

6.6 Applications in Manufacturing Industries

Robots are used in **manufacturing** to help to **improve productivity, consistency** (in terms of final finish) and to reduce overall **running costs**. Robots generally make the factory a much more **safer environment** for workers.

How Are Robots Used in a Factory?

1. **Lift heavy items**
2. **Assemble parts together**
3. **Paint items (Spraying)**
4. **Manufacturing Microchips**



Robots are programmed with a sequence of instructions. The programmer may guide the robot through each step physically or by controlling the robot by remote.



Exact sequence of movement is stored in the memory.



The robot is now able to carry out the same sequence of instructions over and over again.

Advantages

- Robots can work 24/7 with the same consistency and accuracy compared to humans.
- Robots can be more productive than humans.
- Robots can work in extreme conditions not suitable for humans.
- Robots do not need to be paid.

Disadvantages

- Robots cannot easily adapt to a situation which is beyond their sequence of instructions.
- Robots can be expensive to buy and maintain.
- Some workers may lose their jobs as robots can do more labor intensive jobs.
- People are deskilled due to robots doing more complicated jobs.

School management system

Learner registration and attendance	<ul style="list-style-type: none">• Teachers will be able to click on a particular class and complete the register.• Once this is saved then other users of the management system can see who has been register for that particular period.• This is useful as it allows teachers to see who should be attending their lessons.• Data of attendance can then be easily analysed.
Exam timetables	<ul style="list-style-type: none">• Exam Timetables can be produced using management systems and teachers who are not teaching could be easily allocated to invigilate exams.
Creating timetables or cover	<ul style="list-style-type: none">• Timetables can be produced using management systems.• They are generally quicker to create and less prone to errors compared to a paper based system.• Timetables can also be produced cover classes when teachers are absent and lessons need to be covered.
Learner performance	<ul style="list-style-type: none">• Teacher are able to log student data (grades/applications/reports/behaviour) into a school management system.• This data is then available (central storage of data) to anyone other members of staff.• The data can analysed and reports can be produced.
Benefits to school / parents	<ul style="list-style-type: none">• Parents are able to log in and access student reports online.• They can be kept up to date about exam results and general student progress in subjects.• Also they can receive immediate feedback. There would be no need for printed reports which would reduce costs.

Booking system

- Online booking systems use **real time processing** which allows users to make and confirm bookings instantly. Once payment has been received and booking is confirmed then booking can not be double booked. Example uses:

Transport: Flight, Trains and Buses

Entertainment: Theatre, Cinema and Stadium

Accommodation: Hotels, Apartments and Villas

Advantages	Disadvantages
<ul style="list-style-type: none">User can check availability of tickets and compare prices on comparison websites.Confirmation message is sent instantly once payment has been authorised.They prevent double booking as the process is real time. This means if somebody makes a booking then it instantly becomes unavailable.You may receive special offers if you regularly book using a particular booking website.	<ul style="list-style-type: none">It may be difficult to cancel a booking and get your money back.Online booking services have known to crash to high level of traffic to the website.You are unable to receive specific advice on your booking if it is done online.Websites may not be user friendly and may make the booking process more difficult.

Input: User will select the **requirements** of the booking. E.g. date of flights, Airports, Location etc.

Processing : involves checking if bookings are possible (availability)

Outputs:
booking confirmations
/rejections
alternatives/Payment

Describe the **inputs and processing** involved in booking flight tickets online?

Key Words: **Requirements, availability, confirmation, payment, booking reference, e-ticket**

The customer would first select the **number of tickets (requirements)**, **arrival** and **destination airport**, **date and time** of the **flight**. The computer will then check for the **availability of the seat**. Alternative tickets may be offered on a different day if tickets are not available. The customer will then select and **confirm the ticket** and the **payment details** will be entered. Once the payment has been processed a **booking reference** will be generated and the seats will become unavailable. **Confirmation (e-ticket)** could be sent over email.

The screenshot displays a flight booking form with the following elements:

- Flying from:** A text input field with a location pin icon and the placeholder text "City or airport".
- Flying to:** A text input field with a location pin icon and the placeholder text "City or airport".
- Departing:** A date selection field with a calendar icon and the placeholder "dd/mm/yyyy".
- Returning:** A date selection field with a calendar icon and the placeholder "dd/mm/yyyy".
- Adults (18+):** A dropdown menu showing the value "1" with a downward arrow.
- Children (0-17):** A dropdown menu showing the value "0" with a downward arrow.
- Advanced options:** A link in blue text.
- Additional services:** Two checkboxes with labels: "Add a hotel" (with a hotel icon) and "Add a car" (with a car icon).

Give four advantages of using **online booking systems** for the customer rather than using manual systems.

- Speeds up the booking process
- Customers may not have to travel to the theatre so save money in travelling
- Customers may not have to travel to the theatre so save time in travelling/queuing
- Can make/cancel/change a booking at any time
- Can book several shows at same time
- Booking can be carried out anywhere



Banking application

- ICT has revolutionised the way that we do banking, allowing near instant global access to a wide variety of banking services. This lesson looks at the banking services that are now provided by ICT and the computer processing that takes place.
- **Electronic Fund Transfer (EFT)** allows money to be transferred electronically from one account to another. An example of EFT is when an Employer pays their employees their salaries. Transfers can be near instant, or take a couple of days, depending on the nature of the transaction and the arrangements between the banks.

Advantages:	Disadvantages
<ul style="list-style-type: none">• No physical money is transferred which makes the transfer more secure.• Transfer of salaries can be regulated by the government (e.g. Used in Qatar to ensure employers are paying their employees on time).• Customers can set up standing orders (direct debit) to pay bills on specific dates.	<ul style="list-style-type: none">• Money could be transferred from the incorrect account.• Incorrect amount of money could be transferred by mistake.• If you have a poor credit rating then you may not be declined to use EFT as a method of payment (e.g. paying monthly for a mobile phone contract).

Automatic Teller Machines

ATM (Cash machines) can be used for various purposes (including cash withdrawal/deposit, checking/printing statement).

The **PIN** number is compared with the **PIN stored in the chip**. If Pin is the same then the customer can Proceed.

If not customer will be requested to re enter the Pin.

The customer's account is checked to see if it has **sufficient funds**.

The amount is also checked against the card limit or daily withdrawal limit.

Customer may be asked to select a **language**.

The customer types in the **PIN**.

If **Pin is correct** then the customer will select a **service**.

If customer selects the **Cash Withdrawal** then they are requested to select an amount to withdraw.

If there are **sufficient funds** and the amount is within the card limit the required notes are issued.

Customer is requested if they would like a receipt.
The card is then returned to the customer.



Cash Withdrawal
Cash Deposit
Check Balance
Print Statement
Phone Topup



Telephone banking

Customers can use phone banking to perform similar functions are those which can be complete using face-to-face or online banking. These include:

- Querying transactions and account balances
- Sending funds
- Arrange overdrafts
- Paying bills
- Requesting a written statement

Phone banking is very useful for those people who don't have, or don't trust online banking, as it allow them access to their bank account when banks are closed (such as evenings, weekends and bank holidays).

Internet Banking / Mobile Banking

Internet banking (via a web browser) and mobile banking(via an app), allow customers to perform a number of functions that used to be reserved for face-to-face banking.

Advantages


- 24 /7 Access
- Can access on the go using banking apps


Disadvantages

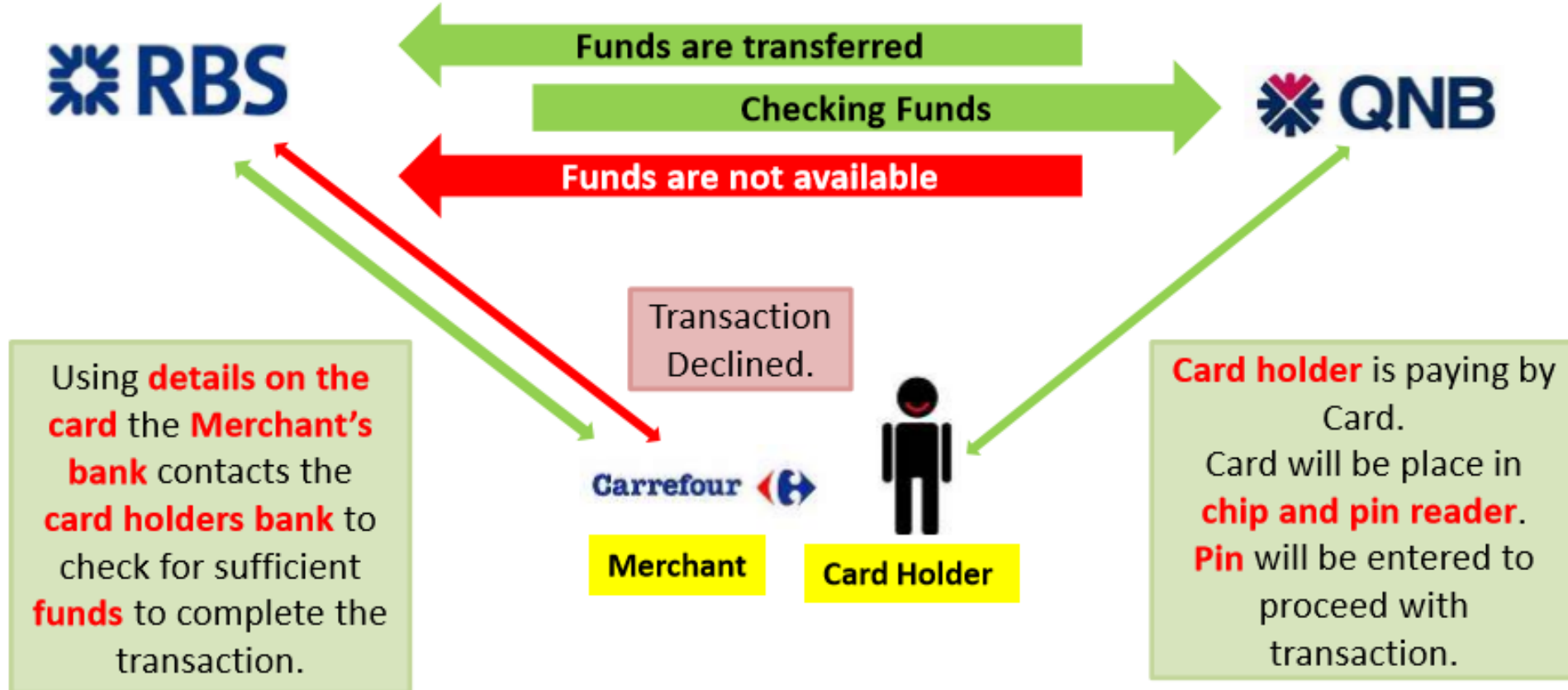
- Phishing is possible
- Large amounts of branch closures and unemployment
- Glitches and crashes can mean that some people can't access their money

Credit / debit cards

Processing credit/debit card Transactions

 **QNB** Customer's Bank (Card Holder's Issuing Bank)

 **RBS** Merchants' Bank (Acquiring)



Describe the processing that takes place at POS to make payment using a debit card?

- Once the customer has entered the Pin it will be compared to Pin on the Chip. IF the Pin is correct than the card will be checked to see if this is valid (not stolen and expired). If the card is valid than the transaction will continue. Using the account details on the chip the shops computer will make contact with the customer's banks. Checks will be made for sufficient funds to complete the transaction. If funds are available then the amount will be transferred from the customer's account to the shops account. If funds are not available then the transaction will be declined. If the transaction has been successful the receipt will be printed and the card will be given back to the customer.

Contactless debit cards are replacing standard debit cards. Some countries are introducing contactless debit card transactions at ATM machines. Discuss the advantages and disadvantages to the bank of using these cards at an ATM.

Disadvantages	Advantages
<ul style="list-style-type: none">• The cards last longer as they are not in contact with the machine• Attracts new customers• Reducing the cost of replacement cards• Reduction in fraud as less money taken out• Cards not retained therefore less cost for replacements• The transactions are faster	<ul style="list-style-type: none">• The cost of producing new cards• The cost of producing new readers• The cost of re-writing the ATM software• They are liable to fraud therefore compensate customers...<ul style="list-style-type: none">...Increasing costs• Less money removed at transaction therefore potentially more small transactions<ul style="list-style-type: none">...Increased administration...Increased hardware use

Give three disadvantages to the customer of using contactless debit cards at an ATM.

These are conclusions. We should write with its reason and some examples.

- The card may be read accidentally
- Only small amounts can be withdrawn
- More chance of fraud if card is stolen/lost
- May not be able to use the ATM as not everyone will be contactless due to cost
- Devices can read the cards wirelessly to steal money

Banking

Advantages

Disadvantages

Online Banking



Customers can now **access their bank accounts** online on secure websites using **authentication techniques**. Some banks have also developed online banking **applications** to allow customers to access their accounts via mobile phones and tablets.

Customers can use the on-line banking system to:

- Check their balance and print statements
- Manage direct debits
- Transfer money internally and externally to other accounts using EFT.
- Apply for loans or credit cards.

- Can be accessed from various platforms and used 24/7 including whilst on the move.
- Save time and costs- No Travelling or money spent on travelling or parking.
- Statements can be downloaded from a given time period.
- Several layers of authentication.

- Internet connection required.
- Less personable for those who would prefer direct communication with a bank representative.
- Your account could be hacked or passwords stolen from key logging software.

Phone Banking



Phone banking is very similar to online banking in that customers can complete similar tasks. Customers will have to enter in their account details to authenticate them to the system. Then they will have to select from various options by the specified numbers keys.

- Can talk directly to a representative from the bank.
- Ask additional queries which are not available online.

- Call costs
- May be put on hold for a long time.
- Call times (9am-5pm) are not flexible.

Stock control system

In a supermarket, the stock will include everything on the shelves and in the storerooms.

The advantages are:

- Save money on keeping too much stock of any item
- Prevent perishable stock from going off before it is sold
- Prevents running out of stock

Computers in the retail industry

Stock control systems can automatically update stock records when items are purchased at the POS.



POS / EFTPOS

Point of sale terminals that are set up at the exits of supermarkets that allow shoppers to pay for their goods in the following way:

- The shopper presents their purchases
- The items are scanned using a bar code reader
- The stock file is searched for the bar code.
- When it is found:
 - The number in the stock file has one subtracted from it.
 - The description and price of the article is sent to the terminal
- The price and description are displayed on the screen.
- The price and description are printed on a till receipt.
- The price is added to the total so far.

If there is a chip and Pin reader added to the POS it becomes an electronic funds transfer at the point of sale (EFTPOS) terminal.

EFTPOS (Electronic Fund Transfer Point of Sale) is when a customer uses a card to complete a transaction.

1. Customer gives **bank card** to cashier at POS.

2. The cashier **enters the card** in to the chip and pin reader and **confirms the value of the purchase**.

Pin entered has to be correct for the transaction to continue. **The card will also be checked for validity (expiry date/stolen).**

3. The customer is requested to **enter their pin**. If **Pin matches the Pin stored on the chip** then the transaction can continue.

4. The shops computer will use the **account details on the chip to connect to the customers bank account** and check the **balance**.

5. If funds are **sufficient** then the transaction will be **approved**.

6. The purchase amount is **subtracted from the customer's account** and **deposited into the shops banks account**.

7. Once the transaction is complete **receipt will be printed**. The cashier will give the card and receipt to the customer.



If **funds are not available** a declined message will be sent to the stores computer. The cashier will then request for another method of payment



Internet banking and shopping is becoming more popular to users due to the development of the internet and the advancement of mobile internet technology.

Advantage	Disadvantage
<ul style="list-style-type: none">• Internet is now available on more platforms including applications available on phones and tablets.• Internet can be accessed 24/7.• No need to travel (saves money on travel/parking)• Saves time (No need to queue in the banks or shops)• Access to wide range of goods on the internet.• Useful for individuals who find it difficult to travel and goods can be delivered directly to your home.• People can spend more time doing other leisure activities.	<ul style="list-style-type: none">• Online account could be hacked/ card details could be stolen.• Users require an internet connection and need to be computer literate.• Lack of socialising/exercising.• You can not see the goods before you buy (try on clothes).• Delays in delivery
Effect on the company	
<ul style="list-style-type: none">• Less retail outlets required which means no rent or utility costs.• Less staff required in retail outlets however specialist staff would have to be employed to maintain the website and run the dispatch department.• Online presence would attract more customers (Global).• Lack of customer interaction.	

Describe the processing that takes place in an automatic stock control system?

Stock is purchased at the POS and the amount is automatically deducted from the overall stock level. If the stock level falls below (lower) than the pre-set value then an automatic delivery request is sent to the supplier. A preset value will be reordered and will arrive in the next delivery. The stock levels will automatically update.

Recognition system

Recognition Systems are used to directly enter data into a computer system. Recognition systems tend to be more accurate and quicker method of entering data into a computer system compared to manual methods.

MICR



Magnetic ink which are found at the bottom of the checks are scanned in to MICR (Magnetic Ink Character Reader).

OMR



Pencil or pen marks are scanned in by the OMR (Optical Mark Reader).

OCR



Scanned text is converted into a format which can be edited.

RFID



Uses radio waves to capture and store information on a tag.

Number Plates



Sensors are used to detect a car (if its gone over the line) and a signal will be send to the microprocessor to take the image of the number plate.

Describe how RFID technology reads the details from the chip.

- The chip is presented near a computer with a radio-frequency scanner
- The scanning antenna puts out radio-frequency signals in a relatively short range.
- It provides a means of communicating with the transponder/the RFID tag
- The scanning device provides energy...
 - ...so that the chips can broadcast the information in them...
 - ...for the computer to read.

Explain why RFID technology is used for reading data from passports.

These are conclusions. We should write with its reason and some examples.

- More secure than a traditional passport as biometric measurement data difficult to forge
- Counterfeits can be more easily identified than non-RFID passports
- More rapid flow at security check points/quicker than reading it manually

When a bank cheque is presented to a bank it is sent off to a cheque clearing centre. Give three items of information that are pre-printed on the cheque in magnetic ink.

- Account number
- Bank/branch sort code
- Cheque number

भारतीय स्टेट बैंक
State Bank Of India

IFSC Code

Date of issue
DDMMYY

PAY Payee Name

Amount in words

Amount in figures

30030

VALID UPTO ₹ 10 LACS AT NON-HOME BRANCH

SB ACCOUNT
PREFIX :
101500021

Signature
MR. SIDDHANT JAIN

MULTI-CITY CHEQUE Payable at Par at All Branches of SBI

Cheque Number (6 Digit) 016958

MICR Code (9 Digit) 462002015

Account ID with RBI 016958

Transaction Code 31

Describe how MICR is used to read these details from the cheque.

- Requires a special Magnetic Ink Character reader/scanner/Details are scanned
- The magnetic ink on the cheque passes over a magnet in the reader/scanner which charges/magnetises the ink
- The MICR reader/scanner then reads the magnetic signal given out by the magnetic ink characters on the cheque.
- Each character produces a unique signal which is read and translated by the MIC reader

Explain why magnetic ink is used rather than bar codes on a cheque.

These are conclusions. We should write with its reason and some examples.

- More difficult to forge
- Even if overwritten/damaged can still be read by computer
- Information is human readable

A student exam answer sheet consists of boxes which the student shades in to indicate their choice of answer. Apart from the details of the test and the lozenges, give two items of information, essential to the student, that are pre-printed on the answer sheet.

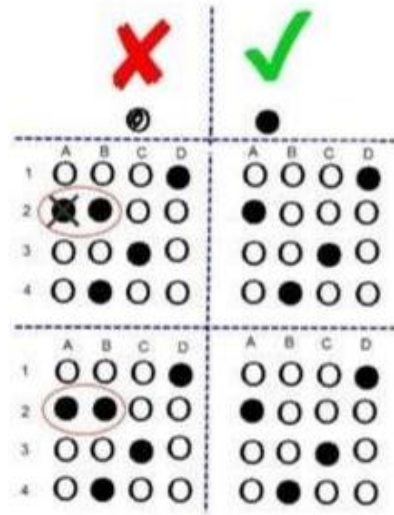
- Student id number/prompts for student number
- Date of birth
- Student name
- Instructions on how to complete the form
- Question numbers
- Centre number/Centre name

Describe how Optical Mark Recognition is used to process the details from the form.

- Dedicated scanner device shines a beam of light onto the form
- Light is reflected back to sensors
- Marks reflect less light so sensors used to identify position of marks
- Computer compares these with correct answer positions

A student exam answer sheet consists of boxes which the student shades in to indicate their choice of answer.

Describe the drawbacks of using Optical Mark Recognition



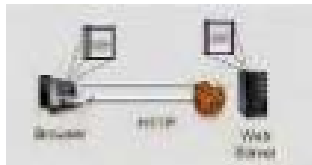
- If the marks don't fill the space completely they may not be read correctly/overflow the space/smudged
- If the marks are not in a dark enough pencil they may not be read correctly
- If more than one lozenge shaded in result is invalidated
- Only suitable for recording one out of a selection of answers, not suitable for text input
- Have to use prepared forms which may be expensive
- Examinations could consist of mainly multiple-choice questions changing the nature of what is being tested

Monitoring and Tracking Systems



Key Logging

Key logging software monitors which **keys have been pressed**. **Passwords** and **personal details** can be **obtained for malicious** purposes by **hackers**.



Cookies

When a user visits a website a cookie is created which could **store the user browsing preferences**:

- Language settings
 - Items in the shopping cart
 - Links which have been click on
- Cookies essentially **leave an electronic footprint** on user browsing habits.



Call Monitoring

Calls can be **monitored by police** as part of **surveillance operations**.

Calls may also be **monitored** as training tool in call centres to **improve employees performance** the **quality of the customer service**.



Number Plate Recognition

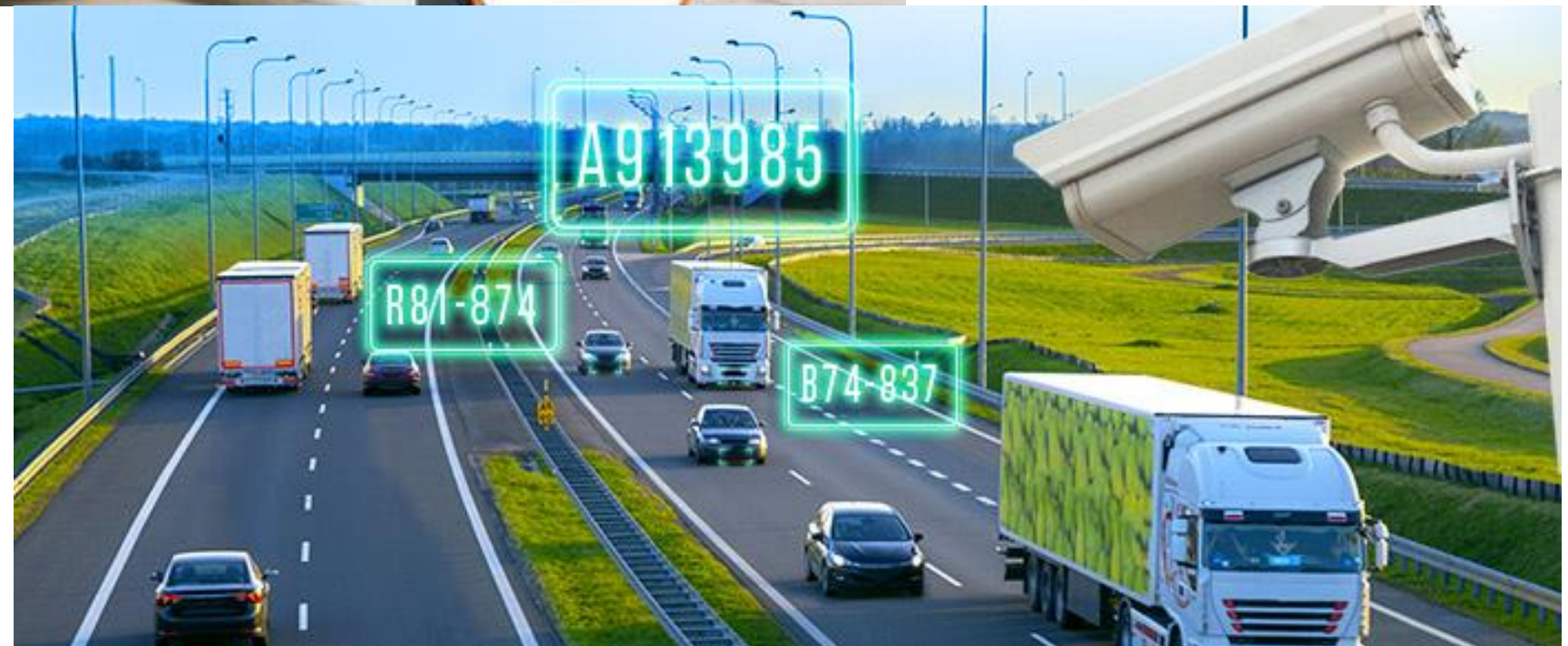
Number plates can be **tracked by cameras situated in specific locations** to keep **track of whereabouts of a specific individuals** to whom the car is licenced too.



A new toll road that drivers pay to use has just opened. The company that owns the road uses Electronic Number Plate Recognition Systems to collect payments from drivers automatically.

Describe how an Electronic Number Plate Recognition System works.

- The system has CCTV cameras.
- The images and the text from the number plate are captured by the camera.
- The system uses optical character recognition to input the data into the computer system.
- The number plate is checked against its database to find the car owner's details.
- Using the car owner details the payment can be processed.



Key-loggers are thought to be security risks but they can be used to monitor and track the use of employees on a computer system.

Describe how a key-logger monitors computer usage.

- A key-logger records the key strokes of a person using the computer
- Transfers / transmits the data back to the supervisor / manager
- The supervisor can then monitor what the employee has been doing / how hard they have been working

A small minority of employees in a company have been using the computers for non-business use, so the company has had to introduce other methods of monitoring their use of ICT. Apart from key-logging list three other ways that employees could be monitored in their use of ICT.

- Monitoring phone call usage, Monitoring emails
- Monitoring the time spent on and websites visited
- Monitoring where employees log in / log out
- Monitor the amount of storage space used
- Monitoring where they send data to print

Satellite Systems

GPS (Global Positioning Systems)

- GPS can determine a specific locations using satellite navigation systems.
- Cars, Ships, Planes can use GPS when navigating to specific locations.
- Walkers to locate position on hills/mountains.
- Used by runners to calculate distance.

Advantages

- Drivers do not have to use maps
- GPS can re-route and find quickest routes.
- Can provide useful locations of amenities (e.g Petrol stations)

Disadvantages

- Loss of signal
- Maps have to be updated (New roads may not be shown)

Describe how a satellite navigation system (sat nav) in a motor vehicle would calculate the quickest route from Destination A to Destination B.

Destination B is input by driver. The Position of the motor vehicle at A is calculated using GPS using data transmitted from 4 satellites. Algorithm calculates shortest distance from A to B. The algorithm makes allowances for traffic and takes into account average road speeds to calculate the time it would take to reach the destination.

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