



I'm not robot



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down the screen quickly. 92Sballs are seen more often in an industrial environment – such as a control room. Because they don't have to move, trackerball doesn't need desk space or a special surface. The operator is also less likely to suffer injuries such as RSI. The ball at the top of the trackerball is moved to control the cursor on the screen. As with the mouse, the buttons are used to select icons and perform other functions. Most laptops have a built-in TOUCH PAD. It includes a touch sensor that allows the user to control the cursor by simply swiping across the pad surface. The buttons on the left and right sides of the pad work in the same way as the mouse buttons. However, simply touching the surface acts as a quick selection method on multiple touchpads. 5.2.7 Microphones Microphones are used to input sound into the computer. For example: • voice over performance in a presentation • part of a speech recognition system • part of a voice recognition system • enabling a disabled person to communicate with a computer. Microphones are built into your computer or are external devices connected via USB or wireless. 030SIOR92S0H4A59H4BASZ Figure 5.14 Microphone 93030SIOR92S0H4A59H4BASEWów, when the microphone receives sound, membrane vibrators produce an electrical signal. This signal goes to the sound card and is converted to digital values and stored on your computer. If the microphone is used in a voice recognition system, the user's voice is detected and then converted to digital. A few spoken words create a digital wave pattern. The software compares this wave pattern with wave patterns stored in memory to see if they match. If they fit, the person has been correctly identified. You can only use certain words because the system is designed to recognize only a few key phrases (e.g. you may be asked to provide your name). This technology can be used in security systems. SPEECH RECOGNITION is a different and more complex technology. This reuses the microphone to enter the words spoken by the user. But this time the software does not try to recognize the speaker. Spoken words are recognized and displayed on the screen, entered into a text editor, or used another application. The basic differences in voice recognition are described below. 1 Suppose a person says the word HUT; the sound card on your computer will convert the digital sound wave: Figure 5.15 2 The software downloads the digital image (shown in Figure 5.15) and divides it into phonemes (these are the smallest elements that make up the language); in this case H UH T. 3 These phonemes are compared with the words in the built-in dictionary: Figure 5.16 4 The WORD HUT will then be suggested by the software in any application. 5 This is obviously a very simple example, and the whole concept of speech 94030SIOR92S0H4A59H4BAZrecognition is very complex. In an attempt to recognize which words are spoken, the software must take into account different dialects, different accents, and so on. To indicate how difficult it is, consider the following well-known example: Two phrases: recognize speech and sow a nice beach, if it is said quickly, are almost identical. Using phonemes, they become: r eh k ao g n ay z / s p y ch i r eh k / ay / n ay s / b iy ch One way is to train a computer to understand the cross-section of people; but some problems are difficult to solve. People have problems with dialects and accents; so it should come as no surprise that we continue to challenge software developers of speech recognition systems. Action 5.4 Describe how speech recognition can be used: teaching language skills to people who have learning difficulties b teaches a person to speak words in a foreign language. Both voice recognition and speech recognition can be used in various other applications. For example, voice recognition is used in cars to allow the driver to speak commands: make warmer, switch on GPS or open window. Keywords must be used to compare voice patterns with a limited dictionary of words already written. These systems are becoming more sophisticated, so that normal speech in the car does not cause unwanted reaction of the computer. Newer systems can also be configured to respond only to commands from the driver. Action 5.5 Consider the pros and cons of using voice recognition in your car. Is it safer? For example, it can allow the driver to reply to an email while driving, etc. Try to expand this argument and draw the correct conclusion from your findings. 5.2.8 Touch screens Touch screens are now a very common form of input device. They allow a simple touch to launch the app or perform many functions of pointing devices, such as a mouse. One of the main uses of touch screen technology is in mobile phones. Currently, there are three main types of touch technologies used on mobile phone screens: • capacitive 95• infrared • resistive. We will consider how each of these technologies works and what are their main advantages and disadvantages. 030SIOR92S0H4A59H4BASE Figure 5.17 96030SIOR92S0H4A59H4BAZFigure 5.18 97030SIOR92S0H4A59H4BAZ Figure 5.19 5.2.9 Sensors Sensors THIS device, that read or measure physical properties, be temperature, pressure, acidity of acidity so on. Real data is ANALOGic – it means that they are constantly changing and have no discrete value. Analogue data usually requires some form of interpretation: for example, measuring the temperature on a mercury thermometer requires the user to look at the mercury height in order to reach the temperature. The temperature can therefore have an infinite number of values depending on the precision of the mercury height measurement. The equally analog surface of the clock requires the user to look at the hands at the 98nieja clock. The area swept away by the hands allows you to interpret the number of hours and minutes. There are many other examples. However, computers cannot make any sense of these physical quantities and the data must be converted to a digital format. This is usually achieved with an analog digital converter (ADC). This device converts physical values to discrete digital values. 030SIOR92S0H4A59H4BAZFigure 5.20 When you are using a computer to control devices such as a motor or valve, you must use a digital analog converter (DAC) because these devices need analog data to operate in many cases. Actuator is often used in these control applications. Although these are technically output devices, they are listed here because they are an integral part of the control system. An actuator is an electromechanical device such as a relay, electromagnet or motor. Note that the electromagnet is an example of a digital actuator; part of the device is connected to a computer that opens and closes the circuit as required. Once connected, the electromagnet can operate the piston or fittings for control, such as a fuel injection system. Other actuators, such as motors and valves, may require a DAC to receive electrical current rather than a simple digital signal directly from the computer. Table 5.2 presents a number of common sensors and examples of applications using named sensors. Table 5.2 Application temperature sensor • central heating system control • chemical process control/monitoring • control/monitoring of temperature in greenhouse moisture/humidity • control/monitoring of soil moisture levels in greenhouses • control/monitoring of greenhouse air humidity levels • monitoring of humidity levels in industrial applications (e.g. monitor the humidity in the paint booth at the car factory) 99light • turn on the street lighting at night and turn off during the day • monitor/control the light level in the infrared/motion greenhouse • automatically turn on the car's headlights when it gets pressurized dark acoustic/sound gas (eg. O2 or • turn on the windscreen wipers in the car automatically CO2) • detect intruders in the pH burglar alarm system • count people entering/leaving the magnetic field of the building • detect intruders in the burglary alarm system • weigh things (eg. vehicle weight) • monitor/control the process by which gas pressure is important • raise the noise level (e.g. A A alarm system • detection of liquid noise drips in the pipe • monitoring of pollution levels in the river or in the air • measurement of O2 and CO2 levels in the greenhouse • checking for CO2 leaks in the power plant • monitoring/control of acidity/alkalinity in the soil in the greenhouse • monitoring of pollution/environment in rivers • any application, where magnetic field changes are required (e.g. mobile phones, CD players, etc.) • used in anti-lock systems in motor vehicles 030SIOR92S0H4A59H4BAZ Sensors are used in both monitoring and control systems. There is a subtle difference between how these two methods work: 100,100

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