

# Designing a Smart Farmhouse System using IoT Architecture

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*Abstract-The Internet of Things (IoT) has had a significant impact on our environment, with devices like smart watches, laptops, mobile phones, and sensor devices being ubiquitous. Home automation enables the self-contained control of electronic devices in the home, allowing for remote management through internet connectivity. Smart farmhouse technology, which leverages IoT to integrate technology and services for a higher standard of living, has recently become popular. In this paper, we review current advancements in smart farmhouse automation technologies and explore their potential integration with smart farmhouse systems. We examine how IoT affects farmhouse automation, the dangers that an IoT smart farm house must avoid, and the top smart farm home security gadgets that you need to be aware of. We also discuss the use of internet and intranet technologies to secure and access farmhouse networks from a distance through smartphones, as well as the role of smart farm house automation in managing farm house features, appliances, and activities.*

*Keywords: Smart Farmhouse, Smart Phone, Internet of Things, Sensors, Security*

## 1. Introduction

The rapid advancements in information technology have changed the way individuals relax at their farm homes. These farm homes also serve as the foundation for income generation as they contain a variety of pets and animals used for breeding and production. As a result of IoT's widespread citation as a way to make smart homes less stressful, there has been a lot of attention paid to research papers. The smart home is a crucial aspect of modern living and employs secure applications and equipment. It is a component of IoT cloud computing systems [1].

These technological advancements have heralded the era of ubiquitous computing where machines do all the labor. The creation of the Smart Farmhouse was motivated by societal changes as well as the desire to assist and support the elderly and disabled. Everyone is interested in ways to improve the lives of the elderly and disabled. The quality of life can 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 Farmhouse." The farm house's equipment and appliances are all connected so that 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 smart farm home appliances and equipment. A farmhouse network may serve many various applications, such as ventilation systems, entertainment systems, lighting systems, and security

systems. Smart farmhouses provide a variety of advantages that a traditional dwelling cannot. As an illustration, chains and padlocks are necessary in a traditional farmhouse to deter trespassers from entering the property. The occupants of a Smart Farmhouse may even recognize and converse with visitors without moving an inch due to the smart farm house security system.

The concepts of smart farmhouse 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 Farmhouse 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 [2]. For a more sophisticated mobility solution, the concepts of smart phones are employed.

The Smart Farm House concept offers numerous advantages to farmers, the elderly, and the disabled, and its integration with modern technology offers even more possibilities. This paper aims to explore the integration of technology and services through home networking for the creation of a Smart Farmhouse.

## 2. The Internet of Things

The Internet of Things (IoT) refers to the network of physical devices, vehicles, home appliances, and other items embedded with sensors, software, and network connectivity. The IoT enables these devices to collect and exchange data, creating a connected ecosystem of devices that can communicate with each other and with humans.

## 3. Advantages of IoT

The Internet of Things (IoT) provides numerous advantages, including the ability to leverage network data and advanced analytics to identify business insights and opportunities, leading to new business prospects. Other advantages include:

- Improved ability to forecast and take action quickly, leading to new revenue sources.
- Enhanced productivity and operational control through IoT sensors and monitoring.
- Predictive analysis to anticipate and prevent potential issues.
- Reduction of errors made by humans.
- Smart home technology provides convenience and control over various physical items.
- Energy savings using IoT-connected appliances and devices.
- Enhanced security and improved living standards through internet-connected devices.

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

## 4. IoT and Smart Home Automation

The integration of Internet of Things (IoT) technology with smart home automation has revolutionized the way we live. With internet-connected devices, we can control and monitor our homes remotely, enhancing our daily lives in various ways. Some advantages of IoT and smart home automation include:

- **Improved comfort and convenience:** Using IoT-enabled devices, we can automate tasks such as setting the ideal temperature, making coffee, and turning off lights. This enhances our daily lives by providing more convenience and comfort.
- **Energy efficiency:** By using smart devices like lighting, air conditioners, and fans, we can reduce energy costs and increase energy efficiency. This is achieved by controlling the devices remotely, turning them off when not in use, or scheduling them to operate only when needed.
- **Enhanced security:** IoT-enabled security systems can detect and alert homeowners of potential threats, including burglaries, fires, and gas leaks. Smart locks and cameras can also be used to monitor and secure the property remotely.
- **Better health and wellness:** IoT-enabled devices can monitor our health and wellness, reminding us to take medications or track our physical activity. Smart home technology can also promote better sleep quality by controlling the room temperature and lighting.
- **Improved accessibility:** For people with disabilities or the elderly, smart home automation can provide greater accessibility and independence. IoT-enabled devices can assist with daily living activities, such as turning on lights or adjusting the thermostat, without requiring physical effort.

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Overall, IoT and smart home automation provide numerous benefits that enhance our daily lives, promote energy efficiency, and ensure security and accessibility.

### 5. IoT Features

After purchasing and configuring IoT devices, the next step is to explore the various home automation features they offer. Some of the key features are:

- **Remote control:** With a smart phone application, all home automation equipment can be remotely controlled. For instance, one can 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:** Most IoT devices can be operated verbally via voice assistants such as Alexa and Google Assistant.
- **Schedules:** Many IoT devices allow for scheduling to turn on and off throughout the day. This is especially helpful for thermostats and smart lighting that need to be adjusted according to the time of the day.
- **Geofencing:** IoT devices can be connected to the GPS on your smart phone, and certain gadgets can switch on and off based on your location. This eliminates the need for fumbling around for keys and makes life simpler.
- **Home and away modes:** Certain IoT devices, such as lightbulbs, allow for the setting of home and away modes. This feature is useful for deterring burglary and conserving energy. When in away mode, the lights will alternately switch on and off at random to simulate actual life.
- **Scenes:** Scenes are collections of IoT devices that can be operated all at once. For instance, you can organize your living room's smart bulbs into a scene so you can dim them all at once.
- **Energy monitoring:** Some lights and thermostats come with energy monitoring features, which allow you to keep track of how much energy your IoT gadget is consuming.
- **Sunrise and sunset mode:** Some smart light bulbs offer a feature that synchronizes with the start and end of the day. This is excellent for preserving your circadian rhythm.
- **Shared access:** IoT devices often allow for multiple users to operate them. This can be achieved either by sharing a single username and password, or by creating multiple accounts for friends and family.
- **Triggers:** Depending on their compatibility, devices from the same brand or from other brands might trigger one another. For instance, Ring devices can naturally communicate with each other, such as when a security system activates an outside light.
- **IFTTT:** IFTTT is a compatibility tool that enables devices from several manufacturers to work together. For instance, Wyze cameras can activate Arlo cameras with IFTTT even if the two businesses don't have a formal collaboration.

It is also important to note that each IoT device comes with a corresponding app that enables all the above functions. Therefore, it is critical that the app is user-friendly and frequently updated.

### 6. Smart Farmhouse

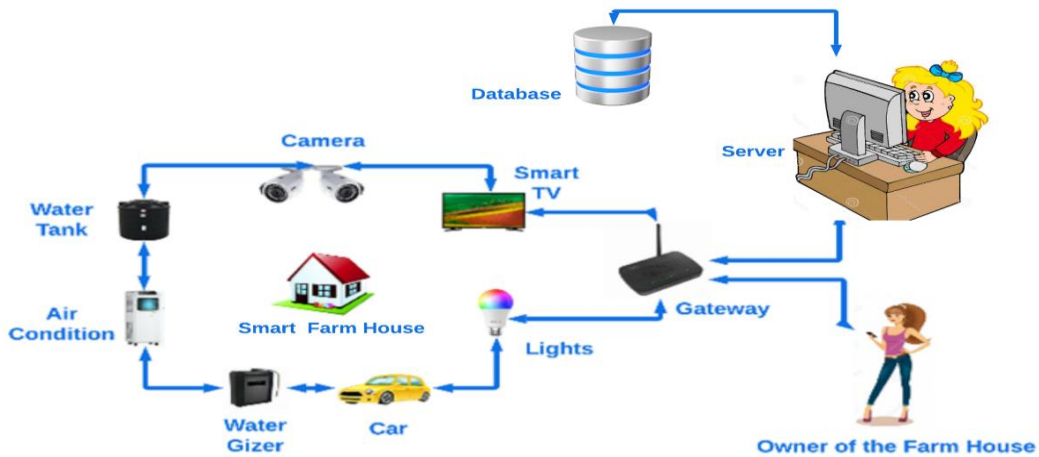
A "Smart Farmhouse" is a house or structure with wiring that has been expressly engineered to allow people to remotely program or manage a multitude of automated home electronics with a single command. For instance, a homeowner on vacation may use a Touchtone phone to activate a security system, set 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 Farmhouse 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 farmhouse design in which the home gateway links to other devices, server and controls other house equipment.



**Figure-1 Architecture of a Traditional Smart Farmhouse 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 Farmhouse. 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].

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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 means 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 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 farmhouses 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 Farmhouse will keep you informed of developments, and security systems may be fitted to be very useful in an emergency. The Smart Farmhouse, 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 energy each one uses. [9].

When the chef went off, the Smart Farmhouse 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 parents. People with impairments or restricted ranges of motion might get comparable advantages from automated devices that are simple to operate.

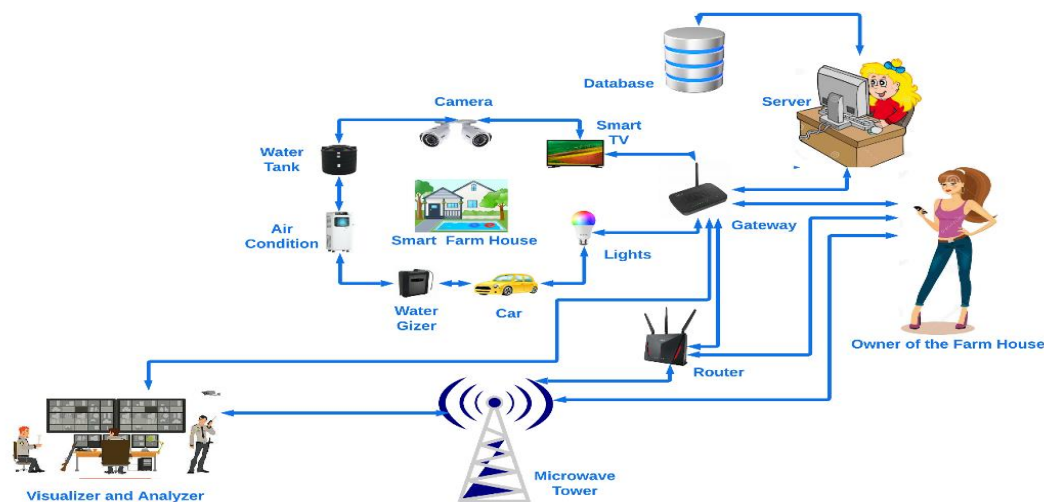


Figure-2 Architecture of Advanced Smart Farmhouse

### 7. Proposed Architecture for IoT enabled Smart Farmhouses

Based on the associated technologies and Smart Farmhouse systems that have been addressed, Smart Farmhouse 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 Farmhouse. The provision of mobility using MIPv6 principles improves the conventional setup for smart farmhouses. Figure 3 depicts the scenario, in which a user can continue to use any linked farmhouse 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.

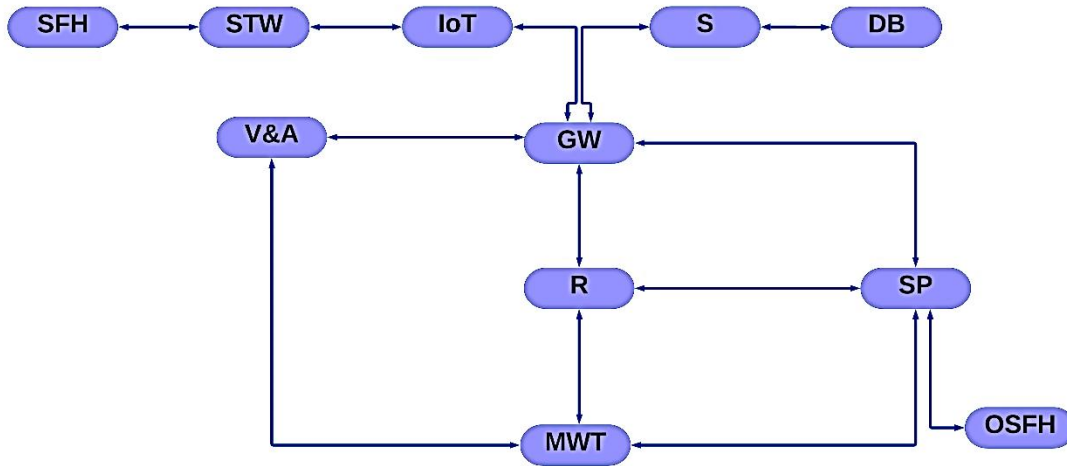


Figure-3 Components of Internet of Things in Smart Farmhouse

Internet of Things (IoT) is a system of interconnected devices that exchange data and information. In Smart Farmhouses (SFH), IoT is implemented by incorporating various components that work together to create a network of automated devices. These devices are controlled remotely through smartphones or other devices, making life easier and more convenient for the homeowner.

### 7.1. Components of proposed Architecture

The following components are typically included in an IoT-based Smart Farmhouse:

- **Smart Farmhouse (SFH):** The physical structure or house equipped with IoT devices.
- **Internet of Things (IoT):** The technology that enables communication between devices in the SFH.
- **Sensors, Trackers, Wearables (STW):** These devices collect data from the environment, animals, and crops. They may include temperature sensors, humidity sensors, moisture sensors, and GPS trackers.
- **Gateway (GW):** The gateway is the interface between the SFH and the cloud. It enables the devices in the SFH to communicate with other devices or systems outside the SFH.
- **Database (DB):** The database stores all the data collected by the sensors and trackers. It is used for analysis and decision-making.
- **Server (S):** The server manages the SFH and the IoT devices. It receives and processes data from the sensors and trackers.

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- **Router (R):** The router connects the SFH to the internet. It enables remote access to the SFH and its devices.
- **Visualizer and Analyzer (V&A):** The visualizer and analyzer software allows the owner to view the data collected by the sensors and trackers. It also provides analytics and visualization of the data.
- **Microwave Tower (MWT):** The microwave tower provides high-speed internet connectivity to the SFH.
- **Owner of The Smart Farmhouse (OSFH):** The owner of the SFH is the user of the IoT-based system.
- **Smart Phone (SP):** The smartphone is the device that the owner uses to control and monitor the SFH and its devices.

### 7.2. Interaction of components

The above-mentioned components work together to create a seamless network of IoT devices in the Smart Farmhouse. The working of these components is discussed below:

- The SFH is equipped with STW sensors to develop IoT, which is connected to the S, DB, V&A, MWT, OSFH via GW and R.
- S is directly connected to DB to secure the data and operates all the STW devices under IoT through GW.
- V&A is connected to STW through GW under IoT for SFH. It can communicate with S as well as OSFH via GW, R, and SP. It is also directly connected to MWT for secure broadcasting.
- GW provides authorized access and enables communication between all components of IoT in SFH.
- OSFH is connected to SP, MWT, V&A, R, S, SFH, and GW to access each component of IoT in SFH.
- V&A is directly connected to MWT and other components for the security of components as well as personnel.
- R is connected to MWT, SP, and GW for routing and secure communication to authorized parties.
- All components are connected through home network and to the internet via MWT through R and SP.
- This model combines Traditional Architecture with Advanced IoT in SFH.
- Communications between all components and stakeholders must be secure in all aspects.

### 7.3. Use of Mobile IPv6

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 Farmhouse 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 network is controlled and maintained by the precise resident labor or farmhouse owner, the communication signals from the user will go through authentication methods similar to those used in the standard MIPv6 handover system.

The MIPv6-Based Smart Farmhouse system has the following advantages over traditional smart farmhouses.

- Exterior property surveillance with cameras even in complete darkness.
- Dimmer usage for tabletop lights instead of traditional wall outlets.
- A video door phone with the added feature of displaying the visitor at the door.
- Motion sensors to detect and distinguish between human and animal movements and alert homeowners accordingly.
- Fingerprint scanning to open door locks without the need for keys.
- Audio systems that can play music through connected speakers in any room.
- Channel modulators that allow viewing of any video signal on all TVs in the house, including security cameras and TV programs.
- Smart Farmhouse apps accessible through remote controls, keypads, and tabletop controllers with devices equipped with internal web servers for online data access [10].

#### 7.4. Security Systems of the proposed Architecture

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.

- **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.
- **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.
- **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].
- **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].
- **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].
- **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.



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While some versions employ microwave and ultrasonic signals, others use infrared heat. The security system for your farmhouse 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].

- **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 color. 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 because combustion in automobiles frequently produces carbon monoxide [19].

- **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 farmhouse. Your farmhouse 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].

- **Connected switches:** Another essential component of smart farmhouse 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].
- **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].
- **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].

- **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 farmhouse 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].
- **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 into your farm house. Although Ring was one of the first video doorbells on the market, there are now several excellent alternatives [26].
- **Passive Infrared:** Checks for body heat (infrared energy). For farmhouse 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].
- **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.

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- **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.
- **Smart Garage Door:** You have more peace of mind thanks to the smart garage door that is Wi-Fi 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].
- **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].

### 8. 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 farmhouse networking could deliver the usage of Mobile IPv6 with the Smart Farm House Systems is optimal. As he departs his farmhouse, 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 farmhouse moves location or network provider.

### 9. References

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