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An Overview of High Performance Development Boards

Bluetooth Technology and its applications

Bluetooth wireless technology is a short-range communications system intended to replace the cables connecting portable and fixed electronic devices. The system offers services that enable the connection of devices and the exchange of a variety of data classes between these devices. The big picture is developing a wireless communication trans receiver and specifically this paper looks into Bluetooth technology as a form of wireless communication and its various applications.

How the technology works:

Bluetooth operates in the range of 2400–2483.5 MHz. It uses a radio technology called frequency-hopping spread spectrum, in which the transmitted data is divided into packets and each packet is transmitted on one of the 79 designated Bluetooth channels. Each channel has a bandwidth of 1 MHz; the first channel starts at 2402 MHz and continues up to 2480 MHz in 1 MHz steps. It usually performs 1600 hops per second. Bluetooth is a packet-based protocol with a master-slave structure. One master may communicate with up to 7 slaves in a piconet; all devices share the master's clock. The devices can switch roles, by agreement, and the slave can become the master. Packet exchange is based on the basic clock, defined by the master, which ticks at 312.5 μ s intervals.

Applications:

Bluetooth is managed by Bluetooth Special Interest Group (SIG) which has more than 19,000 member companies in the areas of telecommunication, computing, networking, and consumer electronics. The Bluetooth technology is widely accepted in the market and Bluetooth finds its application in a lot of products such as telephones, tablets, media players, play stations, and some high definition headsets, modems and watches. In telephones, Bluetooth is generally used to transfer sound data through Bluetooth headphones. In hand-held computers, Bluetooth is generally used to transfer files through byte data. A personal computer that does not have embedded Bluetooth can be used with a Bluetooth adapter that will enable the PC to communicate with other Bluetooth devices. While some desktop computers and most recent laptops come with a built-in Bluetooth radio, others require an external arrangement. One of the first popular applications was of Bluetooth was wireless control of and communication between a mobile phone and handsfree headset. Examples of some more applications are: wireless control of and communication between a mobile phone and a Bluetooth compatible car stereo system, wireless Bluetooth headset and intercom, wireless networking between PCs in a confined space and where little bandwidth is required.

Bluetooth profiles – In order to use Bluetooth wireless technology, a device must be able to interpret certain Bluetooth profiles. The profiles define the possible applications of Bluetooth. Bluetooth profiles are general behaviors through which Bluetooth enabled devices communicate with other devices. Bluetooth technology defines a wide range of profiles that describe many different types of use cases. By following a guidance provided in Bluetooth specifications, developers can create applications to work with other devices also conforming to the Bluetooth specification.

Bluetooth and Android - The Android platform includes support for the Bluetooth network stack, which allows a device to wirelessly exchange data with other Bluetooth devices. The application framework provides access to the Bluetooth functionality through the Android Bluetooth APIs. These APIs let applications wirelessly connect to other Bluetooth devices, enabling point-to-point and multipoint wireless features.

Building blocks/ Technology:

The Bluetooth core system consists of an RF transceiver, baseband, and protocol stack. One of the hardware components includes the Host Controller Computer to run the higher level code. It runs the Application software, upper layer of the Bluetooth protocol stack - profiles, logical link control and adaptation protocol (L2CAP), RFCOMM, and other stack functions above the HCI. Other hardware components include the Link control processor, a microprocessor that runs at least the lower layer of the stack. It may be combined with the host controller in embedded applications. It runs: Lower layer of the Bluetooth protocol stack - link manager protocol (LMP), containing the link manager (LM) and the link controller (LC). The Baseband controller (logic), RF trans receiver, Antenna also form part of the hardware components of a Bluetooth system. The software components include the Application, Bluetooth Profiles, RFCOMM, Service Discovery Protocol (SDP), Logical Link Control and Adaptation Protocol (L2CAP), Host Controller Interface (HCI), Link Manager (LM) and Link Controller (LC)

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