

Vulnerabilities	Obstacles
1. Insert web interface	<ul style="list-style-type: none"> • Default authorization. • Account lockout method is absent. • SQLi, CSRF, XSS vulnerabilities.
2. Inadequate Authorization/Authentication	<ul style="list-style-type: none"> • Untrustworthy password recovery technology. • Weak password. • There is no two-factor authentication..
3. Insecure Network Services	<ul style="list-style-type: none"> • Vulnerabilities of denial of service attack. • Exports ports via UPnP. • Unwanted ports are open.
4. Integrity Verification and Encryption of Transport are lacking	<ul style="list-style-type: none"> • Use of propriety encryption protocol. • Absence of SSL/TLS are not properly configured. • Sensitive and confidential information are not unencrypted.
5. Concerns About Privacy	<ul style="list-style-type: none"> • A large amount of personal information is collected. • The collected information is not properly protected and managed. • The end user is not given the option to allow the collection of specific types of data..
6. Insecure Cloud Interface	<ul style="list-style-type: none"> • Absence of two factor authentication. • There was no examination of interfaces for security flaws. • The presence of insecure passwords.
7. Insecure Mobile Interface	<ul style="list-style-type: none"> • The presence of insecure passwords. • The lack of two-factor authentication. • The lack of an account lockout method.
8. Inadequate Software/Firmware	<ul style="list-style-type: none"> • The lack of encryption options. • There are no password security options. • There are no options for enabling security logging.

Table.1: IoT related Vulnerabilities

Table.2 Suggested solution for lot related Vulnerability

Vulnerabilities	Solutions
1. Insert web interface	<ul style="list-style-type: none"> • Allow the default credentials to be changed. • Turn on the account lockout mechanism. • Evaluate web applications on a regular basis.
2. Insufficient Authentication/ Authorization	<ul style="list-style-type: none"> • Implement a safe password recovery system. • Use a complex and strong password. • Turn on two-factor authentication.
3. Insecure Network Services	<ul style="list-style-type: none"> • Close any unused network ports. • Disable UPnP. • Check for vulnerabilities in internet services.
4. Integrity Verification and Transport Encryption are lacking	<ul style="list-style-type: none"> • Encrypt end-to-end communication. • Maintain SSL/TLS implementations. • It is not necessary to use proprietary encryption solutions.
5. Privacy Concerns	<ul style="list-style-type: none"> • Reduce data collection. • Anonymize the information gathered. • Allow end users to choose which data is collected.
6. Insecure Cloud Interface	<ul style="list-style-type: none"> • Use complex and strong password. • Carry out an evaluation of all cloud interfaces. • Allow Two-factor authentication.
7. Insecure Mobile Interface	<ul style="list-style-type: none"> • Use strong and complex password. • Allow account lockout mechanism. • Enable Two-factor authentication.

8. Insufficient Software/Firmware	<ul style="list-style-type: none">• Enable security logging mechanism.• Allow the selection of encryption options.• Notify and users regarding security alerts.
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Table.3: Application areas of Internet of Things

Service Sectors	Application Groups	Locations	Devices
Apartment blocks	Institutional/ advertisements	Education, Retail, Hospitality, and Healthcare	HVAC, Transportation, Fire & Protection, Lighting, Security, Access, and so on.
	Manufacturing	Process, Clean Room, Campus	
Energy	Demand/Supply	Energy Production, Transmission and Distribution Low Current, and Voltage Stability	Turbine generators, wind turbines, UPS, battery packs, generators, metres, drill bits, fuel cells, and so on.
	Alternative	Co-generation, Solar wind, Electrochemical	
	Gas/Oil	Derricks, Rigs, Heads, Pumping systems, and Transmission lines	
Health and Customers	Infrastructure	Installing, network connectivity, and energy management	Power Systems, MID, e-Readers, Dishwashers, Desktop Computers, Washer/Dryer, Meters, Lights, TVs, MP3, Games Console, Alarms, and so on.
	Awareness & Safety	Power protection, Security/ Alerts, Children, Fire safety.	
	Convenience & Entertainment	HVAC/Climate Regulate, Lighting, Equipment, and Entertainment	
Life Science and Healthcare	Care	Hospital, Emergency Room, Mobile, Point of Care, Clinic, Labs, and Doctor's Office	PDAs, MRIs, and Implants, Surgical Equipment, Pumps, Telemedicine, Monitors etc.
	Home/ In Vivo	Home Monitoring Systems, Implants	
	Research	Discovery, Diagnostics, and Laboratories	
Transportation	Non-Vehicular	Air, rail, and maritime drug transport	Automobiles, lights, ships, aircraft, road signs, tolls, and so on.
	Vehicles	Consumer, commercial, building, and off-highway	
	Trans Systems	Tolls, traffic management, and navigation	
Industrial	Resource Automation	Mining, Irrigation, Agriculture, Woodland	Pumps, Valve springs, Vats, Conveyor belts, Manufacturing, Equipment, Ships, and so on..
	Processes/Fluid	Petrochemicals, Hydrocarbons, Food Beverage	
	Discrete/Converting	Materials, papers, and rubber/plastic Electronics for metal cutting, testing	
	Distribution	Pipelines, Conveyance	
Retail	Specialty	Fuel Stations, Gaming, Bowling, Discos, Cinemas, Special Events	POS Concourses, Tags, Cash Registers, Vending Machineries, Signs, and other similar products
	Hospitality	Hotels Restaurants, Bars, Cafes, Clubs	

	Stores	Supermarkets, Shopping Malls, and Single Stores Sites, Dispersion, and Centers.	
Public Safety/ Security	Surveillance	Radar/ Satellite, Environ., Military Fixed, Security, Unmanned	Tanks, fighter jets, battlefields, jeeps, automobiles, ambulances, homeland security, environment Monitor, etc.
	Equipment	Weapon systems, automobiles, ships, aircraft, and equipment	
	Tracking	Postal, Human, Animal, Food, Health, and Baggage	
	Public Infrastructure	Water treatment, building, environmental equipment and personnel, police, fire, and regulatory	
	Emergency Service	Ambulance, Police, Fire, Homeland Security	
Networks and IT	Public	Service is available, E-Commerce, Cloud Services, Mobile Carriers, and Security protocols	Servers, flash memory, and personal computers Routers, toggles, PBXs, and so on.
	Enterprise	Privacy Nets, IT/Data Center Office	