

Comp 100

Lecture Notes

Chapter 8

Digital Devices

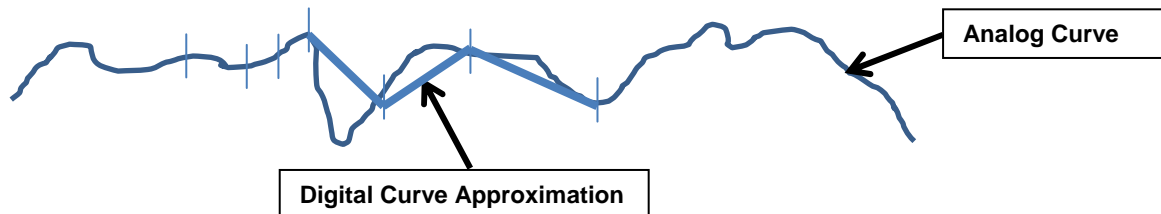
- Personal Video Recorder (PVR) Software
 - Free
 - Available for Windows, Linux, Mac OS/X
 - Record standard TV or HDTV on hard drive
 - Access to TV listings; schedule PVR via web access
 - XBMC Media Center and/or MeediOS programs – detect & skip commercials
- Tablets
- Smartphones
- Etc

Analog – “measure” – continuous, i.e., analog, i.e., waves set of real numbers, i.e., real line 

- Ears detect sound waves, i.e., patterns of pressure changes in the atmosphere
- Eyes detect changing intensity of light waves
- Touch detects changing intensity of pressure on our skin

Digital – “count” – discrete samples of data, used to represent an analog signal set of integers 

- Sufficient digital samples of an analog signal can be used to reproduce a good enough representation of an analog signal to satisfy most users, but there is the possibility that there will always be some users who can detect the differences
- Analog to Digital Conversion
 - Sampling the analog wave, i.e., selecting specific points on the analog curve to represent by their x & y values
- Digital to Analog Conversion
 - Connecting the digital points with short straight lines to approximate the original analog curve; adequate for most users



- Advantages of Digital
 - Reduced amount of data required to reproduce music, video, pictures, etc, allow for the development of MP3 files, ease of data transfer, HDTV, Google Maps, video cameras embedded in cell phones, web-based TV & Radio, etc.
 - Small devices now hold huge collections of a large variety of data
 - Immediate access to almost everything

- **Digital Telephony – equipment that supports voice communications over a distance**
 - **Cell phones -- full feature phones**
 - ✓ Internet access
 - ✓ Text messaging
 - ✓ Digital image & video capture
 - ✓ Personal Information Management (PIM) services
 - ✓ CPU, Memory, I/O units
 - ✓ **Smartphones -- cell phone features**
 - ✓ data plan
 - ✓ large screen
 - ✓ WiFi
 - ✓ Operating System
 - ✓ Application Software
 - **Cellular Operations**
 - ✓ analog-to-digital converter chip – converts information to-and-from
 - ✓ digital signal processor – compress & decompress information
 - ✓ amplifier boosts analog signal for listener
 - **Cellular Network**
 - ✓ Set of connected geographical areas,
each centered on a base transceiver station, i.e.,
tower supporting antennas, amplifiers, receivers, transmitters
 - ✓ Base station picks up request for service
 - ✓ Passes the request on to a central location, i.e., Mobile Switching Center
 - ✓ As you move from one area to another, when the signal is no longer strong enough, the Mobile Switching Center selects another base transceiver station to support the call
 - **Cell Phone Components**
 - ✓ **CPU Activities**
 - ▶ Coordinates all data movement
 - ▶ Provides user interface
 - ✓ **CPU Types/Vendors**
 - ▶ Qualcomm Snapdragon processor
 - ▶ Apple A4 processor
 - ▶ Marvell XScale processor
 - ✓ **Operating Systems Types/Vendors**
 - ▶ Windows Phone 7
 - ▶ Apple iPhone iOS
 - ▶ HP Pre webOS
 - ▶ Google Android -- Open Source
 - ▶ MeeGo -- Open Source
 - ▶ Symbian -- Open Source
 - ▶ Openmoko -- Open Source
 - ✓ **Memory Types**
 - ▶ ROM
 - ▶ RAM
 - ▶ Rewritable ROM – flash memory
 - ✓ **Mobile DTV Standard**
 - ▶ Enables smartphones/tablets to receive free TV broadcasts

- ✓ Smartphone software
 - ▶ www.getjar.com
 - ▶ Android Market

- ✓ Synchronizing: Computer — Smartphone
 - ▶ micro SD cards
 - ▶ USB ports & mini-USB ports
 - smartphone appears as a flashdrive – drag & drop files
 - ▶ Windows – Control Panel – Sync Center
 - Connect device to Windows 7 machine
 - Launch Sync Center
 - Select the SET UP NEW SYNC PARTNERSHIPS options
 - ▶ Wireless
 - Bluetooth Technology
 - radio wave transference 30-60 feet
 - accessories – earpieces, mice, keyboards, stereo headsets
 - WiFi 3G/4G cloud service connection
 - Sugar Sync
 - data & photos: Android phone ↔ computers
 - Google Sync
 - iPhones, Blackberry Symbian, Windows Mobile
 - Google's email, calendar events, contracts backed up on Google servers
 - Amazon Kindle
 - Syncs bookmark from any source
 - Apple iOS 5
 - Enables cloud support for Calendar, iTunes, PhotoStream, Contracts, and Mail

- ✓ Text Messaging
 - ▶ Short Message Service (SMS)
 - Cell phone network
 - ≈ 160 characters – text only
 - **store-and-forward** technology
 - quicker than email – why??
 - text-prediction algorithm, e.g., T9 “text on 9 keys” algorithm
learns from usage patterns
 - ▶ Multimedia Message Service (MMS)
 - Supports text, sound, images, video
 - Subscription services push MMS information

- ✓ Mobile Internet
 - ▶ wireless Internet Service Provider (wIPS)
 - ▶ connectivity plan (data plan)
 - ▶ data transfer speed
 - cable or fiber-optic maximum ≈ limited ≤ 50 Mbps
 - 3G maximum ≈ limited ≤ 0.6 – 2.3 Mbps
 - 3G common in all areas
 - 4G maximum ≈ limited ≤ 100 Mbps
 - 4G currently rolling out across US
 - Most providers limited ≤ 3 – 6 Mbps (“near 4G” networks)

- ▶ **Creating Personal WiFi Hotspots**
 - **MiFi Device**
 - fits in shirt pocket
 - connects to the internet via 3G wireless phone network
 - resulting WiFi signal carries up to 30 feet
 - supports five WiFi devices
 - **Tethering**
 - iPhone 4 connects to notebook computer via Bluetooth
 - provides Internet access via 3G network signal
- ▶ **Internet Display on Smartphones**
 - **Microbrowser software optimizes content for smaller screen**
 - **Small-screen rendering technology**
 - **Smartphones with larger screens**
 - **Wireless Markup Language provides**
 - text-based content
 - contains no graphics
 - designed for a small screen
- ▶ **Email via Smartphones**
 - **Larger screens**
 - **Integrated keyboards**
- ✓ **Cell Phone / Smartphone Features**
 - ▶ **MusicID – identifies song titles by listening to song fragment**
 - ▶ **Subscriptions to HD radio stations**
 - ▶ **Navigation devices – AT&T Navigator**
 - **Turn-by-turn instructions**
 - **Real-time traffic conditions**
- ✓ **Cell Phone / Smartphone Security**
 - ▶ **Viruses**
 - **Symantec Mobile Security**
 - **Android**
 - **Windows Mobile**
 - **Blackberry**
 - **Symbian OS**
 - **Frequently check manufactures website for software upgrades**
 - **Limit download only from reliable sites**
 - ▶ **Restrict phone number distribution**
 - **Physical restrictions**
 - **Virtual phone number is assigned to ring on an actual phone**
 - **Telusion: www.tossabledigits.com**

- Voice over Internet Protocol (VoIP)
cell phone / smartphone call quality ≪ land line call quality
land line phone plans less expensive than cell phone / smartphone plans

Voice-based internet communication

- ✓ analog voice data converted into packets of digital information
- ✓ packets sent over diverse paths through the internet graph
- ✓ packets are reassembled at the destination and converted back to analog data

Equipment

- ✓ speakers
- ✓ microphone
- ✓ internet connection
- ✓ VoIP provider

Providers

- ✓ Skype www.skype.com
 - Install free skype software
 - Free internet calls to other Skype users
 - Calls to non-Skype users subject to small fee
 - Create Skype account
 - Manage online status
 - View contact list
 - Integrate skype service into facebook news feed
- ✓ Vonage www.vonage.com
 - Setup is a bit more complicated
 - Service is not free
- ✓ Comcast / Verizon
 - provide VoIP services as an option when bundled with an
 - Internet plan or
 - cable TV plan
- ✓ iPad
- ✓ Sony Vita

Advantages

- ✓ Low cost
- ✓ Portable – internet connection

Disadvantages

- ✓ Poor sound quality
- ✓ Questionable reliability
- ✓ Power interruption – loss of service
- ✓ Security risks
 - Spam
 - Hackers
 - Fraud
 - Etc

Internet-Based Digital Phone System

- ✓ Phone messages bundled as e-mails
- ✓ Incoming calls displayed on TV screen with caller ID info
- ✓

Digital Media & Information

- **Digital Publishing**
- **Digital Music**
- **Digital Photography**
- **Digital Video**
- **Digital Navigation**

Digital Convergence