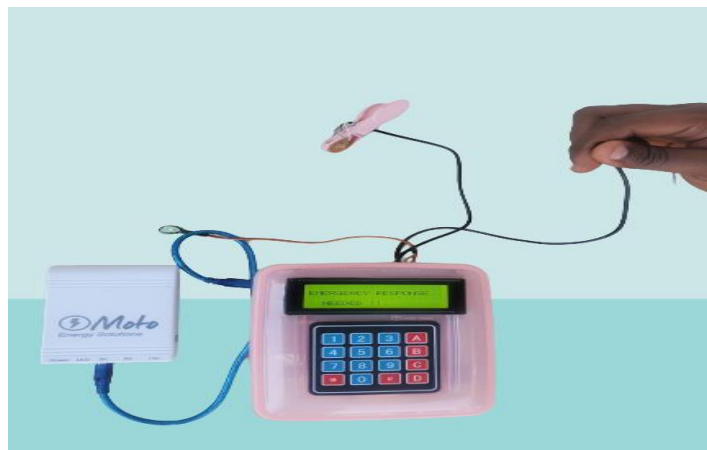


Fig. 16: Emergency Alert on Health Detector System Dashboard

The intravenous sensors detect whether the blood has finished in the bag or not and this will be known when the fluid passed the minimum level of fluid and when this happen will directly inform the nurse through GSM Module that is

assembled in the device box, the message will be contained with patient identification, room number, and displays the drop is empty.

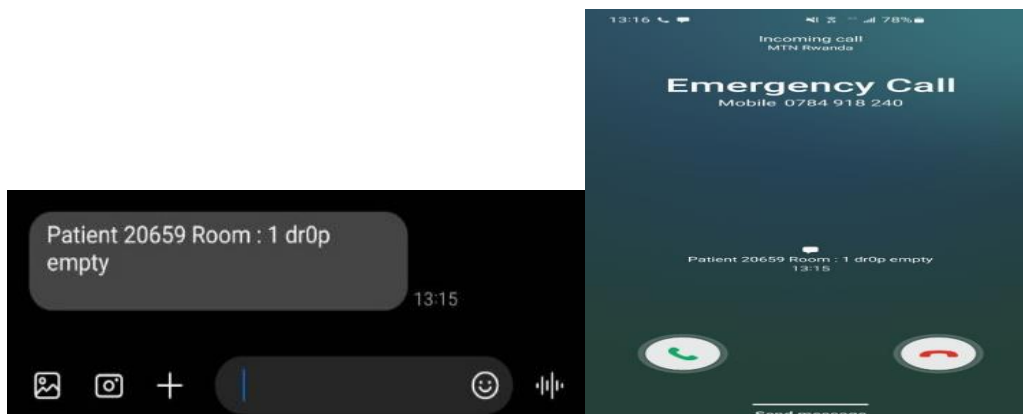


Fig. 17: Emergency alert on GSM Mobile page

## VI. ANALYSIS OF FINDINGS

After all configuration are made on Human health detector system, when the temperature sensor senses that the temperature is too high will automatically notify the nurses through messages, by call, and alert mechanism on dashboard. Also when the heartbeat sensor senses that the heart rate is increased above 70 bpm will automatically notify the nurses through messages, by call, and alert mechanism on dashboard. Thus the intravenous sensor detects that the blood has finished in the bag or the fluid passed the minimum level of fluid it automatically notify the nurses through messages, by call, and alert mechanism on dashboard; it is now proven that any unusual condition and or settings will be communicated to the doctors/nurses in the above mentioned means so that they figure out what is going on with the sensors for a quick intervention and also saving patients' lives.

## VII. CONCLUSIONS

The aim of the research was to implement human health detector system based on internet of things using Arduino microcontroller and GSM module with a mobile phone to alert the doctor and nurses. The goals of research were achieved successfully. After implementation of my project we insure university of Kigali and Rwandan government that human health detector system will reduce the number of deaths that may result from uncontrolled heartbeat, temperature and IV blood transfusion. Also, I can conclude that the objectives of this project have been successfully met and they are as follows:

- Constructed a wireless human health detector system controlled by a GSM-based phone.
- Implemented a user-friendly and a safe system to control patient body change especially aimed to assist nurse to continuous monitoring patient health even though they are not around.
- This system ensures that any change that can occur to the patient and led to the highness of the temperature, heartbeat rate cross the provided limits or the fluid finished in the bag that can led to serious complication to the patient will immediately let the Doctor/Nurses know to be able to save the patient's lives and this will continue to assure a quick recover for the patient not only in Rwandan hospitals but also in whole Africa.

## VIII. RECOMMENDATIONS

We cannot come to the end of this report without making the recommendations for the implementation of Human Health detector system based on Internet of things using microcontroller and GSM. So at the completion, the following recommendations are made:

- It is recommended that the next researchers on this topic to use their best for using a sensor which is able to differentiate People with the other things.
- The researcher recommends other universities especially in Information technology in to focus on Internet of things project (IoT) which will go to increase the skills of the student in hardware and also in software.

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