International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 04 | Apr 2021 www.irjet.net p-ISSN: 2395-0072

Smart System for Pregnancy using Raspberry Pi & IoT

Dr.I.Poonguzhali[1], R.Ranjana[2] Sreyaa Krishna M[3], Manjula M[4], Vaishnavi V[45]

[1]Associate Professor, [2]Assistant Professor, [345] UG Scholar , Electronics and Communication Engineering
Panimalar Institute Of Technology, Chennai, India

Abstract - *Usually, pregnant ladies will have their routine check-ups and be keen on their health status. Whereas in some cases among few will be facing hypersensitive disorder and more than ten babies are born prematurely worldwide, resulting from one million death each year. Also, in few cases, babies are facing life-long disabilities. This can be solved by monitoring uterine contractions to evaluate the health and progress of the pregnancy. This paper presents an idea to design a smart pregnancy system using IoT which will help pregnant women to monitor their health. It is an innovative, smart and protection of the baby in pregnancy time. To design this, we need technologies that include IoT (modules like raspberry pi, temperature sensing, baby moment detecting mechanism, live video surveillance, cloud computing, and user-friendly web application to monitor the moment. Different sensors are used to detect the temperature like Lm35. The collected data are stored in the cloud and analyzed at regular intervals. A wellbeing calculation is applied to these datasets to get data.*

Key Words: *Raspberry pi, Internet of Things (IoT), Remote patient monitoring, Smart device, Fetal monitoring.'*

1. INTRODUCTION

Fetal heart observing is an approach to check the pulse of your infant (hatchling) during work. The pulse is a decent method to see whether your child is progressing admirably. It can show if there is an issue. Checking might be done constantly during work (persistent) or on set occasions (irregular). For generally safe pregnancies, specialists concur there's no requirement for constant fetal checking. Occasional observing (discontinuous auscultation) is comparably powerful. A couple of studies have discovered that infants might be barely more secure when observed constantly, however, results are uncertain.

The checking is normally finished with one of these gadgets:

- An electronic fetal screen
- A handheld Doppler gadget (like the one your guardian used to tune in to your infant during your pre-birth visits),
- A stethoscope-like gadget called a fetoscope.

The medical attendant or supplier will check your infant's pulse at explicit spans. This may happen each 15 to 30 minutes in the dynamic period of the main phase of work, and each five to 15 minutes during the second (pushing) stage.

This is what she'll be tuning in for: "baseline" pulse: This is your infant's pulse between withdrawals when he's not moving (typical is somewhere in the range of 110 and 160 beats each moment).

Raspberry Pi is a movement of minimal single-board pcs made in the United Kingdom by the Raspberry Pi Foundation in relationship with Broadcom. The Raspberry Pi project initially inclined towards the advancement of showing essential software engineering in schools and non-industrial nations. The first model turned out to be more mainstream than expected, selling outside its objective market for utilizations like advanced mechanics. It is generally utilized in numerous regions, for example, for climate checking, as a result of its ease, particularity, and open plan. It is ordinarily utilized by PC and electronic specialists because it selects HDMI and USB gadgets.

The Internet of things (IoT) depicts the organization of actual items—"things" or articles—that are inserted with sensors, programming, and different advancements to interface and trading information with different gadgets and frameworks over the Internet.

Things have advanced because of the assembly of different innovations, continuous investigation, AI, item sensors, and implanted frameworks. Customary fields of implanted frameworks, remote sensor organizations, control frameworks, computerization (counting home and building mechanization), and others all add to empowering the Internet of things.

In the purchaser market, IoT innovation is generally inseparable from items relating to the idea of the "brilliant home", including gadgets and machines (like lighting apparatuses, indoor regulators, home security frameworks and cameras, and other home apparatuses) that help one or more normal environments, and can be controlled using

gadgets related with that biological system, for example, cell phones and savvy speakers. IoT can likewise be utilized in medical services frameworks.

Remote patient monitoring (RPM) is an innovation to empower checking of patients outside of regular clinical settings, for example, in the home or in a far-off region, which may expand admittance to the mind and diminish medical services conveyance costs.

2. LITERATURE SURVEY

Internet of Things IoT has brought a progressive change in data and correspondence advances. Internet of Things (IoT) gives the admittance to huge information and it permits gadgets installed with sensors and actuators to convey and divide data between them. Physical gadgets and frameworks implanted with various sensors, programming and actuators are associated with one another and trade data and information through the web. Articles are being detected and controlled across the web distantly. IoT sets out immense open doors as the actual world is incorporated into PC-based frameworks. This incorporation brings about decreased human investment, improved effectiveness alongside monetary advantage and exactness. This paper focuses on a joined way to deal with build up a fitting medical services framework recipient and helpful for the two patients just as specialists. The principal focal point of this work was on ease, smaller plan, less convoluted, convenient furthermore, easy to use. There is a great deal of medical care checking frameworks accessible having various disadvantages like low power saving, massive, wired arrangement, moderate reaction [1,2,3].

We have built up a keen portable information module (given a Raspberry Pi) for fetal screens, along with a coupled FHR information watcher. This framework empowers the distant transmission of FHR information and the last's representation on different cell phones. As of now, our model must be utilized for research purposes. Notwithstanding, our answer is a common-sense one that can be applied in many medical clinics, which empowered us to confirm the idea inside our current HIS. On the off chance that this device is popularized, the maker and programming makers will want to create fitting arrangements, (for example, a suitable application programming interface (API)). By and by, before commercialization, the internet browser and model can be made accessible to medical care establishments wishing to test our methodology. We set up this instrument in a closely coordinated effort with a Clinical Examination Center devoted to e-wellbeing. The Center brings together multidisciplinary abilities in software engineering, IT, signal handling, ergonomics, human factors, and man-machine interfaces. This underlying stage empowered us to build up an apparatus that could without much of a stretch be utilized at home and in the emergency to a clinic, and we took record of use and the clients' exercises. Essentially, if this apparatus is popularized sooner or later, it is feasible to coordinate significant devices and assets to help item affirmation using the Continue Design Guidelines [4,5].

In this paper, we have introduced other IoT-based medical services data systems, comprising of a WBAN, an RFID framework, a cell organization, a data set, and a web worker. Specifically, a novel panic gadget, where an RFID-GSM interface is used for the transmission of physiological signals with QoS support, has been created. The proposed structure has been demonstrated and re-enacted utilizing Riverbed Modeler, and the presentation of the framework has been assessed under three unique situations. All together to approve parts of the structure, the contextual analyses that incorporate detecting (through hubs), validating (using worker), and moving (through panic) cycles of ECG and internal heat level signs, just as close to home data, are recreated dependent on the sensible information. From the simulation results, it is seen that the QoS rules for information rate and inertness specified by ISO/IEEE 11073 norm are fulfilled energy-efficiently as long as the number of openings (CAP or GTS) in the super frame structure is utilized in understanding the traffic force of hubs. Specifically, while the CAP is reasonable for the low traffic force,

the GTS assignment is exceptionally liked for the high traffic density, particularly on account of time-basic information transmission. Also, the proposed IoT-based structure offers a plan rule for scientists to build up a medical services mechanization framework. Besides, the proposed structure can be reached out to have cloud-based handling just as dynamic components to offer an overhauled IoT-based wellbeing checking and the executive's framework [6,7].

3. *EXISTING SOLUTION*

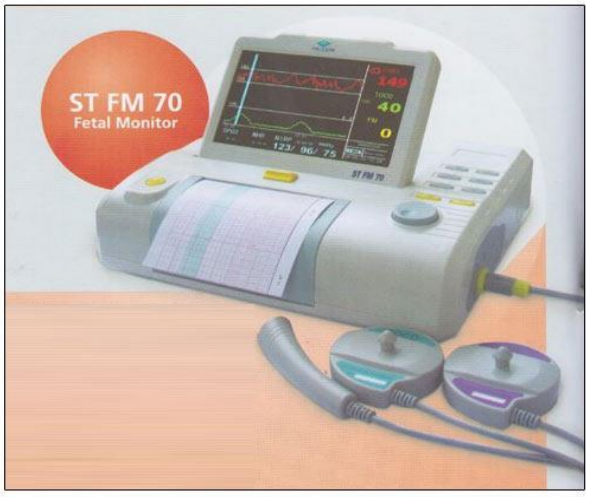

Fig. 1 Electronic fetal

Fig 1 is an Electronic fetal, it is a method where instruments are utilized to ceaselessly record the heartbeat of the embryo and the constrictions of the lady's uterus during work.

Constant electronic fetal heart checking might be utilized during work and birth. an ultrasound transducer set on the mother's mid-region directs the hints of the fetal heart to a pc. the rate and example of the fetal heart are shown on the pc screen and imprinted onto unique diagram paper.

Fig 2 Doppler fetal

A Doppler fetal shown in fig 2 screen is a hand-held ultrasound transducer used to perceive the fetal heartbeat for pre-birth care. It uses the Doppler effect on give a perceptible entertainment of the heartbeat. A few models likewise show the pulse in beats each moment (BPM).

Fig 3 Fetoscope

Fig 3 is an Fetoscope which is used to get data about a hatchling inside the uterus. There are two kinds of fetoscopes: A fiberoptic degree for gazing straight toward the baby inside the uterus and a stethoscope intended for tuning in to the fetal heartbeat.

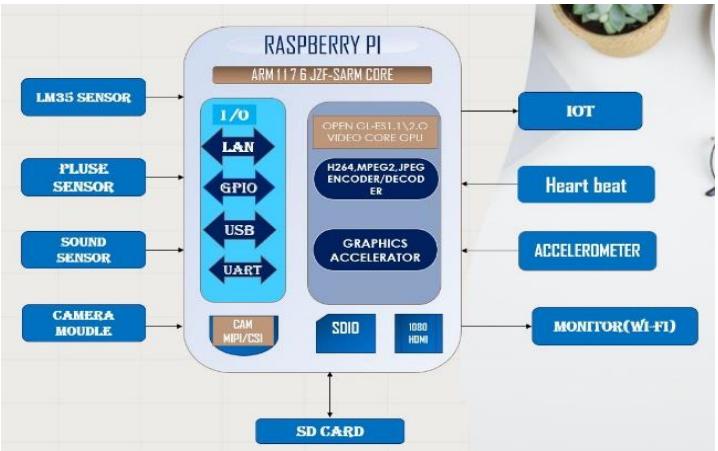

Fig. 4 Sensor Flow

In fig 4 we can see how sensors are used in these existing solutions to know the condition of pregnant women but that will be restricted to the particular area in that area and has to check the conditions manually.

4. PROPOSED METHODOLOGY

The proposed system aims to monitor the health of pregnant ladies using IOT devices and store the collected data on the IoT server.

- To provide technical support to make healthcare systems easier and faster.
- To gather precise actual boundaries of a patient.
- To provide availability of necessary data on the internet.
- To provide faster assessment and treatment.

Work flow consists of 4 stages they are

- data acquisition
- data processing
- data storage
- data transmission

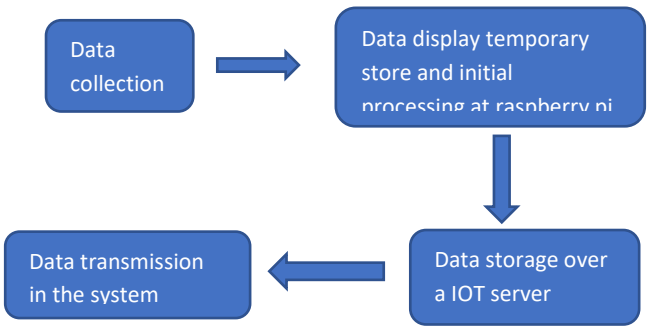

Fig 5 Block diagram of the Work Flow

Fig 5 is the proposed methodology in which the sensor is used to collect the patient's data, Information here alludes to the wellbeing boundaries of temperature and heartbeat-rate. The sensor used over here are low power sensors. They collect data from the patient on daily basis and with this frequently obtained data the health condition of the patient is observed and required prescriptions are recommended. This collected data is shown on an l cd connected to the raspberry pi. If required the data is processed and then forwarded to the IoT server for storage from where it is accessible to desired clients in the system. The system works on basic client –server principle of computer networking. Data collected on the IoT server is stored for the reference of all peers in the system and transmitted to these peers as and when required.

The Proposed system consists of 3 blocks:

- 1st block shows the raspberry pi 3 model b in which wireless connectivity is provided within it (wifi).
- 2nd block here the data are collected from that side and it to the IOT server (data storage of the overall system).
- In the 3rd block the data is accessible at the doctor's side so they can access the information of the pregnant ladies and recommend them with a proper prescription.

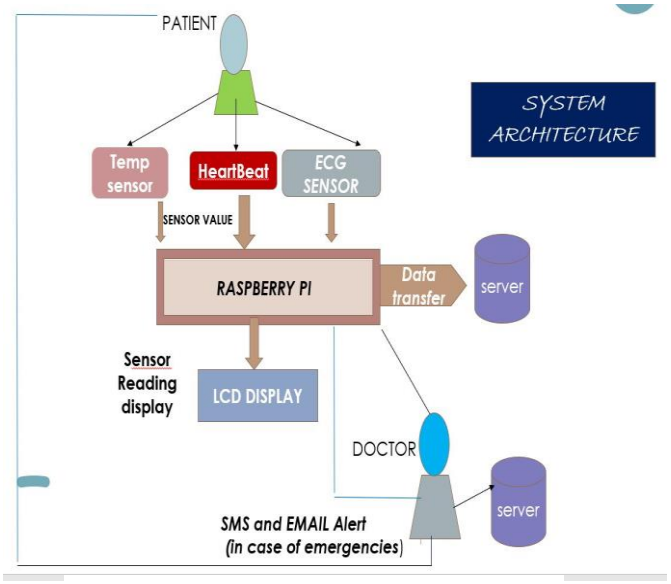

Fig 6 Proposed system

The data from the patient is collected at the Raspberry pi with help of sensors. The data collected will be stored onto IOT server as patient-ids and forwarded to the doctor for their analysis purpose. The doctor will analyze this data and will give assessment accordingly and hence monitoring of health is done.

what are protocols used here ?

- http- used for data transfer and communication.
- generally used protocols with iot based system are coap, mqtt and http.

what is use of these protocols??

- coap –used where network performance is the
- main target to achieve.
- mqtt and http – chosen for sensor-based application.

A quick view about the proposed system

- The both sensors and forecasting cloud is used, so that resulting data have accuracy the condition.
- Surveillance from Wide area network (WAN) Which can be viewed in the web application.
- Control the situation from a remote area anywhere from the world.

HARDWARE	SOFTWARE
RASPBERRY PI	RASPBIAN
TEMPERATURE (LM35)	HTML AND PHP
PLUSE SENSOR	MQTT PROTOCOL
SOUND SENSOR	LANGUAGE -LINUX
MCP38008(ADC IC)	PYTHON
USB CAMERA	
SD CARD	
MONITOR	

Fig 7 Table

5. SIMULATION RESULTS

This project is a commercial framework completely based on IOT technology and one version of its prime applications. The principle lies on the same which uses various kinds of sensors and boards interfaced on a single compact system which is always live on the internet and it is supported by a definite cloud to store the data's and used to extract all the information about the condition for further analysis what the practical parameters show about the same. The whole system comprises more of a detection of required statistical information from the ambience of the real time environment. The preservation of the accurate data in a specific board and providing all the details (via the internet space) at the required end for delivering the clear-cut scenario of the happenings at the system end.

The sequence starts with collecting data from the sensors and stored in ESP32. The LM 35 sensor is a temperature sensor which is used to sense the temperature. It contains the analog value. The analog value is stored in ESP32. The accelerometer sensor is used for direction purposes (X, Y, Z). In case when a pregnant lady fell down the information regarding this obtained from ESP32 in which the information is stored. The pulse sensor used to monitor the pulse. The data obtained over is analog which is stored and the information regarding this obtained from ESP32.The sound sensor is used to detect the sound. If the sound is detected when a pregnant lady falls, the information regarding this is stored and obtained from the ESP32. The camera will be turned on only if there is change in direction and sound detected during their fall matches. With the help of the IP address, we can monitor their activities. Therefore, the four sensors mentioned above will collect the information and all the data will be stored inesp32 and we can get the value from the ESP32.The value whichever obtained from the ESP32 is sent to raspberry pi. From the raspberry pi the data is sent to the cloud and the data is monitored over there. The cloud used over here is IoT ubidots dashboard.

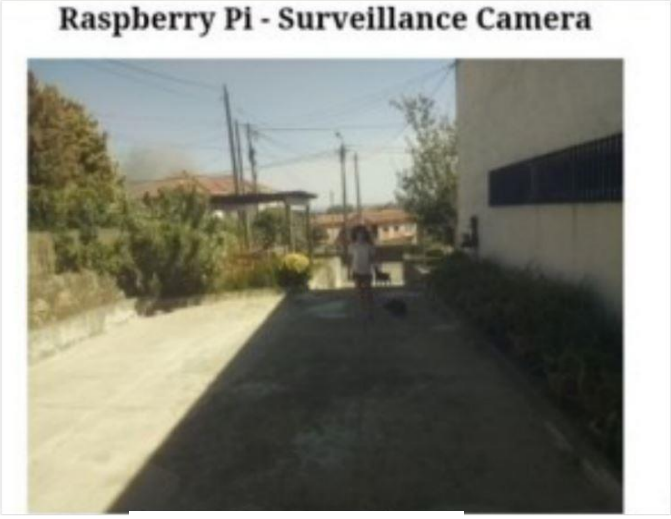

Fig. 8 Surveillance camera

Fig 9

Here each and every data can be monitored. They monitor and control physical assets. Each and every information regarding the patient is stored and monitored in the UBIDOTS and that can be shared to the doctor. Therefore, doctors can prescribe the necessary treatment

and medicine to the pregnant lady. Proper diagnosis can be given with exact parameters of accurate values to ensure the betterment of improving the health care facilities for pregnant people which opens a large door of positivity and confidence to the respective women and people around them. Hence this is the working principle and description of the entire project presented in this paper.

6. CONCLUSION

The smart mobile system for pregnancy using raspberry pi is the IOT based technology used to monitor the mother Fetus daily so that we can come to know their health status. This method, analyses baby's activities with video enhancement and instant web app notification for better monitoring of the baby. Therefore, we can prevent the mortality rate and health check status of the premature baby.

REFERENCES

[1] Zia Uddin Ahmed, Mohammad Golam Mortuza, Mohammed Jashim Uddin, Md. Humayun Kabir, Md.Mahiuddin, MD. Jiabul Hoque, "Internet of Things Based Patient Health Monitoring System Using Wearable Biomedical Device" Conference: 2018 International Conference on Innovation in Engineering and Technology (ICIET), DOI: 10.1109/CIET.2018.8660846.

[2] Agathe Houzé de l'Aulnoit, Samuel Boudet, Michaël Génin, Pierre-François Gautier, Jessica Schiro, Denis Houzé de l'Aulnoit, Régis Beuscart "Development of a Smart Mobile Data Module for Fetal Monitoring in E-Healthcare" Journal of Medical Systems (2018) 42:83.

[3] Faruk aktas, celal ceken, yunus emre erdemli "Iot-Based Healthcare Framework for Biomedical Applications" journal of medical and biological engineering, 966–979 (2018).

[4] Trie Maya Kadarina, Rinto Priambodo "Preliminary Design of Internet of Things (IoT) Application for Supporting Mother and Child Health Program in Indonesia" international conference on broadband communication, wireless sensors and powering (2017), DOI: 10.1109/bcwsp.2017.8272576.

[5] Ramgopal Kashyap "Miracles of Healthcare with Internet of Things" Smart Devices, Applications, and Protocols for the IoT, DOI: 10.4018/978-1-5225-7811-6.ch007.

[6] SU Gowtham, M Gokulamanikandan, P Pavithran, K Gopinath "Interactive Voice & IOT Based Route Navigation System for VisuallyImpaired People Using Lifi" International Journal of Scientific Research in Computer, 2017 IJSRCSEIT | Volume 2 | Issue 2 | ISSN: 2456-3307.

[7] K Banumathi, M Grace, G Kalaikaveya, S Shobana, "Monitoring of Transformer via Internet of Things Using GSM Technology" vol 4, 647-651.