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Internet of Things in Smart Farm House

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Abstract: *Our environment is significantly impacted by IoT. Everybody is used to having these at any time or location. The smart watch, laptop, automobile, bike, mobile phone, tablet, and sensor devices are some examples. Home automation is the self-contained control of your home's electronic devices. Due to their connectivity and internet presence, these devices may be used remotely. Due to home automation, you no longer need to manually control your equipment via an app or voice assistant. For instance, you could set your thermostat to activate the air conditioning an hour before you arrive at your farm house from work to spend the holidays or just relax so you don't have to come home to a stuffy farm house. You could also set your lights to turn off at the time you typically go to bed. Living more comfortably is made possible by home automation, which may also result in energy and heating cost savings. Home automation with Internet of Things technologies can help improve security. Home automation might boost security by utilizing IoT devices like security cameras and systems. The integration of technology and services through home networking for a higher standard of living and make yourself relax in this tense environment of the world is known as smart farm house technology. The term "smart farm house" has recently gained popularity, and it refers to a home equipped with cutting-edge technologies. All items can be connected to the Internet using internet of things (IoT) technology. IoT equipment Smart farm houses, intelligent fire control, , labour security, intelligent transportation, environmental protection, industrial monitoring, etc. are just a few examples of the many fields where this technology is used. An IoT-connected house is a collection of connected devices that can be managed remotely from a smartphone or computer. This study offers the current advancements in smart farm house automation technologies as well as their prospective integration with smart farm house systems. For the purpose to secure the network and access the network of the farm house form distance both internet as well as intranet technologies are used thorough smart phone to make it more moderate and advance . The automated and computerized management of farm house features, appliances, and activities is referred to as "smart farm house automation." This study will examine how the Internet of Things (IoT) affects farm house automation, the dangers that an IoT smart farm house must avoid, and the top smart farm home security gadgets that you really need to be aware of are discussed.*

Keywords: *Smart Farm House, Smart Phone, Internet of Things, Sensors, Security*

1. Introduction:

The way individuals need to relax at their farm homes has changed as a result of the latest advances in information technology. Additionally, these farm homes serve as the foundation for their income generation because they contain a variety of pets and animals used for breeding and production. There has been a lot of attention paid to research papers as a result of IOT's widespread citation as a way to make smart homes less stressful. The smart house is a crucial aspect of modern living. Smart homes employ secure applications and equipment. It is a component of IOT cloud computing systems [1].

These technological advancements heralded the era of ubiquitous computing, when machines do all the labour. The creation of the Smart Farm House was motivated by societal changes as well as the desire to assist and support the elderly and disabled. Everyone is more interested in ways to improve the lives of the elderly and crippled. The quality of life might be enhanced by creating a comfortable agricultural setting.

The integration of technology and services through home networking to improve the quality of living a relaxed life is known as a "Smart Farm House." The farm house's equipment and appliances are all connected so they may communicate with one another, with the residents, with the workers, and with the visitors. The most recent cutting-edge smartphones may be used to operate the smart farm home appliances and equipment. A farm house network may serve many various applications, such as ventilation systems, entertainment systems, lighting systems, and security systems. Smart farm houses provide a variety of advantages that a traditional dwelling cannot. As an illustration, chains and padlocks are necessary in a traditional farm house to deter trespassers from entering the property. The occupants of a Smart Farm House may even recognize and converse with visitors without moving an inch due to the smart farm house security system. The concepts of smart farm house systems, smart phone technology, and its prospective usage in automated and secure smart homes are presented in this paper. The characteristics of a perfect Smart Farm House application system are also recognized, and they provide the basis for the creation of a ubiquitous Smart Farm House architecture that makes use of cutting-edge technology, particularly wireless sensor networks and smartphones. For a more sophisticated mobility solution, the concepts of smart phones are employed.

Sections:

The rest of this paper is organized as follows: Section 2 illustrates an Overview, Section 3 describes Internet of Things in Smart Farm House, The proposed architecture for Smart Farm House through smart phone is outlined in Section 4, and Section 5 is wrapped with Conclusion of the study.

2. An Overview:

Internet of Things

The "Internet of Things," or "IoT," is any Internet-connected device that isn't generally connected; an example would be a smart lightbulb that you can operate via an app. IoT devices, which comprise all home automation technology, may be set up to activate one another. Thus, even if IoT refers to the technology itself, home automation is what you can do with IoT devices to tinker with your life a little [2].

The Internet of Things (IoT) has the following advantages:

New business prospects come from the capacity to leverage network data and advanced analytics to find business insights and opportunities.

- Improved ability to forecast and take action
- Quick action, new revenue sources
- Improved productivity
- Enhanced operational controls
- Predictive analysis
- Errors made by humans are reduced

IOT sensors for better monitoring and smart home technology provide you the power to control a network of physical items [3].

IoT and Smart Home Automation:

We cannot disregard the comfort that IoT delivers to our homes. Using internet-connected smart devices, you might, for instance, make your coffee the night before or set your thermostat to the ideal temperature before you get home from work. Additionally, you can use your smartphone to control the air conditioning while you are gone. You can also use it to lock the doors, switch off the lights, and monitor the property. IoT is a technology that creates networks by connecting various smart devices. The installed equipment may be accessed over the network, giving you complete control over it even when you're not nearby. Imagine having access to your home's appliances via a phone app. By employing lighting, air conditioners, freezers, and fans, you may reduce your energy costs. Internet-connected devices ensure security and higher living standards while enhancing our daily lives [4].

IoT Features:

Once your IoT devices have been purchased and configured, it's time to build the home automation features that initially.

Remote control: In the first place, all home automation equipment may be remotely managed via a smart phone application, whether it be to arm a security system for a neighbor, greet a visitor via a video doorbell, or turn on a light for an overnight guest who couldn't locate the switch themselves.

Voice assistants: The majority of Internet of Things (IoT) devices can be operated verbally via voice assistants, most notably Alexa and Google Assistant.

Schedules: Many IoT devices may be set on schedules in order to turn on and off continuously throughout the day. This is especially helpful for thermostats and smart lighting, which you could forget to change when you enter and leave your house every day.

Geofencing: You can have certain IoT gadgets switch on and off based on your position by connecting the GPS on your smart phone to them, which will make things much simpler. We didn't have to bother looking for our keys in our backpack because we had our doors unlocked anytime we were close by.

Home and away modes: While not all IoT devices support this, certain smart home items, such as lightbulbs, allow for the setting of home and away modes. Take into account the fact that many individuals leave their lights on all day to give the impression that they are at home, thereby deterring burglary. Even when you're at home, you generally don't leave all the lights on all the time, thus this is a bit impractical. When in away mode, the lights will alternately switch on and off at random, more closely simulating actual life. On the other hand, home mode may be readily accessed while you're at home and may have some gadgets turned on and others off, depending on your preferences.

Scenes: Scenes are collections of IoT devices that you may operate all at once rather than one by one. For instance, we have our living room's smart bulbs organized into a scene so we can dim them all at once.

Energy monitoring:

Do you want to know how much energy your IoT gadget is consuming in detail? You can see how much you're saving with energy monitoring in some lights and thermostats.

Sunrise and sunset mode:

You may have your lights synchronized with the start and end of the day, which is a function that is typically found on smart light bulbs and is excellent for preserving your circadian rhythm.

Shared access:

IoT devices often allow for many users to operate them. To do this, either everyone uses the same username and password to enter into the same app, or the user adds guests so that friends and family may create their own accounts. Make sure your IoT gadget can be operated by several individuals if you live with roommates or other family members

Triggers:

Depending on their compatibility, devices from the same brand or from other brands might trigger one another. For instance, Ring devices may naturally communicate with one another, such as when a security system activates an outside light.

IFTTT:

Having trouble connecting two devices using the app directly? IFTTT, or "If This Then That," is compatible with several gadgets. IFTTT enables the triggering of devices from several manufacturers; for instance, Wyze cameras can activate Arlo cameras with IFTTT even if the two businesses don't have a formal collaboration.

App:

Finally, it's critical that the app be user-friendly because each IoT device has a matching app that enables all of the aforementioned functions. Make careful to verify the app's current ratings from wherever you obtained it, since software upgrades sometimes result in improvements.

3. Internet of Things in Smart Farm House:

A "Smart Farm House" is a house or structure with wiring that has been expressly engineered to allow people to remotely program or manage a multitude of automated home electronics with a single command. For instance, a homeowner on vacation may use a Touchtone phone to activate a security system, set up a home theatre or entertainment system, regulate temperature gauges, turn on or off appliances, control lighting, and do many other tasks. [5].

Home automation, often known as "smart home technology," or demotics (from the Latin "domus," meaning "house"), enables homeowners to control smart devices and offers security, comfort, and energy efficiency. On a smartphone or other networked device, this is often accomplished using a smart home app [1].

As electronic technologies merge, the field of farm home automation is growing quickly. The farmhouse network includes technology for information, communications, entertainment, security, and convenience. In traditional Smart Farm House designs, a home gateway, which serves as a service provider for consumers, often controls every component in a farm house network. [5]. Users may control every other appliance and component from this server. All operational protocols for household appliances are already defined.

Figure-1 depicts a conventional configuration for a smart farm house design in which the home gateway links to other devices, server and controls other house equipment.

Figure- 1

Architecture of a Traditional Smart Farm House System

Peer-to-peer networks can be used by some devices and appliances, however they are only applicable to home devices that utilize the same protocols. As a result, a home gateway is activated to serve as the appliance service gateway, translating between various protocols.

X10, Insteon, Zigbee, home plug and Z-Wave are the different technologies that might provide communication within a Smart Farm House. Pico Electronics of Glenrothes, Scotland created X10 in 1975 to enable compatible goods to communicate with one another remotely through a home's already-existing electrical wiring. It is an open, global industry standard for electronic devices used in home automation, sometimes referred to as demotics. For signaling and control, it largely requires power line connections, and the signals used are radio frequency bursts that encode digital information. [6].

Some systems, like ZigBee and Z-Wave, employ radio waves to communicate between household appliances. These two radio networks, which employ mesh network topologies, are the most well-known. For the purpose of remotely controlling applications in residential and light business contexts, Z-Wave is a proprietary wireless communications protocol. Lighting, home access control, entertainment systems, and other household appliances are just a few examples of the home electronics systems and equipment that may be equipped with a low-power RF radio as part of this technology. [7].

ZigBee is a specification for a group of high-level communication protocols using portable, low-power digital radios and is based on the IEEE 802 standard for personal area networks. Applications for short-range wireless data transfer at reasonably modest rates include wireless light switches, electricity meters with in-home displays, and various consumer and industrial devices. In comparison to other WPANs, such as Bluetooth, the ZigBee specification's technology is meant to be easier to use and less costly. Radio-frequent (RF) applications needing a low data rate, high battery life, and secure networking are the ones ZigBee is designed for. Due to its preset rate of 250 kbps, ZigBee is most suitable for periodic or intermittent data transfer as well as a single signal from a sensor or input device [7].

The INSTEON system connects lighting switches and loads without the need for additional wire. In order to increase dependability by offering a backup system in the event of wireless interference, this dual-mesh network integrates wireless radio frequency (RF) technology with the existing electrical wiring in the home. It is a networking technology for home automation created by Smart Labs, Inc. It is intended to make it possible to network devices like switches, thermostats, motion sensors, etc. utilizing radio frequency (RF), power lines, or both. All INSTEON devices are peers, which mean they may all transmit, receive, and repeat any INSTEON protocol message without the need for a master controller or routing software and without the need for network management. [8].

All of the appliances and gadgets that are linked to the home network are receivers, and the remote controls and keypads that are used to operate the system are transmitters. It goes without saying that modern farm houses may make life simpler, more enjoyable, and more practical. You could gain confidence through networking at Farmhouse. Whether you are at home or abroad, the Smart Farm House will keep you informed of developments, and security systems may be fitted to be very useful in an emergency. The Smart Farm House, for instance, could activate a fire alarm, open doors, call the fire service, and light a worker's escape route.

Smart technologies may help farms conserve energy. Due to Z-Wave and ZigBee technology limitations, certain devices can "sleep" and awaken in response to commands. Electric expenditures are reduced when lights are automatically switched off when someone leaves a room and when rooms may be heated or cooled depending on who is there at any one time. One clever farmer said that his heating expenses were around one-third less than those of a normal home of a comparable size. Some devices can control appliances to use less energy by monitoring how much each one uses. [9].

When the chef went off, the Smart Farm House would take action by turning off the oven or turning off the water before a tub overflowed. It also makes it possible for adult children who could live elsewhere to help in caring for their elderly parent. People with impairments or restricted ranges of motion might get comparable advantages from automated devices that are simple to operate.

Figure-2 outlines some of the applications that a Smart Farm House can offer

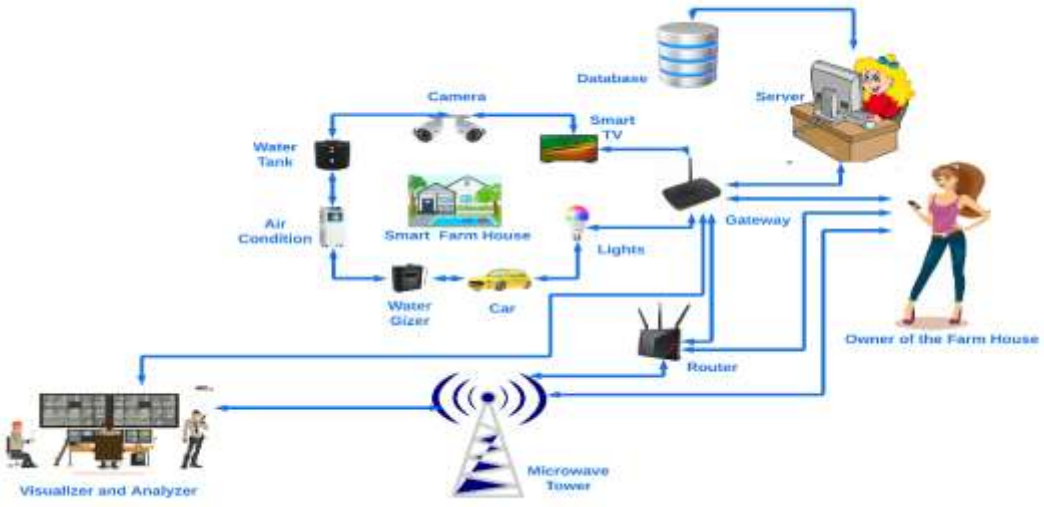

Figure- 2 Architecture of Smart Farm House

4. Proposed Architecture for Smart Farm Houses:

Based on the associated technologies and Smart Farm House systems that have been addressed, a Smart Farm House technology is the fusion of technology and services via home networking for the provision of a higher standard of life that is more relaxed. The focus of smart farm house technology has expanded to encompass ICT capabilities in addition to electrical equipment integration

within the farmhouse. In terms of various networks for work & productivity, entertainment, communication, and information that merge and are connected to the outside world through a home gateway, it becomes a house environment. It's worth is dependent not just on one system but also on how other systems are connected to one another and how they work together to interact.

The integration of the technologies of Wireless Sensor Networks and Mobile IP forms the foundation of the suggested design for the Smart Farm House. The provision of mobility using MIPv6 principles improves the conventional setup for smart farm house. Figure 3 depicts the scenario, in which a user can continue to use any linked farm house equipment or appliances even after switching to a different network. The user's smart phone is connected to a care-of-address that identifies his present position when the user leaves the farm home network and joins a foreign network.

4.1. Components of Internet of Things in Smart Farm House:

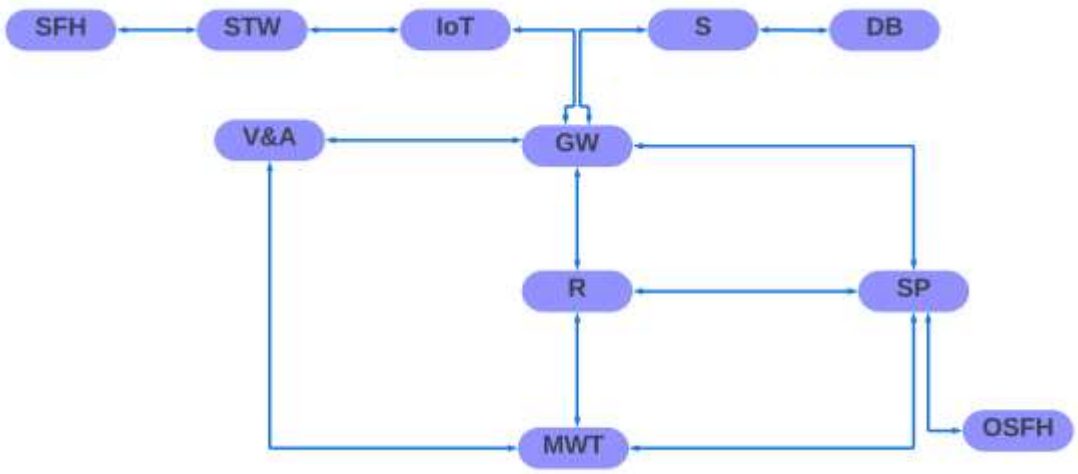

Figure -3 Components of Internet of Things in Smart Farm House

Following are the Components of Internet of Things in Smart Farm House:

1. Smart Farm House (SFH)
2. Internet of Things (IoT)
3. Sensors, Trackers, Wearables (STW)
4. Gateway (GW)
5. Database (DB)
6. Server (S)
7. Router (R)
8. Visualizer and Analyzer (V&A)
9. Microwave Tower (MWT)
10. Owner of The Smart Farm House (OSFH)
11. Smart Phone (SP)

The above mentioned components are here by connected with each other for the purpose of transferring data under the shadow of Internet of Things in Smart Farm House.

These components are discussed as under:

1. SFH has STW to develop IoT and is connected with S, DB, V&A, MWT, OSFH via GW and R.
2. S is directly connected to DB for the purpose to secure the data and on the other hand S is also connected to operate all the STW under IoT through GW
3. V&A is connected to STW through GW under IoT for SFH. It may communicate with S as well as OSFH via GW, R and SP. It is also connected MWT for secure broadcasting.
4. GW is here to provide the access to authorized concerns and is also here to make possible communication between all components of IoT in SFH.
5. OSFM is connected to SP, MWT, V&A, R, S, SFH and GW to access each and every component of IoT in SFH being the OSFH.
6. V&A are directly connected to MWT and other components for the purpose of security of components as well as personnel.
7. R is connected to MWT, SP and GW for routing and Secure Communication to the authorized ones.
8. All the components are connected through home network as well as to the internet via MWT through R and SP

9. This model is the combination of Traditional Architecture as well as Advance IoT in SFH.
10. The communications between all the components and stakeholder have to be secure in all aspects.

For the said purpose we will soon publish our efforts highlighted in this regards in our next paper.

4.2. Internet of Things in Smart Farm House Architecture Based on MIPv6:

When switching to a network with a different IP address, users of smart phone devices whose IP addresses are associated with one network can stay connected due to Mobile IPv6. The Mobile IP protocol is used by the foreign network to communicate with the home network of a care-of address to which all packets for the user's device should be forwarded when the user leaves the network with which his device is linked (home network) and enters the domain of the foreign network. Regardless of where it is now located in the home network, each mobile node is identifiable by its home address. A mobile node is assigned a care-of address that indicates its present position when it is not connected to its home network, and its home address is assigned to the local endpoint of a tunnel to its home agent. In wireless WAN scenarios, where users must transport their mobile devices across several LANs with various IP addresses, mobile IP is most frequently observed.

The Smart Farm House system will communicate with nodes (house appliances) and exchange smart farm house information using the common mobile IPv6 message formats. To guarantee that the home networked is controlled and maintained by the precise resident labour or farm house owner, the communication signals from the user will go through authentication methods similar to those used in the standard MIPv6 handover system.

The following services are limited to what the MIPv6-Based Smart Farm House system is capable of providing:

- Even when it's pitch black outside, cameras will monitor the exterior of your property.
- Instead of using the wall outlet to plug in your tabletop light, use a dimmer.
- A video door phone offers more than just a doorbell; it also lets you see who is at the door.
- Motion sensors can distinguish between robbers and dogs and will inform you if there is motion around your home.
- Instead of fumbling for home keys, door knobs may be opened with scanned fingerprints.
- Audio systems play music from your stereo in any room with speakers connected.
- Channel modulators enable any video signal to be viewed on every television in the home, whether it comes from a security camera or your preferred television program.
- The Smart Farm House apps are activated through remote controls, keypads, and tabletop controllers. Additionally, devices include internal web servers that let you access their data online [10].

4.3. The IoT and Smart Farm House Security Systems:

These days, there is a growing need for home security, and there are many different gadgets on the market that may assist you monitor your place of residence. IoT technologies vary in terms of their features and potential, though.

In terms of utility for keeping an eye on and safeguarding Smart Farm House, some of the gadgets are more valuable than others. In a word, IoT-enabled gadgets let you start cooking supper or conduct simple chores like turning on your geyser with just one button press. Home IoT gadgets unquestionably provide unmatched convenience. The key elements of IoT-enabled House Security Systems are listed below.

1. Smart Home Security:

People spend money on smart home security systems to upgrade and safeguard their residences. With these options, you have keyless access to your home and real-time updates on its security. Digital locks may need a pin or let you unlock your door with a smart phone.

2. Smart Locks and Alarms:

Smart locks allow you to remotely manage the front door and improve home security. To give access to users at a particular time, you may establish a timer. As an illustration, the eye Lock product acts as an iris-based authentication system to only permit access to approved personnel. Smart burglar alarms can also be operated by IoT-powered locks.

3. Smart Cameras:

You can use cameras to monitor your house by IoT. With the help of a smart security device from many things, you may utilize the cameras on smartphones and tablets without paying for them. These capabilities are transformed into advanced video monitoring cameras by its application, which also provides live streaming and motion detection. When suspicious or unexpected occurrences occur, the devices use the IFTTT protocol to send an email or SMS alert [11].

Without smart cameras, a home security system falls short of fulfilling its purpose. They serve as the virtual eyes of your home, enabling you to keep a watch on every activity both inside and outside the building in real time. Smart camera options abound, including wireless IP camera systems that can be accessed from any location with an internet connection. Door cameras or gate cameras can capture surveillance footage for observing the areas close to the entry gates [12].

4. Biometric Locks:

In daily life, biometrics is frequently utilized. In IoT-based smart security locks, the user can get access using fingerprint or facial recognition technology. These biometric locks might provide great safety for any area while eliminating the need for keys. [13].

5. Video Door Entry Systems:

Video door entry systems may help you benefit from the advantages of comfort and security by allowing your voice and face to be used for access management in your home. These choices for video surveillance are compatible with Siri, Google Home, and Amazon Alexa.

The benefits of interoperability are available to you because they work well together. These solutions allow you to monitor your house from a distance and even have video conversations with visitors [14].

6. IoT Motion Sensors:

One of the most common and important IoT farm home sensors is the motion sensor. This is due to the fact that they are useful and enhance security. IoT home devices that can detect movement include motion sensors. A motion sensor may detect motion using a variety of physical energies. While some versions employ microwave and ultrasonic signals, others use infrared heat. The security system for your farm house must include motion sensors. They have the ability to set off alerts to alert you to activity inside or around the house. These systems monitor vibrations and inputs in 2D and 3D, record them, and analyze them to detect unusual movement. Unrecognized movements may be detected using these IoT devices. It might then notify you of any unintentional motions it discovered. A motion sensor may be used to automate smart gadgets as well. For instance, some homeowners use them to turn on their lights automatically. By incorporating motion sensors into smart light bulbs, this is made possible. The sensors may signal the lights to turn on whenever they see movement. A motion sensor, as you might think, detects motion and movement in an area. These sensors maintain watch while you are away from home and can alert you to motion within your home as well as the opening or closing of your doors or windows. Motion sensors serve as an extra set of eyes for you, letting you know if anything unusual happens in your home, like a teenager sneaking out (or in), or if a youngster visits a room that's off-limits, like the medicine cabinet.

Motion sensors are a great energy-saving tool as well. These sensors might be linked to the thermostat or lights to help regulate energy use in an area based on occupancy. For instance, the lights will be turned off and the thermostat will be adjusted to a more energy-efficient setting if no one is there. [15].

Additionally to alerting you when a motion sensor has been tripped, motion sensors may be linked to video so that you can also record video to document the incursion. A multi-sensor is a gadget that combines numerous sensors. Motion, temperature, light, humidity, vibration, and UV are a few of the combined capabilities. Motion sensors differ greatly from one another [16].

7. IoT Heat/Fire/ Carbon Monoxide Detectors:

Heat sensors and other IoT farm house sensors can also be used to stop destructive fires from starting. Heat sensors pick up on excessive heat in the backdrop. Overheating may be a sign that a fire is starting. It recognizes high heat and subsequently sounds an alarm to warn you of a fire. Heat detectors may be combined with sprinklers much like smoke detectors can. So when it notices too much heat, it might alert the sprinklers. The smoke sensor and heat detector together would be an effective duo for putting out flames [17].

Property damage is most frequently caused by fire, by far. There are a number of pollutants that can endanger the environment and air quality in our homes, all of which have the potential to cause property damage and injury to the occupants. For years, the basic fire detector has been beeping away at the first hint of smoke in the house. A carbon monoxide detector monitors the amount of CO in the air and alerts users if the level is unsafe. A CO detector can save a life because it is odorless and impossible to detect without help. This is especially true if it is connected to an emergency monitoring service. In addition to detecting smoke and CO, some modern sensors can also keep an eye on your farm house overall air quality and look for contaminants including dust, soot, pollen, temperature, humidity, air staleness, pollution, and particles as discussed above. The savings insurance companies provide when you employ these sensors are even more alluring [18].

Carbon monoxide kills without being heard. It has no flavor and no color. Before you ever realized it, you had been poisoned. Every year, carbon monoxide poisoning sends about 50,000 patients to the emergency department in the United States. In addition, carbon monoxide poisoning claims the lives of about 400 Americans each year. The Centers for Disease Control and Prevention provided these figures. The human senses are incapable of detecting carbon monoxide since it has no smell and no colour. The carbon monoxide detector is created as a result. When it detects a significant amount of carbon monoxide, this gadget sounds an alert. The garage is the perfect location for this instrument. This is due to the fact that combustion in automobiles frequently produces carbon monoxide [19].

8. Smart Thermostat:

With the help of the smart thermostat, you can manage the heating and cooling in your farm house from anywhere. Smart thermostats are nice, but they may also save you money by keeping an eye on the humidity and temperature inside and outside of your farm house. Your farm house temperature fluctuates as you come and go, and a smart thermostat can vary the temperature based on how you behave and how the rooms are used. The best thermostats allow you to keep the room at the temperature you desire while you are there and can automatically switch to an energy-saving mode when no one is around. They adjust the temperature in each room separately. An intelligent house that understands you and your preferences for temperature is possible thanks to the application of cognitive technologies to these sensors [20].

These gadgets are crucial, especially in modern residences in the country's coldest regions. Thermostats are tools that enable you to gauge the interior temperature in your house. By doing this, you may adjust your heater to the temperature you desire.

Some thermostat models are quite accurate. This enables you to adjust your heater to the desired temperature precisely. Overuse of energy would be prevented by doing this.

A few of these IoT home sensor types also have an application. By doing this, you could hear your home even if you were outdoors. So, after leaving the chilly outside, you might return to a warm house [21].

9. Connected switches:

Another essential component of smart farm house security solutions is smart switches. Smartphones, iPads, Siri, Google Home, and Amazon Echo may all be used to operate them. Through the gadgets, you can easily manage the lights, drapes, and electrical appliances to provide ease and enhance your experience [22].

10. Management Panels:

Smart tablets may be configured to manage IoT-connected devices. By providing data from linked devices, they aid in managing home security. You may see recorded video and manage the operation of all Internet of Things (IoT) devices, including lighting, heating, and door entry systems [23].

11. Leak/Moisture Detection:

Water and ice damage are the second most prevalent causes of farm home insurance claims. Nobody enjoys getting the dreaded call informing them that their house is leaking water directly onto the flat below them. Your ice maker's water line burst, and for the past 24 hours, water has been pouring continuously. This incident was quite expensive.

If your property is in danger from frozen pipes or even a burst waterline, a moisture detection sensor can alert you. These sensors notify you when there are leaks in your house so you may address the issue before any harm is done. The sensor may be installed next to appliances that could leak water, including sump pumps, dishwashers, refrigerators, sinks, and water heaters. You will receive a message if the sensor finds any unwanted water, allowing you to quickly return home and investigate the issue [24].

12. Window & Door Open and Close:

Door and window sensors may even switch lights on and off as doors are opened and closed, alerting you when people arrive and leave your home. Your first line of defense against farm house invasions should be door and window sensors; some of these devices can even tell when a window has been smashed. These sensors warn you of prospective intruders as well as a rebellious adolescent. Once more, wireless technology enables you to get alerts directly on your phone or tablet and to swiftly contact for assistance if necessary [25].

13. Video Doorbell:

The video doorbell doubles as a theft-prevention device. You can check who is at your door from your smartphone with this amazing gizmo. Whether you want to check who is at the door when you are inside alone or whether someone is at your house while you are at work. You'll be aware. When you combine this with the door open/close sensor, burglars won't bother trying to get in to your farm house. Although Ring was one of the first video doorbells on the market, there are now a number of excellent alternatives [26].

14. Passive Infrared:

Checks for body heat (infrared energy). For farm house security, these sensors are the most often utilized. They build a defensive grid by sensing heat and movement, if a moving item blocks many grid zones and the infrared energy levels change, the sensors trip [27].

15. Microwaves :

To measure the reflection off moving objects, the sensor fires out microwave pulses. Although MW sensors are more costly and susceptible to electrical interference than infrared sensors, they cover a larger region.

16. Area Reflective Type:

It is an LED that produces infrared light. The sensor determines the distance to the person or item and determines if the object is inside the predetermined region using the reflection of those rays.

17. Smart Garage Door:

You have more peace of mind thanks to the smart garage door that is wifi linked. Never wonder if you left the garage door open is a simple yet effective notion. Anywhere in the world, you can use your phone to open and close your garage door [28].

18. Intercom/Hub:

Your smart home now has to be managed from a single place thanks to the sensors you installed. With the touch of a button, you may call for services, whether they are emergency or maintenance, and have access to all of your smart home sensors and a communication system throughout the house. An intercom system that allows you to see through walls lets you converse visually and acoustically across rooms in the house. While you are gone at work, you may use your smartphone to contact a room in your house. This function is helpful for monitoring an elderly parent while you are away.

As you can see, there are a wide range of sensors that might enable you to build a secure, intelligent house that is monitored even while you are away. The use of technology is rising quickly, and insurance companies are even beginning to reward it. Because they want you and your house to be secure, several insurance companies are starting to offer services to assist you in making your home smart and proactive in protecting you and your finances. [29].

4.2. Prerequisites, Benefits, Advantages and Disadvantages for Smart Farm House:

Prerequisites: [30], [1].

- Managing all of your house devices from one place.
- Flexibility for new devices and new devices appliances.
- Maximizing homes securities.
- Remote controls of our home functions.
- Improving appliances functionalities.
- Home managements insights.
- Increased energy efficiency. Etc.

Benefits:

New business prospects come from the capacity to leverage network data and advanced analytics to find business insights and opportunities.

- Improved ability to forecast and take action.
- Quick reaction.
- New sources of income.
- Enhance operation process controls.
- An increase in output.
- Forecasting analysis. Etc.

Advantages for Smart Farm House:

• Boost customer interactions.
• Innovative tools and applications for advances.
• Technology improvements.
• Decreased waste.
• AI-related tools.
• Improved data gathering. Etc.

Disadvantages for Smart Farm House:

- Technology Learning Curve.
- Security and Privacy.
- Sedentary Lifestyle.
- Costly. Etc.

5. Conclusion:

With the fast advancement of the digital era in which we live, smart homes that rely on the Internet of things have started to emerge and grow in recent years. It saves time and work for homeowners while also providing comfort. As a result, several security difficulties manifest. In this study, the vulnerabilities that can be exploited are outlined with an emphasis on the security of smart homes and the privacy of persons. The security and hazards encountered by smart homes were examined through a study of several earlier researches on the subject. Comparing the systems used to manage smart homes and discussing what has been accomplished in the area in this regard. The creation of an automated smart house operating system utilizing contemporary technology has been the subject of several studies with the goal of achieving the security and privacy requirements in smart homes. This study showed how picking a system that satisfies security standards and enables researchers to conduct numerous tests on smart home technologies may be advantageous to anybody who wants to build a smart home. Just as Rome couldn't be built in a day, your house couldn't be automated in one. As an alternative, you might build up your home automation system gradually. There is virtually no limit to what you can automate, making your life safer and more convenient than ever before, thanks to the abundance of new Internet of Things (IoT) devices that are being released on the market every day. In order to provide mobility, improved communications, and connectivity for house networking that may result in effective, dependable, and emergent services a farm house networking could deliver the usage of Mobile IPv6 with the Smart Farm House Systems is optimal. As he departs his farm house, the suggested design may offer a smooth convergence for communication between people and the tools and equipment there. Since the system is configured with IP addresses recognized with appropriate authentications, the user can have autonomous control of the farmhouse gadgets and equipment even if the owner of the farm house moves location or network provider.

References:

[1]. Kumar, V. and Chawda, R.K. (2020) “A research paper on Smart Home,” *International Journal of Engineering Applied Sciences and Technology*, 5(3), pp. 530–532. Available at: https://doi.org/10.33564/ijeast.2020.v05i03.088.

[2]. Almusaylim, Z.A. and Zaman, N. (2018) “A review on Smart Home Present State and challenges: Linked to context-awareness internet of things (IOT),” *Wireless Networks*, 25(6), pp. 3193–3204. Available at: https://doi.org/10.1007/s11276-018-1712-5.

[3]. Brous, P., Janssen, M. and Herder, P. (2020) "The dual effects of the internet of things (IOT): A systematic review of the benefits and risks of IOT adoption by organizations," *International Journal of Information Management*, 51, p. 101952. Available at: https://doi.org/10.1016/j.ijinfomgt.2019.05.008.

[4]. Singh, H. *et al.* (2018) "IOT based smart home automation system using sensor node," *2018 4th International Conference on Recent Advances in Information Technology (RAIT)* [Preprint]. Available at: https://doi.org/10.1109/rait.2018.8389037.

[5]. Caytiles, R.D. and Park, B. (1970) *[PDF] Mobile IP-based architecture for Smart Homes: Semantic scholar, undefined*. Available at: https://www.semanticscholar.org/paper/Mobile-IP-Based-Architecture-for-Smart-Homes-Caytiles-Park/5f7ddf654948e5d98b2ad6f7c9a5b44372e76d3e (Accessed: November 16, 2022).

[6]. *Communication through power lines X-10 protocol [BS program] [+CD ...* (no date). Available at: https://lrc.umt.edu.pk/cgi-bin/koha/opac-search.pl?q=au:%22Amir%20Niaz%2C%20Muhammad%22 (Accessed: November 16, 2022).

[7]. Yassein, M.B., Mardini, W. and Khalil, A. (2016) "Smart Homes Automation using Z-wave protocol," *2016 International Conference on Engineering & MIS (ICEMIS)* [Preprint]. Available at: https://doi.org/10.1109/icemis.2016.7745306.

[8]. Withanage, C. *et al.* (2014) "A comparison of the popular home Automation Technologies," *2014 IEEE Innovative Smart Grid Technologies - Asia (ISGT ASIA)* [Preprint]. Available at: https://doi.org/10.1109/isgt-asia.2014.6873860.

[9]. Danbatta, S.J. and Varol, A. (2019) "Comparison of zigbee, Z-wave, wi-fi, and bluetooth wireless technologies used in home automation," *2019 7th International Symposium on Digital Forensics and Security (ISDFS)* [Preprint]. Available at: https://doi.org/10.1109/isdfs.2019.8757472.

[10]. Alaa, M. *et al.* (2017) "A review of smart home applications based on internet of things," *Journal of Network and Computer Applications*, 97, pp. 48–65. Available at: https://doi.org/10.1016/j.jnca.2017.08.017.

[11]. Alam, M.R., Reaz, M.B. and Ali, M.A. (2012) "A review of Smart Homes—past, present, and future," *IEEE Transactions on Systems, Man, and Cybernetics, Part C (Applications and Reviews)*, 42(6), pp. 1190–1203. Available at: https://doi.org/10.1109/tsmcc.2012.2189204.

[12]. Mi, X. *et al.* (2017) "An empirical characterization of IFTTT," *Proceedings of the 2017 Internet Measurement Conference* [Preprint]. Available at: https://doi.org/10.1145/3131365.3131369.

[13]. Ishak, Z. *et al.* (2020) "Secure biometric lock system for files and applications: A Review," *2020 16th IEEE International Colloquium on Signal Processing & Its Applications (CSPA)* [Preprint]. Available at: https://doi.org/10.1109/cspa48992.2020.9068689.

[14]. Li, M. *et al.* (2018) "Smart home: Architecture, technologies and systems," *Procedia Computer Science*, 131, pp. 393–400. Available at: https://doi.org/10.1016/j.procs.2018.04.219.

[15]. Hossein Motlagh, N. *et al.* (2020) "Internet of things (IOT) and the Energy Sector," *Energies*, 13(2), p. 494. Available at: https://doi.org/10.3390/en13020494.

[16]. *Ultrasonic and passive infrared sensor integration for dual technology ...* (no date). Available at: https://www.egr.msu.edu/classes/ece480/capstone/fall09/group05/docs/ece480_dt5_application_note_lhodges.pdf (Accessed: November 16, 2022).

[17]. Saeed, F. *et al.* (2018) "IOT-based intelligent modeling of Smart Home Environment for Fire Prevention and Safety," *Journal of Sensor and Actuator Networks*, 7(1), p. 11. Available at: https://doi.org/10.3390/jsan7010011.

[18]. Hsu, W.-L. *et al.* (2019) "Application of IOT in the prevention of carbon monoxide poisoning," *Sensors and Materials*, 31(11), p. 3465. Available at: https://doi.org/10.18494/sam.2019.2482.

[19]. Rose, J.J. *et al.* (2017) "Carbon monoxide poisoning: Pathogenesis, management, and future directions of therapy," *American Journal of Respiratory and Critical Care Medicine*, 195(5), pp. 596–606. Available at: https://doi.org/10.1164/rccm.201606-1275ci.

[20]. Rahaman, A. *et al.* (2019) "Developing IOT based Smart Health Monitoring Systems: A Review," *Revue d'Intelligence Artificielle*, 33(6), pp. 435–440. Available at: https://doi.org/10.18280/ria.330605.

[21]. Ullo, S.L. and Sinha, G.R. (2020) "Advances in smart environment monitoring systems using IOT and sensors," *Sensors*, 20(11), p. 3113. Available at: https://doi.org/10.3390/s20113113.

[22]. Hamdan, O. *et al.* (2019) "IOT-based interactive dual mode Smart Home Automation," *2019 IEEE International Conference on Consumer Electronics (ICCE)* [Preprint]. Available at: https://doi.org/10.1109/icce.2019.8661935.

[23]. Risteska Stojkoska, B.L. and Trivodaliev, K.V. (2017) "A review of internet of things for smart home: Challenges and solutions," *Journal of Cleaner Production*, 140, pp. 1454–1464. Available at: https://doi.org/10.1016/j.jclepro.2016.10.006.

[24]. Clerckx, B. *et al.* (2022) "Foundations of Wireless Information and Power Transfer: Theory, prototypes, and experiments," *Proceedings of the IEEE*, 110(1), pp. 8–30. Available at: https://doi.org/10.1109/jproc.2021.3132369.

[25]. Jose, A.C. and Malekian, R. (2017) "Improving smart home security: Integrating logical sensing into smart home," *IEEE Sensors Journal*, 17(13), pp. 4269–4286. Available at: https://doi.org/10.1109/jsen.2017.2705045.

[26]. Zheng, S. *et al.* (2018) "User perceptions of smart home iot privacy," *Proceedings of the ACM on Human-Computer Interaction*, 2(CSCW), pp. 1–20. Available at: https://doi.org/10.1145/3274469.

[27]. Mukhopadhyay, B., Srirangarajan, S. and Kar, S. (2018) "Modeling the analog response of passive infrared sensor," *Sensors and Actuators A: Physical*, 279, pp. 65–74. Available at: https://doi.org/10.1016/j.sna.2018.05.002.

[28]. Mohamed Ariff, M.I. *et al.* (2022) "Design and development of a smart garage door system," *2022 IEEE International IOT, Electronics and Mechatronics Conference (IEMTRONICS)* [Preprint]. Available at: https://doi.org/10.1109/iemtronics55184.2022.9795768.

[29]. Al-Mamun, G.M.S.U. and Faruk, A.O. (no date) *Analysis of sensors used to make smart homes*, *LC International Journal of STEM (ISSN: 2708-7123)*. Available at: https://lcjstem.com/index.php/jstem/article/view/86 (Accessed: November 17, 2022).

[30]. Bhandari, R. and Darshan, P. (2019) "Survey on IOT based Home Automation," *International Journal of Computer Applications*, 177(11), pp. 34–38. Available at: https://doi.org/10.5120/ijca2019919529.