

SOCIETAL APPLICATIONS OF IOT

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Abstract- A product in general is developed in order to benefit the society. Each product aims at different group of people. It is developed to solve a particular problem or enhance the usage of the current system in practice. Societal requirements associated with a product gives it an edge over others in the market. As an architecture, it can be developed using variety of engineering design process. This survey paper proposes some ideas for overall societal improvement , primarily using IOT.

Keywords—Internet of Things(IoT),healthcare,LED,LDR,Micro Electro Mechanical System(MEMS),Global Positioning System(GPS),Wireless Body Area Network(WBAN),Global System for Mobile communication(GSM), Light Dependent Register(LDR)

1. INTRODUCTION

The Internet of Things (IoT) is a multivariate and evolving tool which promises to become the next major technology on the social applications of the society. Infinite number of smart devices and sensors that allow us to sense the real time information from our surroundings employs the concept of IoT. Each detail is uniquely incorporated transparently and seamlessly in a large number of different and heterogeneous end systems, while providing open access to selected subsets of data for the development of a plethora of digital services. IoT is as a revolutionary way to provide independent living opportunities that helps in improving the quality of life. In the IoT, things are expected to become active participants where they are able to interact and communicate among themselves by exchanging data and information sensed about the environment. The rest of this paper is as follows. The second section presents the related works on various IoT applications that benefit the society. The third section gives a brief description of the four applications of IoT that are presented in this paper. The fourth section is devoted for a comparative study on the four described applications. The fifth section focuses on future research directions. Finally, the last section concludes this paper.

2. RELATED WORK

In [1], Wireless Body Area Networks(WBANs) is suggested as the key enablers of remote and in-hospital health monitoring that are expected to revolutionize the health and real-time body monitoring industry. It emphasises on two sensors for measuring the fundamental health parameters or vital signs such as heartbeat, temperature, blood pressure - one the body sensors deployed in, on or around the human body, the other a context-aware sensors like the ones embedded in smartphones. [2] makes a unique contribution in that it identifies all key components of an end-to-end Internet of Things healthcare system, and proposes a generic model that could be applied to all IoT-based healthcare systems. The approach discussed in [3] is an unobtrusive data gathering system implementation to collect data about daily activities of elderly people, and using it to perform risk detection algorithms. The produced data is useful to define a risk profile of each elderly person. [4] focuses specifically to an urban IoT system. It throws light on the Smart City vision, which aims at exploiting the most advanced communication technologies to support added-value services for the administration of the city and for the citizens. It provides a comprehensive survey of the enabling technologies, protocols, and architecture for an urban IoT. Review of state-of-the-art IoT solutions and applications that can be used for elderly and disabled care are the areas concentrated in [5]. It provides home solutions designed to provide independent living for the elderly and disabled and IoT solutions designed for their health care. [6] proposes an overview of the Internet of Things for people with disabilities .Different application scenarios are illustrated along with their critical challenges such as shopping scenario, school scenario and domestic environment. The approach in [7] deals with an unobtrusive data gathering system implementation to collect data about daily activities of elderly people, and with the implementation of the related Linked Open Data (LOD)-based data management system, risk detection algorithms are generated for proper customized interventions. Validation of some use cases demonstrates how this scalable approach is useful in defining a risk profile of each elderly person. [8] uses IoT for energy efficient environment conditions - sensing and controlling in home. It provides an idea of fully smart environment condition monitoring by utilizing various sensors (temperature, humidity, light and level) that additionally optimizes use of energy. It employs prediction logic for automatic detection and resolution of any problem in the devices.

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[9] catalogues an Energy Preserving System for Smart Rooms (EPSSR). The system focuses on measuring the number of persons in a room and accordingly alter the brightness of light.

An automotive localization system using GPS and SMS services is the idea presented in [10]. The system apprises the necessary people when an accident takes place.

3. PROPOSED SYSTEM

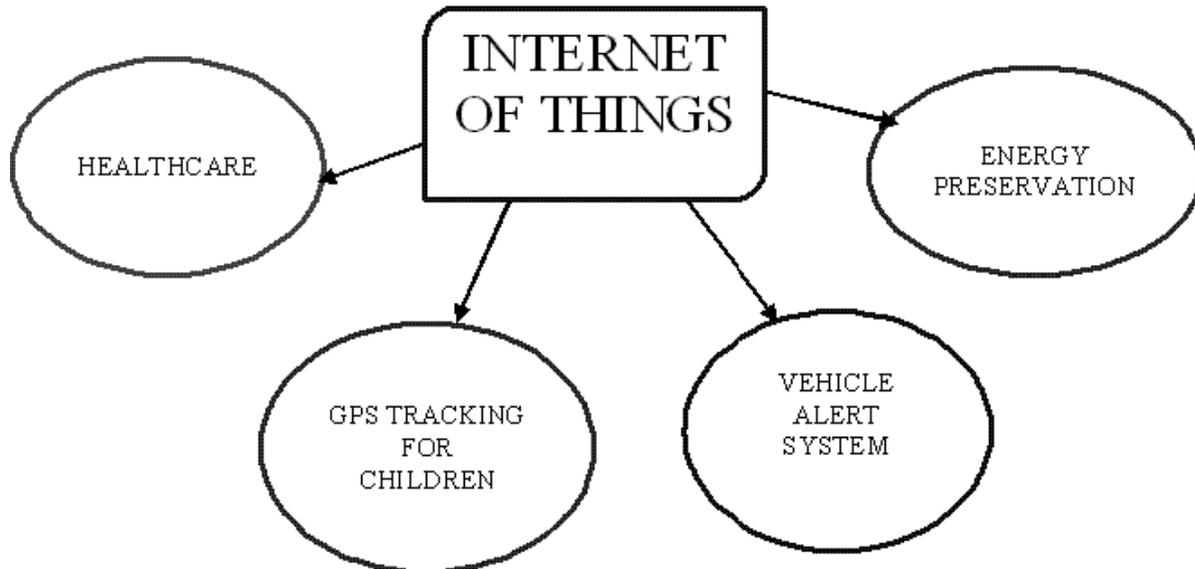


Figure 1:-Classification

3.1 Health care in remote areas

The Internet of Things (IoT) has been widely identified as a potential solution to alleviate the pressures on health-care systems, and has thus been the focus of many recent researches.

The people in remote places are deprived of basic healthcare facilities due to the lack of hospitals or the unwillingness of doctors to work in such an environment. This has a greater impact on the people of varying ages. Children in their pre-teenage stage are vulnerable to lot of health issues due to their routine activities, which not addressed now will turn fatal in the future. Old people are more like infants, therefore more attention on their health has to be provided at their comfort, as they don't prefer travelling long distances that eventually makes them neglect the importance that has to be given to their health. The utmost healthcare facilities must be provided to the women of all ages as they go through different phases of womanhood.

This system is useful for treatment of basic ailments faced by people. A hardware device or an application is developed to sense the preliminary requirements of the doctors such as heartbeat, blood pressure, temperature, etc. The system is equipped with the necessary sensors for detection and the results are sent to the doctors incharge [1]. The results are evaluated and the necessary medical report is sent back to the patients for their medical assistance as depicted in figure 2. Both the result and the report is sent through an online portal. If doctors detect any complexity in the treatment, the patients are intimated so that they can take the necessary decisions for their further medical treatment.

Recommended sensors are those that measure the vital signs - pulse, respiratory rate, and body temperature - as these are the essential signs for determination of critical health. Further sensors that could be implemented are blood pressure and blood oxygen sensors, as these parameters are often taken alongside the three vital signs. Special-purpose sensors such as blood-glucose, fall detection, and joint angle sensors could also be implemented for systems targeting a specific condition. All these sensors are integrated together to form a single device that enables patients to use it at ease. In case of any difficulty, doctors on the other side provide guidance on the usage of the system as shown in figure 3. The central node receives data from the sensor nodes. It processes this information, forms a consolidated report and then forwards the information to an external node i.e., a service centre where doctors are available for attending the patients[2].

The system proposed is useful for the patients residing in inaccessible areas or isolated regions. It benefits people of all age groups. Healthcare facilitates patient monitoring through computers, inturn it reduces the outpatient visits. Healthcare is the most challenging area and one of the area where enhancement is highly essential. A good and reasonable healthcare system will benefit the entire human race. It will help in addressing day-to-day problems faced by the people.

Health care systems should include the health improvement instead of only providing them with health systems. A health care system consists of all organisations, people and actions whose primary intent is to influence determinants of health as

well as more direct health-improving activities[2]. Health care system is therefore more than the pyramid of publicly owned facilities that deliver personal health services.



Figure 2:doctors depicting the method of using the device



Figure 3: working of the system

3.2 Vehicle emergency alert

The high demand of automobiles has also increased the traffic hazards and the road accidents. Life of the people is under high risk. This is because of the lack of best emergency facilities available in our country. When an auto crash occurs suddenly, the reaction of the emergency services now becomes a race between life and death. Today, wireless innovation have titled the odds in favour of success like never before. Before, the people in the emergency services had little more to reply upon the raw courage .

An automatic alarm device for vehicle accidents is introduced in this paper. This design is a system which can detect accidents in significantly less time and sends the basic information to first aid centre within a few seconds covering geographical coordinates, the time and angle in which a vehicle accident had occurred. This alert message is sent to the rescue team in a short time, which will help in saving the valuable lives. A switch is also provided in order to terminate the sending of a message in rare case where there is no casualty, this can save the precious time of the medical rescue team. When the accident occurs the alert message is sent automatically to the rescue team and to the police station. The message is sent through the GSM module [4] and the location of the accident is detected with the help of the GPS module. This is depicted in figure 4. The accident can be detected precisely with the help of both Micro electro mechanical system (MEMS) sensor and vibration sensor[10]. The Angle of the rolls over of the car can also be known by the message through the MEMS sensor.

GSM devices are identified by the presence of a Subscriber Identity Module (SIM). It has given birth to many wireless services. Its end users were the first to take advantage of an inexpensive implementation of SMS (short message system), which is more popularly known as texting. The Global Positioning System (GPS) is a satellite-based navigation system made up of at least 24 satellites. GPS works in any weather conditions, anywhere in the world, 24 hours a day. These features makes its usage essential in the system proposed. MEMS is used to precisely locate the accident. The angle of the rolls over of the car can also be known by the message through the MEMS sensor.

This application provides the optimum solution to poor emergency facilities provided to the road accidents in the most feasible way. It is just a click away from getting the right help at the right time for the victim. As the famous proverb says“*A stitch in time saves nine*”, this system helps in sorting out problems immediately before it turns fatal.



Figure 4:-working of proposed model

3.3 GPS tracking system for children

Parenting comes with a wide range of challenges—but perhaps the toughest challenge of all is ensuring your kids are safe even when they're out of sight. There are many known cases where special children will wander off, often getting lost.

This system aims at two wings – one is for the special kids and the other is for all kids in general to help and protect them. As kids grow, they'll want to explore, push boundaries, and make their own rules. Fortunately, with wearable GPS trackers the challenge of parenthood just got a little easier. The chip is equipped with GPS that helps to track the location of the kids[7]. The chip is deployed in such a way that it can be attached to any kind of material like clothes, bags, electronic gadgets, etc.

Whether the child is on a family outing, at an amusement park, or on a school trip, these devices give one less thing to worry about. And whether the child is starting kindergarten or is in middle school, wearable GPS technology provides with an ability to locate children at any time[6], even in the densely crowded places. It helps to keep track of their day[5] without being too intrusive—giving the peace of mind that every parent desires.



Figure 5:-attachment of chip in any material



Figure 6:-depiction of the proposed model

3.4 Energy preservation of lighting devices

Energy is used in some or other forms in everyday life. Abundant energy is required to complete a day. Unfortunately, the amount of energy is depleting drastically, but on the other side the demand for it is never endingly increasing. Therefore the availability and demand is not directly proportional to each other. This makes the conservation of energy as the need of the hour. The idea of saving electricity is proposed in the system.

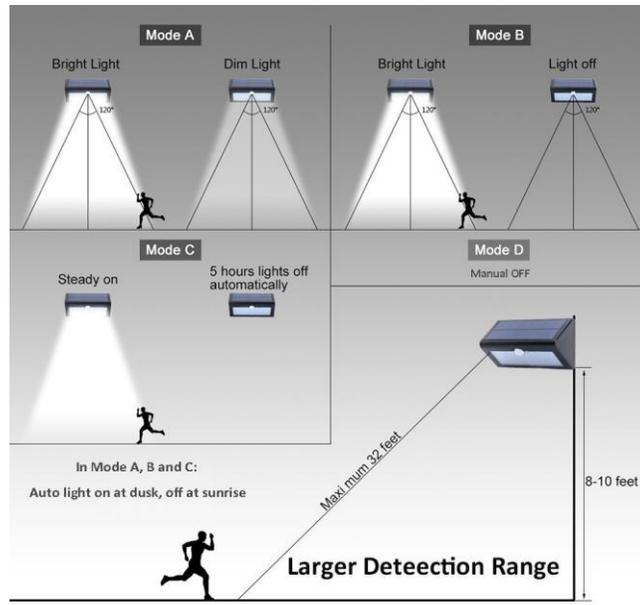


Figure 7:-different modes of working of the model

The system of automatic brightness control uses the concept of an Light Dependent Register(LDR) sensor that is primarily used to reduce the voltage of the lighting source when not in use[8]. This is visually depicted in figure 8. At the day time there is a need of less light LED sensors that senses the light and accordingly the programmed LDR glows, but when there is need of more light the LED senses that there is need of more light and emits more light as needed. This system is better than any other system as intensity of the light is controlled according to the amount of light needed in the room which is based on the number of people present. Based on the light needed, the LED increases and decreases its brightness accordingly. The same concept can be employed for various modes such as the ones illustrated in figure 7.

An LDR is a component that has a (variable) resistance that changes with the light intensity that falls upon it. This allows them to be used in light sensing circuits. When the light level decreases, the resistance of the LDR increases. As this resistance increases in relation to the other Resistor, which has a fixed resistance, it causes the voltage dropped across the LDR to also increase. When this voltage is large enough (0.7V for a typical NPN Transistor), it will cause the Transistor to turn on. The value of the fixed resistor will depend on the LDR used, the transistor used and the supply voltage.

The system can be put into use in malls, banquets, multipurpose halls, gated communities, etc.. It has greater advantages with respect to the units of electricity consumed at various places. It helps in reducing the consumption of electricity to a larger extent. This reduces electricity bills too. As it is put into practice, a convergence point is reached where demand and availability are on the same mark.



Figure 8:-different modes of working of the model

4. COMPARATIVE STUDY

TOPIC	DESCRIPTION	BENEFICIARY	ADVANTAGES	DISADVANTAGES
Health care in remote areas	Providing health assistance in places with scarce healthcare facility	All people	This system is useful for the patients residing in inaccessible areas or isolated regions.	<ul style="list-style-type: none"> ▪ electronic glitches can happen ▪ inadequate assessment
Vehicle emergency alert	A system for alerting emergency forces in case if an accident is reported	Social cause	<ul style="list-style-type: none"> ▪ Timely rescue of the victim ▪ affordable system ▪ alert message regarding the accident is automatically sent to hospital, police station and relatives. 	<ul style="list-style-type: none"> ▪ insufficient cellular signal ▪ higher possibility of misuse of the system in unnecessary cases.
GPS tracking system for disabled and children	Helps in tracking kids and the people with unstable mind in real-time	<ul style="list-style-type: none"> ▪ Special kids(unstable mind) ▪ Kids 	<ul style="list-style-type: none"> ▪ safety for children ▪ great assistance to guardians in time of emergency 	<ul style="list-style-type: none"> ▪ insufficient signal strength ▪ since it's a chip attached to a material, there is a greater chance of losing it.
Energy preservation of lighting devices	This system helps in preserving electricity by reducing the brightness and the power consumed by the lighting devices	<ul style="list-style-type: none"> ▪ Future generations ▪ Environment 	<ul style="list-style-type: none"> ▪ saves the units of electricity consumed unnecessarily ▪ reduces the electricity bill. 	implementation cost is high

5. CONCLUSION AND FUTURE ENHANCEMENT

IoT has been continuously bringing a progression of mechanical changes in our day to day lives, which thus makes our life less difficult and more agreeable through different innovations and applications. IoT is a perfect developing innovation giving new advancing information and the required computational assets for making progressive applications. In this paper, we have described the different ideas in the areas of healthcare, emergency situations, disabled people with accentuation on what is being done and how it benefits the society and help in improving their living conditions.

The ongoing research in the field of IoT and its implementation in full or partial manner will definitely improve the quality of life of human civilization. Today IOT is being implemented everywhere which is of human concern like Smart city, smart environment, security and emergencies, smart business process, smart agriculture, domestic and home automation and healthcare.

Over 50 million sensors and smart watches, smart meters and smart phones, washing machines, fridges, wearable devices and many more things will be connected over internet in coming years. The world community is now moving towards creating opportunity to live in a "connected life" environment.

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