



SMART TECHNOLOGIES AT HOME & WORK WORKBOOK

Name:

Course Date:

Programme:

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Smart Technologies Ecosystem

Task 1a:

Define Smart Technologies

Smart technologies refer to devices and systems that use sensors, connectivity and software to collect, analyse and act on data, thereby enhancing convenience and efficiency. Designed to operate in a more intelligent and interconnected manner, they integrate advanced digital capabilities into everyday objects and systems, enabling them to connect and communicate with each other and with users.

Task 1b:

From the table of words below sort them into devices and their matching categories:

Smart Home	Industrial IoT	Watch	Smart Office	Thermostat
Robots	Smart Health	Lighting	Wearable	Blood Pressure Monitor

Category	Device
Smart Home Devices	Thermostat, Lighting
Wearable Devices	Watch, Blood Pressure Monitor
Smart Health Devices	Blood Pressure Monitor
Industrial IoT Devices	Robots, Thermostat
Smart Office Devices	Lighting, Thermostat



Task 2a:

Choose TWO Smart Home technologies and describe a device, feature or function related to your chosen technology:

Smart Home Technology	Description of device, feature, or function
HP Smart Printer	<p>Feature: HP Smart App</p> <p>Description:</p> <p>The HP Smart App connects to your HP Smart Printer via Wi-Fi or cloud, enabling remote access to the printer's functions. With this app, users can:</p> <ul style="list-style-type: none">● Print documents and photos from anywhere.● Scan documents using their smartphone camera or the printer's scanner.● Fax documents digitally without a physical fax machine.● Monitor ink levels and receive alerts for low ink.● Order ink or paper directly from the app.● Set up and troubleshoot the printer with step-by-step guides.
Echo Dot	<p>A key feature of the Echo Dot related to smart technology is its voice-controlled smart home using Amazon Alexa.</p> <p>Feature: Voice-Controlled Smart Home</p> <p>Description:</p> <p>The Echo Dot uses Amazon's Alexa voice assistant to control compatible smart home devices through simple voice commands. Users can connect and manage devices like smart lights, thermostats, plugs, cameras, and locks.</p>



Task 2b:

Choose TWO Smart Workplace technologies and describe a device, feature or function related to your chosen technology:

Smart Workplace Technology	Description of device, feature, or function
Lighting	<p>Feature: Automated Schedules & Occupancy Sensing</p> <p>Description:</p> <p>Smart lighting systems in the workplace can be programmed to turn lights on or off based on pre-set schedules or real-time occupancy detection. Using motion sensors and timers, the system automatically adjusts lighting depending on whether a room is in use and the time of day.</p> <p>For example:</p> <ul style="list-style-type: none">• Lights turn on when someone enters a conference room and turn off when the room is empty.• Office lights dim or shut off after business hours, reducing energy waste.• Lighting levels adjust based on natural daylight to maintain consistent brightness (daylight harvesting).
Smart Chair	<p>A key feature of a workplace smart chair is its Posture and Activity Monitoring capability.</p> <p>Feature: Posture & Activity Monitoring</p> <p>Description:</p> <p>Smart chairs are equipped with embedded sensors that track a person sitting throughout the day. These sensors track posture, sitting duration, and movement. The chair connects to a companion app or dashboard, which provides real-time feedback and reminders to:</p>



	<ul style="list-style-type: none"> • Correct poor posture (e.g., slouching or leaning). Take movement breaks to reduce sedentary time. • Switch between sitting and standing (when used with sit-stand desks). <p>Some smart chairs can even adjust lumbar support automatically based on the user's sitting behavior.</p>
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Optional Extension Task:

From your chosen smart home and smart workplace technologies choose ONE OF EACH and state why you think they are advantageous for us to use:

Smart Home Technology	<p>Your stated advantage(s):</p> <ul style="list-style-type: none"> - This feature enhances convenience and productivity, especially for home offices or mobile professionals, by making printing tasks seamless and accessible from virtually anywhere. - This hands-free control simplifies home automation, enhances convenience, and supports accessibility, making it easy for anyone to manage their home environment using just their voice. It's especially useful for multitasking or for people with limited mobility.
Smart Workplace Technology	<p>Your stated advantage(s):</p> <ul style="list-style-type: none"> - This feature improves energy efficiency, reduces electricity costs, and creates a more comfortable and productive work environment by ensuring optimal lighting conditions with minimal manual input. It also supports sustainability goals by lowering the carbon footprint of the workplace. - This feature promotes better ergonomics, reduces the risk of musculoskeletal problems, and enhances overall health and productivity in the workplace by encouraging good sitting habits and physical activity.



Task 3:

Choose ONE BENEFIT and ONE CHALLENGE of Smart Technology and argue a counterpoint based on your opinion and what you know Smart Technology:

Smart Techn ology Benefi t	<p>Benefit: Convenience</p> <p>Counterpoint:</p>	<p>Smart technology offers incredible convenience, letting users control lights, thermostats, appliances and more using just their voice or a smartphone. This automation not only saves time, but also makes everyday tasks easier, particularly for those with mobility issues or hectic schedules.</p> <p>However, this convenience can lead to people becoming overly reliant on technology. People may become dependent on automation for even the simplest tasks, which could reduce their ability to function effectively without it. They may forget how to adjust a thermostat manually or perform basic troubleshooting when a device fails, for example.</p>
Smart Techn ology Challe nge	<p>Challenge: Privacy and security</p> <p>Counterpoint:</p>	<p>Smart devices collect large amounts of personal data, such as voice commands, daily routines and location information, creating potential vulnerabilities. These can pose serious risks to privacy, whether from hackers or companies misusing data.</p> <p>That said, many smart technology providers are enhancing their security protocols by incorporating features such as two-factor authentication, end-to-end encryption and more transparent privacy controls. When used carefully and with awareness, smart technology can still be safe and beneficial, especially if users take basic precautions such as using strong passwords and keeping software updated.</p>



How Smart Devices Work

Task 4:

Complete the table below by cutting and pasting the correct functionality to match the smart device component from the list:

Smart Device Component	Functionality of Component
Sensors	Detect changes in the environment.
Actuators	Execute actions based on data received.
Controllers	The 'brain' of the smart device that processes sensor data and makes decisions.
Connectivity Modules	Enable communication with other devices and networks.
User Interface	Allows users to interact with the device.

Functionality options:

- The 'brain' of the smart device that processes sensor data and makes decisions.
- Allows users to interact with the device.
- Enables communication with other devices and networks.
- Detect changes in the environment.
- Execute actions based on data received.

Optional Extension Task:

From the components listed above choose TWO and provide a real-world example of the functionality:

Smart Device Component	Component: Sensors
	Real-world functionality: A smart thermostat uses temperature sensors to detect the current room temperature. This information is used by the system to decide whether to turn the heating or cooling on or off in order to maintain the desired temperature set by the user.



Smart Device Component

Component: Actuators

Real world functionality: A smart door lock uses actuators to physically move the locking mechanism when a command is received from a smartphone app or voice assistant, locking or unlocking the door.

Task 5:

Using the example from the slides as a guide, define and create your own process/ data flow based on the four smart device principles explored. You can do this on any activity from any smart device:

State the smart device being used and the scenario in which the principles are being executed:

Smart Fitness Watch

Data Collection

The watch collects real-time data such as heart rate, number of steps taken, distance covered, GPS location and time spent jogging.

Data Processing

The watch analyses this data by comparing the user's heart rate and pace with their pre-set fitness goals and past performance trends.

Decision Making

The system determines that:

- the user's heart rate is above the target zone
- the current pace is slower than average

It therefore suggests slowing down to avoid overexercise and recommends adjusting the route to achieve a better pace



Action Execution

The watch vibrates and displays a notification saying, 'Slow down to stay in your target heart rate zone', while also suggesting a shorter route based on your current performance.

Task 6:

Consider how AI and or Machine Learning have impacted your own experiences in using Smart Devices in relation to the following topics:

Data Analysis & Pattern Recognition

Personal Impact: I use a smartwatch to track my sleep and daily activity. Over time, the device has recognised patterns, such as lower sleep quality after late-night screen time and fewer steps at the weekend. It analyses this data alongside general user trends and makes recommendations, such as adjusting my bedtime or setting movement reminders when sitting for a prolonged time.

Personalisation

Personal Impact: My Amazon Echo Dot speaker has learned my preference in music, news and even morning routines. Based on my repeated voice commands and habits, it now automatically plays a specific playlist when I wake up, reads me short news updates from my preferred sources, and reminds me of tasks at the times I mention them, such as “Remind me to take my pills at 1 pm”.

Example:

The majority of likes on my Netflix account are for US comedy shows that are 30 minutes or less in length, this is data that is analysed along with the millions of other Netflix users and patterns of what is watched, by whom and when emerges from the data. I am then provided with a list of “30-minute laughs” on my “For You” feed that is entirely made up of US sitcoms and comedy shows that are roughly 25-30 minutes per episode.

Optional Extension Task:

Using the Netflix example above consider and identify TWO other types of data they could use, consider the purpose:



Netflix Data Type	<p>Data: Time of day content is watched</p> <p>Potential purpose: Recommend shows or movies that match the viewer's mood or attention span at a given time. For ex. short, light content in the evening, and longer dramas or documentaries at weekends or during the day.</p>
Netflix Data Type	<p>Data: Viewing device</p> <p>Potential purpose: Tailoring the video quality and format to the device being used, for ex. by enabling mobile-friendly previews or suggesting offline downloads for phone users.</p>

Smart Device Connectivity

Task 7:

From the stated feature or benefit, identify whether it is related to a wired or wireless connection:

Feature/Benefit	Wired/Wireless
This connection is less susceptible to interference from other devices	Wired
This connection minimises the risk of signal drops	Wired
This connection allows devices to be easily moved and reconfigured	Wireless
This connection offers higher data transfer speeds	Wired
This connection is easier to expand	Wireless
This connection is typically viewed as easier to manage	Wireless



Task 8:

From the four security topics choose TWO, define the term and describe a feature. The topics are: Encryption | Authentication | Firmware Updates | Network Segmentation



Security Topic	Definition	Feature
Encryption	Encryption is the process of converting data into an encoded format to prevent unauthorised access. Only authorised parties in possession of the correct decryption key can read the original data.	Messaging apps with end-to-end encryption (such as WhatsApp) ensure that only the sender and recipient can read the messages, protecting them from hackers and third-party interception.
Firmware updates	Firmware updates are upgrades to the software provided by manufacturers to fix bugs, address security vulnerabilities and enhance device performance.	Smart devices (such as routers and smart thermostats) are kept protected against newly discovered security threats by automatic firmware updates, so manual user action is not required.

Optional Extension Task:

Research network segmentation and identify at least one benefit of having smart devices on a segmented network:

Network Segmentation	<p>Benefit: Improved security</p> <p>Placing smart devices (such as cameras, speakers or thermostats) on a segmented network isolates them from more sensitive devices (such as laptops or smartphones). This reduces the potential damage caused by a cyberattack — if a smart device is</p>
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compromised, the attacker cannot easily access personal data or critical systems on the main network.

Course Notes

It is recommended to take notes from the course, use the space below to do so:



SMART DEVICES ECOSYSTEM

Internet connected devices- designed to do a task but with additional functionality.

They involve sensors (such as a change in voltage)

Things like brightness, adaptability features.

Internet based devices that help us to monitor, automate and enhance our daily lives.

Mobiles, laptops, PC's - Any device which we can access remotely - CCTV cameras, computer access, servers, routers, switches, Ring doorbells, etc. - Fix remotely connected to the internet

Following commands - Ask a question and likes of AI can respond, using the likes of Google Home, Alexa - Controlling Services, such as TV's lights, etc

Devices that can communicate and work with other devices

Devices that connect to other devices or networks(usually) wirelessly, enabling automated control and intelligent functionality.

SMART DEVICES CATEGORIES:

- Smart Home Devices
- Wearable Devices
- Smart Health Devices
- Industrial IoT Devices (Predictive Maintenance)
- Smart Office Devices

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<https://www.home-assistant.io/>

Home Assistant

SMART HOME TECHNOLOGIES:

- Thermostats : Boiler
- Lighting :Smart RGB
- Security Systems: Motion, door and window sensors, Smart lock, AI
- Appliances: Smart TV, Google, Alexa
- Entertainment Systems: Netflix(making personalised recommendations)

SMART WORKPLACE TECHNOLOGIES:

- Lighting: Brightness Sensors



- IoT(Internet of things) Sensors: Brightness Sensors, Occupancy/Motion sensor, Temperature/Humidity sensor, Industry Specific Sensor, mWave Sensor(detecting someone in a room sitting without moving)
- Security Systems: Access Control System (card, fob)
- Office Equipment: MFD (Multi-function devices)

SMART TECHNOLOGIES BENEFITS & CHALLENGES

Benefits:

- Convenience & Efficiency
- Energy Savings
- Enhanced Security
- Health & Wellness Monitoring

Challenges:

- Privacy concerns
- Security risks
- Cost & Accessibility
- Technical issues & Interoperability

SMART TECHNOLOGIES BENEFITS & CHALLENGES

- Balance:
- It's important to balance both the benefits and challenges of smart technology; there will always be a need to continuously improve the security, privacy, and accessibility to increase use and adoption.

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SMART DEVICE COMPONENTS

Basic components of Smart devices

- Sensors
- Actuators: motors in the electronic lock
- Controllers
- Connectivity Modules
- User Interface

SMART DEVICE PRINCIPLES

Smart Device Principles:

- Data Collection: sensors
- Data processing: controller
- Decision making:
- Action execution: actuators

AI & MACHINE LEARNING IN SMART TECHNOLOGIES

The significance of AI & ML is far reaching, key factors include:

- Learning from Data: "Does this person likes to switch on the kettle in the morning" Profiling
- Automate Actions: ex.Thermostats



- Personalise Experience: ex. Shopping Amazon (reminding about your past searches), Netflix, Spotify
- Predict Maintenance Needs: something that is constantly connected ex. Lightbulb

- Data Analysis
- Pattern Recognition
- Personalisation
- Predictive Maintenance

SMART DEVICE CONNECTIVITY

- Ethernet: RJ-45 cable
- Powerline Communication

WIRED CONNECTIVITY

Benefits:

- Stability
- Speed
- Reduced Latency

WIRELESS CONNECTIVITY

- Wi-Fi
- Bluetooth
- Zigbee: open source that connects smart devices to a smart network (locally within our network)
- Z-Wave: proprietary standard (you have to pay for using the device)

Benefits:

- Flexibility & Mobility
- Easier installation
- Supports multiple devices

SMART DEVICE NETWORK SECURITY

- Encryption: Clear Text turning it into Ciphertext (ex: WPA2/WPA3)
- Authentication: Multi factor authentication (MFA) it is 99.9% secure
- Firmware updates: updates to our devices firmware OS (operating system) BIOS/UEFI Firmware
- Network segmentation



Additional Information

We have included a range of additional links to further resources and information that you may find useful.

Session Name

END OF WORKBOOK

Please check through your work thoroughly before submitting and update the table of contents.

