**MULTIMEDIA AND ANIMATION**

**BRANCH: CS/IT**

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**MULTIMEDIA AND ANIMATION**

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**UNIT -1**

**INTRODUCTION TO MULTIMEDIA SYSTEM**

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**WHAT IS MULTIMEDIA**

**Multimedia is content that uses a combination of different content forms such as text, audio, images, animations, video and interactive content. Multimedia contrasts with media that use only rudimentary computer displays such as text-only or traditional forms of printed or hand-produced material.Multimedia is the field concerned with the computer-controlled integration of text, graphics, drawings, still and moving images (Video), animation, audio, and any other media where every type of information can be represented, stored, transmitted and processed digitally.**

**EVALUATION of Multimedia**

1. **1. Multimedia is media and content that uses a combination ofdifferent content forms. The term can be used as a noun (amedium with multiple content forms) or as an adjectivedescribing a medium as having multiple content forms. Theterm is used in contrast to media which use onlyrudimentary computer display such as text-only, ortraditional forms of printed or hand-produced material.Multimedia includes a combination of text, audio, stillimages, animation, video, or interactivity content forms.**
2. [**2.**](https://image.slidesharecdn.com/project-120909004647-phpapp02/95/history-of-multimedia-2-728.jpg?cb=1347151722)**The printing press was invented in the Holy Roman Empire bythe German Johannes Gutenberg around 1440, based onexisting screw presses. Gutenberg, a goldsmith by profession,developed a complete printing system, which perfected theprinting process through all of its stages by adapting existingtechnologies to the printing purposes, as well as makinggroundbreaking inventions of his own.**
3. [**3.**](https://image.slidesharecdn.com/project-120909004647-phpapp02/95/history-of-multimedia-3-728.jpg?cb=1347151722)**The newspaper in its modernform is usually regarded asbeginning in 1566, when thegovernment of Venice, Italy,issued written news-sheetsand exhibited them in thestreets. Anyone was allowedto read them on payment of asmall coin called Gazetta. Onthis account the news-sheetswere called gazettes.**
4. [**4.**](https://image.slidesharecdn.com/project-120909004647-phpapp02/95/history-of-multimedia-4-728.jpg?cb=1347151722)**In 1822, Charles Babbage proposed the useof such a machine in a paper to the RoyalAstronomical Society on 14 June entitled"Note on the application of machinery to thecomputation of astronomical andmathematical tables". This machine used thedecimal number system and was poweredby cranking a handle.**
5. [**5.**](https://image.slidesharecdn.com/project-120909004647-phpapp02/95/history-of-multimedia-5-728.jpg?cb=1347151722)**The Analytical Engine was a proposedmechanical general-purposecomputer designed by Englishmathematician Charles Babbage. It was firstdescribed in 1837 as the successor toBabbages Difference Engine, a design for amechanical computer.**
6. [**6.**](https://image.slidesharecdn.com/project-120909004647-phpapp02/95/history-of-multimedia-6-728.jpg?cb=1347151722)**In 1879 Thomas Edison granted thepatent of photographs.**
7. [**7.**](https://image.slidesharecdn.com/project-120909004647-phpapp02/95/history-of-multimedia-7-728.jpg?cb=1347151722)**1886:Burroughs First commercially successful adding machine.**
8. [**8.**](https://image.slidesharecdn.com/project-120909004647-phpapp02/95/history-of-multimedia-8-728.jpg?cb=1347151722)**The first primitive radio transmitters (calledHertzian oscillators) were built by Germanphysicist Heinrich Hertz in 1887 during hispioneering investigations of radio waves.These generated radio waves by a highvoltage spark between two conductors.**
9. [**9.**](https://image.slidesharecdn.com/project-120909004647-phpapp02/95/history-of-multimedia-9-728.jpg?cb=1347151722)**The tabulating machine was an electrical device designed to assist in summarizing information and, later, accounting. Invented by Herman Hollerith, the machine was developed to help process data for the 1890 U.S. Census. It spawned a larger class of devices known as unit record equipment and the data processing industry.**
10. [**10.**](https://image.slidesharecdn.com/project-120909004647-phpapp02/95/history-of-multimedia-10-728.jpg?cb=1347151722)**In 1890, Louis Glass and William S.Arnold invented the nickel-in-the-slotphonograph, the first of which was anEdison Class M Electric Phonographretrofitted with a device patentedunder the name of Coin ActuatedAttachment for Phonograph. Themusic was heard via one of fourlistening tubes. Early designs, uponreceiving a coin, unlocked themechanism, allowing the listener toturn a crank which simultaneouslywound the spring motor and placedthe reproducers stylus in the startinggroove.**
11. [**11.**](https://image.slidesharecdn.com/project-120909004647-phpapp02/95/history-of-multimedia-11-728.jpg?cb=1347151722)**Steamboat Willie is a 1928American animated shortfilm directed by WaltDisney and Ub Iwerks. It wasproduced in black-and-whiteby The Walt Disney Studio andreleased by CelebrityProductions. The cartoon isconsidered the debut of MickeyMouse, and hisgirlfriend Minnie.**
12. [**12.**](https://image.slidesharecdn.com/project-120909004647-phpapp02/95/history-of-multimedia-12-728.jpg?cb=1347151722)**Magnetic tape was invented for recordingsound by Fritz Pfleumer in 1928 inGermany, based on the invention ofmagnetic wire recording by ValdemarPoulsen in 1928. Pfleumers inventionused a ferric oxide (Fe2O3) powdercoating on a long strip of paper. Thisinvention was further developed by theGerman electronics company AEG, whichmanufactured the recording machinesand BASF**
13. [**13.**](https://image.slidesharecdn.com/project-120909004647-phpapp02/95/history-of-multimedia-13-728.jpg?cb=1347151722)**The Atanasoff–Berry Computer (ABC) was thefirst electronic digital computing device. Conceived in1937, the machine was not programmable, beingdesigned only to solve systems of linear equations.**
14. [**14.**](https://image.slidesharecdn.com/project-120909004647-phpapp02/95/history-of-multimedia-14-728.jpg?cb=1347151722)**1943:Zuse – Z3: First machine towork on a binary system rather thandecimal system.**
15. [**15.**](https://image.slidesharecdn.com/project-120909004647-phpapp02/95/history-of-multimedia-15-728.jpg?cb=1347151722)**1948:Shockley, Bardeen andBrattain develop the transistor.More reliable and cheaper to run the vacuum tube.**
16. [**16.**](https://image.slidesharecdn.com/project-120909004647-phpapp02/95/history-of-multimedia-16-728.jpg?cb=1347151722)**IBM 701: First electronic stored computer that use vacuum tubes, Ram,punch cards and was the size of a piano,was announced to the public on April 29, 1952**
17. [**17.**](https://image.slidesharecdn.com/project-120909004647-phpapp02/95/history-of-multimedia-17-728.jpg?cb=1347151722)**In 1972 the firstcommercial videogame was releasedby he atari inc.**
18. [**18.**](https://image.slidesharecdn.com/project-120909004647-phpapp02/95/history-of-multimedia-18-728.jpg?cb=1347151722)**SONY Betamax VCR with a onehour, ½ inch video cassette tape.1975.**
19. [**19.**](https://image.slidesharecdn.com/project-120909004647-phpapp02/95/history-of-multimedia-19-728.jpg?cb=1347151722)**Facebook was launched in February 2004, owned and operatedby Facebook, Inc. Facebook was founded by MarkZuckerberg with his college roommates and fellowstudents Eduardo Saverin, Andrew McCollum, DustinMoskovitzand Chris Hughes. The websites membership wasinitially limited by the founders to Harvard students, but wasexpanded to other colleges in the Boston area, the Ivy League,and Stanford University.**
20. [**20.**](https://image.slidesharecdn.com/project-120909004647-phpapp02/95/history-of-multimedia-20-728.jpg?cb=1347151722)**YouTube is a video-sharing website,created by threeformer PayPal employees in February2005, on which users can upload, viewand share videos.**
21. [**21.**](https://image.slidesharecdn.com/project-120909004647-phpapp02/95/history-of-multimedia-21-728.jpg?cb=1347151722)**Twitter is an online social networking service and microblogging service that enables its users to send and read text-basedmessages of up to 140characters, known as "tweets". It was created inMarch 2006 by Jack Dorsey and launched that July. The servicerapidly gained worldwide popularity, with over 500 million activeusers as of 2012, generating over 340 million tweets daily andhandling over 1.6 billion search queries per day.**

**Multimedia Hardware**

1. **1. Multimedia Hardware IT: Multimedia**
2. [**2.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-2-638.jpg?cb=1400696281)**Intensive Work • Multimedia projects involve working with lots of different types of media • Usually this will require faster or special purpose hardware • Not only in production, but rendering (producing the final presentation) can be very intensive work for a computer**
3. [**3.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-3-638.jpg?cb=1400696281)**Desktop vs. Laptop Desktop Laptop Performance Faster, more options Lower power consumption Portability Not really Absolutely Cost Excellent value for money Usually a premium price tag Keyboard Easier to work with Designed for portability Screen Multiple large screen options The bigger the screen, the less battery time Upgrading Swapping parts is easy Can be difficult and costly Generally, multimedia designers will usually have both a desktop and a laptop. The desktop for designing and their laptop for presenting.**
4. [**4.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-4-638.jpg?cb=1400696281)**Apple PC vs Windows PC • Apple has traditionally dominated content creation with media • Changed over time due to a larger range of more powerful options with Windows-based PC’s • Apple platform still maintains strong presence due to quality software (Final Cut, Logic Pro, etc.) not available on Windows**
5. [**5.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-5-638.jpg?cb=1400696281)**CPU – Central Processing Unit • The “brain” of the computer • It’s the component that does all the heavy lifting (computational work) • The faster the processor, the faster the computer can work • Two factors – speed vs multi core**
6. [**6.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-6-638.jpg?cb=1400696281)**CPU Speed • Raw speed of a CPU, measured in Hertz • Data cycles through the CPU, the higher the Hertz, the faster it travels • Most multimedia systems will have a CPU speed of over 3GHz**
7. [**7.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-7-638.jpg?cb=1400696281)**Multicore / Multi-threaded • These are CPU’s that have more than one processor built in • Data is usually shared between them to reduce computing time • Therefore a slower multicore CPU can (in some instances) perform better than a fast single core • Application dependent – software must work with Multicore for the benefit**
8. [**8.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-8-638.jpg?cb=1400696281)**What’s better for Multimedia? • Multi-threaded systems tend to suit multimedia project more as long as the software being used supports it • Major applications – Adobe, Autodesk, etc. all now support multicore systems**
9. [**9.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-9-638.jpg?cb=1400696281)**RAM – Random Access Memory • Temporary storage area • This is where projects you are working on reside until you save to permanent storage • Holds data for the CPU waiting for it to be processed**
10. [**10.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-10-638.jpg?cb=1400696281)**How important is RAM? • Very! • The more RAM you have, the more applications you can work on at the same time • The faster your RAM is, the more your processor can do (latency and speed) • Modern multimedia systems will generally have at least 8GB of DDR3 RAM**
11. [**11.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-11-638.jpg?cb=1400696281)**GPU • This is like the CPU but designed for graphics • The GPU will often determine how fast images/graphics will move when animated • Determines the computers maximum display resolution • Can have more than one core (just like a CPU)**
12. [**12.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-12-638.jpg?cb=1400696281)**Graphics Cards • Have a processor to move graphics (GPU) • Have RAM to store data being worked on • As they can process a lot, they usually require lots of cooling • Vital to any multimedia workstation**
13. [**13.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-13-638.jpg?cb=1400696281)**The power of the GPU • As GPU performance is now outpacing CPU performance, many organisations are relying on GPU’s for all their processing (GPGPU) • Technologies, such as nVidia’s CUDA, allow applications such as Autodesk 3D Studio Max and Adobe Premiere to use the GPU for more than just moving graphics around • CUDA has thousands of small cores that process data at the same time (parallel computing)**
14. [**14.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-14-638.jpg?cb=1400696281)**Motherboard • Sometimes called Mainboard • Component that connects everything together • Controllers for moving data around the computer • Processor brand/type specific – usually can’t mix and match between architectures • Some will contain built-in components such as GPU or Sound Processor**
15. [**15.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-15-638.jpg?cb=1400696281)**Sound Cards • Needed so you can hear sound from your computer • Converts digital data into sound waves • Most systems have a sound controller built into the Motherboard and use the CPU for processing • Audiophiles and sound professionals will have a dedicated DSP for this**
16. [**16.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-16-638.jpg?cb=1400696281)**Digital Signal Processor (DSP) • Is just like a GPU but for sound • Music artists and multimedia designers will usually have a dedicated card with a DSP to handle sound processing • Handle multiple channels simultaneously and produce better quality audio**
17. [**17.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-17-638.jpg?cb=1400696281)**Storage: Hard Disk Drive (HDD) • HDD – traditional storage medium for nearly all computers • Mechanical disk made up of metal platters that are magnetised to hold data**
18. [**18.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-18-638.jpg?cb=1400696281)**Storage: Solid State Drive (SSD) • A combination of a Flash USB drive and a Hard Disk Drive • No moving parts • Becoming far more common • Popular with light weight, portable devices**
19. [**19.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-19-638.jpg?cb=1400696281)**SSD vs. HDD… Which is better? SSD HDD Performance So much faster that it’s not funny Slowest component in a computer Reliability Not quiet there yet but improving Tried, tested technology that will last for years Cost More expensive per GB Cheap as chips Versatility Smaller, lighter, less power consumption Large device that doesn’t like shock and runs hot Both. Most multimedia workstations will have a SSD for common applications for performance and use HDD where lots of storage is required.**
20. [**20.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-20-638.jpg?cb=1400696281)**Monitors • Often overlooked but incredibly important • A good quality monitor will represent colours correctly – cheap ones usually don’t • Larger sizes are important as they will support higher resolutions (fit more stuff on the screen) • Most designers will usually have more than one connected to their computer and have a large screen capable of better than 1920x1080 resolution**
21. [**21.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-21-638.jpg?cb=1400696281)**Keyboard & Mouse • Vital input devices • Don’t go cheap on these – your hands won’t forgive you • A good quality mouse can make the difference between clean, accurate designs and dodgy lines • Keyboard types – traditional vs mechanical • Mouse types – Optical vs laser**
22. [**22.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-22-638.jpg?cb=1400696281)**Other Components • Chassis or case – box that holds all the parts of a computer • Power supply – device that converts AC into DC for the computer and powers all components • Optical Drives – CD/DVD/Blu-Ray – input and output mediums used for many multimedia projects**
23. [**23.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-23-638.jpg?cb=1400696281)**Other devices • Drawing tablets – connect to your PC and allow you to draw using a stylus/pen • Headphones/speakers – essential with multimedia presentations • External storage – USB drives, hard disk drives, etc. for backup**
24. [**24.**](https://image.slidesharecdn.com/hardware-140521174046-phpapp02/95/multimedia-hardware-24-638.jpg?cb=1400696281)**Typical Multimedia Designer’s System CPU Multicore, 3GHz + such as Intel i7, Intel Xeon, or AMD FX RAM At least 8GB DDR3 (2 x 4GB) GPU At least 1GB nVidia GeForce or nVidia Quattro DSP Some form of dedicated sound card Storage 1 x SSD for Operating System and applications 1+ HDD for files and production work Monitor 1+ 24 inch with at least 1920x1080 resolution, preferably 2560 x 1440 Others Good quality keyboard, mouse, drawing tablet, headphones, optical drive Chassis Large, quiet, cool case with a power supply big enough to run it all (600+ watt)**

**MULTIMEDIA**

**Software Requirements:**

**Adobe CS4:**

**Adobe CS4 is a collection of graphic design, video editing, and web development applications.**

**Adobe Fireworks:**

**A graphics package that allows users to create bitmap and vector graphics editor.**

**Google Sketchup:**

**SketchUp is a 3D modeling program designed for architects, civil engineers, filmmakers, game developers, and related professions.**

**Photoshop Pro:**

**Adobe Photoshop, or simply Photoshop, is a graphics editing program developed and published by Adobe Systems.**

**Adobe Shockwave**

**Adobe Shockwave (formerly Macromedia Shockwave) is a multimedia player program, first developed by Macromedia, acquired by Adobe Systems in 2005.**

**Hardware requirements for creating multimedia:**

**1. Video cameras:**

**These are used to create videos in digital format.**

**2. Digital cameras:**

**The input devices that capture and store images in digital form instead of film.**

**3. Microphones:**

**The input devices that capture sound.**

**4. Flatbed scanner**

**5. Sheetfed scanner**

**6. Barcode scanner**

**7. 3D scanner**

**8. Traditional film camera**

**9. USB cable**

**10. Firewire cable**

**11. Video capture card**

**12. Soundcard**

**13. Keyboard piano**

**14. Audio synthesizer**

**15. Monitor**

**16. CPU**

**Software requirements for creating multimedia:**

**1. Microsoft Powerpoint:**

**These are used in slide making for the class and office presentations which comprise texts, graphics, pictures etc.**

**2. Adobe flash player:**

**These are used to create animation in slides.**

**3. Adobe Shockwave**

**4. Microsoft Frontpage**

**5. Google Sketchup**

**6. Adobe Fireworks**

**7. Gimp**

**Multimedia Communication And Display Device**

**The present invention relates to a novel multi-media display and communications apparatus, and in particular to such an apparatus which may be incorporated into various products, and especially into wearing apparel.**

**Background of the Invention**

**Humans are social animals. They engage each other through a variety of communication channels. They talk with each other, they take photographs and movies of each other, and through advances such as smart phones, they transfer and exchange information (and gossip) on a continuous basis, irrespective of where the parties the such exchange are located. Humans also are expressive creatures. They express themselves both through the media that they employ to communicate with each other, as well as through their physical actions and the clothes they wear. As technology expands, there is an increasing melding of the different expressive modes and the communication channels by which people express themselves and share their thoughts and feelings with each other.**

**Brief Description of the Invention**

**The present invention provides for a multi-media communications device that allows the display of information in a unique and innovative personal manner. It comprises a microprocessor "brain" that controls audio and video display devices and allows for the wireless receipt of data from external sources to drive the display devices. Innovatively, the display devices are of a nature that allows them, and the associated drive and control components, to be integrated into a wide variety of products. In particular, they may be integrated into items of wearing apparel, such as shirts. With the video display device integrated into the front or back of a shirt, for example, the wearer can be an electronic billboard or movie screen, the shirt displaying video images that are received wirelessly and/or stored by the device. Speakers likewise integrated into the shirt can provide accompanying sound.**

**Control signals for the device may likewise be transmitted wirelessly to the processor, such as through known "Bluetooth" technology. The device may¬ be linked through such a Bluetooth connection to a portable device under the control of the wearer, such as a smartphone or other device. Through commands entered through the smartphone, the wearer can direct the device to play audio-visual media as desired, whether transmitted by the remote device or generated or stored by the device. The device may incorporate other peripherals, such a camera or a microphone to allow it to record audio-video data, as well as sensors such as an accelerometer to permit the coordination between the recording or display of data and a physical action, such as a jump by the wearer. Because a preferred implementation of the invention is in the form of a t-shirt, the invention may be from time to time re ferred to herein as "the Shirt".**

**Brief Description of the Drawings**

**A fuller understanding of the invention may be achieved upon consideration of the following detailed description of an illustrative embodiment thereof and the annexed drawings, wherein:**

**Fig. 1 is a block diagram of the operative elements of the invention;**

**Fig. 2 is a depiction of the construction format of the video display of the invention;**

**Fig. 3 is pictorial view of the layout of a printed circuit board carrying the main processor of the Shirt and other components;**

**Fig. 4 depicts the bytes in a wireless data transmission to the shirt for display of the word "Hello"; Fig. 5 is a depiction of a t-shirt bearing the Shirt invention, with components shown in phantom; and Fig. 6 is a depiction of the t-shirt of Fig. 5 illustrating the actual appearance of the garment, with the components hidden.**

**Detailed description of the invention As depicted in Fig. 1 , the multi-media communications and display**

**Shirt device of the present invention comprises a processor system having a microprocessor 10 that controls the operation of peripherals connected thereto and processes received data and instructions for the peripherals. It may be 32 bit system, such as an ATSAM3S processor. A battery pack power supply 12 powers the processor as well as all the other components of the system. As well known, the power supply may include, or be coupled to, charging, filtering and regulation circuitry needed to provide the power at the appropriate ratings for each of the devices it powers and to allow the battery to be recharged as needed.**

**The microprocessor provides the signals to operate the video display panel 16 and stereo speakers 18. which may be coupled to the microprocessor through appropriate amplification circuitry. The processor also controls the operation of a video camera 20 and a microphone 22, allowing the inputting of audio/video material. The camera may be coupled to the microprocessor through an appropriate interface as known, such as a CX93510 encoder, which takes the raw image data from the camera and converts it to a form usable by the microprocessor. In addition to the storage provided in the processor itself, external flash memory 26 may be prov ided for the processor, along with an RS422 interl ace 28. The memory allows for the retention of video and audio data for later display upon receipt of appropriate commands. A micro-accelerometer sensor 24, such as the Analog Devices model ADXL345. a three-axis unit that serves also as a tilt sensor, may also be operative ly connected to the processor. External operating instructions and display data are delivered to the processor 10 by a wireless receiver, such as Bluetooth receiver 14, which may be, for example, a Bluegiga Technologies WT32 unit. The Bluetooth receiver allows the device to be coupled to another Bluetooth-enabled device, such as a smartphone. The smartphone in turn is supplied with an application that allows it to generate the control signals appropriate to operate the device and transmit to the device data, such as text and image data, to be**

**presented/displayed by the device. The application may allow, for example, images received by the smartphone's camera or stored by the smartphone to be transmitted to the device and shown on the device screen. To the smartphone or other Bluetooth device to which the Shirt is coupled the inventive device appears simply as another Bluetooth peripheral with its own application programming interface (API).**

**Video display 16 is preferably an LED matrix, configured and constructed to be both flexible and water resistant, allowing it to be mounted to fabric, such as a shirt front, in a manner that substantially preserves the wearability, washability, and flexibility of the garment. Preferably, it is fabricated as a two layer flexible printed circuit board (PCB) film of polyimide, 170 microns in thickness, with components mounted to both sides. The PCB may be mounted on the inside surface of the shirt fabric intended to be the video "screen" with two layers of a mesh fabric, preferably that known in the trade as "powermesh", a nylon/spandex blend fine mesh fabric serving as a diffuser between the PCB film and garment fabric. As depicted in Fig. 2, the LE D matrix itself is divided into 32 sections, each of which comprises 32 multicolor LED devices arranged with 1 cm spacing in a 4x8 rectangular matrix, and driven by a microprocessor, such as an ATMEGA644M or P RISC microcontroller, as known in the art. Each LED forms a pixel of the overall display. The LED sections or matrixes themselves are arranged to form a 32 by 32 pixel square display, with 1024 LED pixels total.**

**As known in the art, the LEDs of each section and the sections themselves are multiplexed and switched by the processor such that each LED is sequentially provided with an appropriate signal to have it i lluminate at the correct color and intensity to produce the desired overall image.**

**Switching between the four rows of a section of LEDs may be performed by p- channel power MOSFETs, such as the FDME 1023PZT, a small dual MOSFET, to minimize the board real estate needed, while the cathodes of the LEDs are led through appropriate load resistors to the corresponding processor switch outputs. The section processors are clock-matched to the main processor 12 to achieve a fast error-free data transfer rate and allow the video data to be delivered to the processors of the array with only a single signal control line and a ground, in addition to the lines carrying the data to be displayed.**

**Fig. 3 depicts the arrangement of major components on a main PCB 32. The main PCB carries main "brain" microprocessor 10, as well as associated circuitry and components, including some of the peripherals, such as the camera 20 and accelerometer 24. The PCB board may be of multi-layer rigid design, with two snap connectors 30 connecting the board to the LED display through a I X (transmit) and a ground line. The PCB carrying the microprocessor and associated components may sit in an internal pocket on the shirt, and is thus removable, while the LED array is permanently affixed to the shirt. Given the different power demands of the microprocessor and other main PCB components on the one hand and the display matrix 16 on the other, the battery pack 12 may be in two parts, with power for the main PC B board being provided by a board-mounted supply (which may be part of the B luetooth transceiver 14). Power for the matrix is supplied by another battery pack 52 (Fig. 5) located at the matrix and able to be disconnected therefrom for charging. An independent charger may be provided to charge both batteries, such as through USB ports. The main PCB may carry a power management and battery charging circuit 34 to condition and distribute battery power as appropriate to components. The main PCB is also connected to the video display 16 by a multi-conductor ribbon cable (not shown) carrying the display signal data. The ri bbon cable is disconnectable from the PCB. as are the snap connectors 30, to allow the PCB to be removed from the pocket. Because the Shirt is also capable of recording video through camera 20 and audio through microphone 22. main PCB may also carry the video processor/encoder CX935 1 0 38 for camera 20 as well as a jack 36 to input audio from the microphone 22, typically located remote to the board. Jack 36 may also be used to couple generated audio (amplified by amplifier 1 8a) to the speakers 1 8.**

**As indicated above, user-generated control commands for the microprocessor 10 are issued by the smartphone or other wireless device to which the Shirt is Bluetooth coupled. "Short" commands generated by the API in the phone, instructing the Shirt to take or report some action, are typically 4 bytes long. Each 4 byte command comprises a 2 byte header, a following single byte identifying the nature of the command, and a final, argument byte which sets any settings relevant to the command. If no argument is relevant, the last byte is zero. "Long" commands can also be issued to carry or deliver a payload of data, such as a photo or text to be displayed, rather than to set a mode or function for the Shirt. At present the types of data to be sent to the Shirt are text and images. Thus there are only two long commands. Other long commands can be developed to send other types of data.**

**A long command comprises a 2 byte (bytes 0 and 1 ) header, followed by a command byte (byte 2) setting forth the type of data being delivered (e.g. hex 40 for text). Byte 3 is the address where the data transmitted is to be stored at the Shirt. The received data will overwrite any prior data at that location. The next byte (4) represents the payload length. For a text transmission the payload length is the actual number of characters in the phrase. The maximum length is thus 255. "Hello", for example, would have a payload length of 5. corresponding to the 5 letters in the word. If a group of commands include data that are to be displayed sequentially, the addresses for the data should be sequential.**

**The next bytes in the string are the actual bytes of the payload. For "Hello" bytes 5 through 9 would be used, each byte being the actual ASCII value for the corresponding letter or character. The final byte of the string is a checksum. Fig. 4 depicts the string for "Hello".**

**For sending images bytes 0 through 2 are of the same format as for a text (with. e.g.. the command byte being decimal 65 to denote an image). The fourth byte denotes whether the image data is compressed. For compressed image data each pixel may be, for example, one of 256 colors, and thus can be represented by a single byte. With limited memory available, compression is presently required. With 3 color LEDs a single byte of data is sufficient to describe 256 colors, with the 8 available bits of each byte being allocated among the red, green and blue color channels. Red and green are allocated 3 bits each, while blue, the shades of which are less able to be differentiated by the human aye, being allocated 2 bits (3:3:2 compression), allowing 8 levels for red and green and 4 levels of blue to be designated and combined as needed to generate the 256 colors. With a LED image display area fixed at 32 by 30 pixels (which is smaller than the available display space), the total number of bytes of the payload will always be 960 (32 x 30). The bytes following the compression byte (bytes 5 - 965) are the 960 bytes of the payload. Again, the last byte of the message string is a checksum. The payload bytes are arranged in column order.**

**All instructions sent to the Shirt require a response. The response will differ depending on the command given. All responses, however, begin with a 1 byte header, followed by a 1 byte identification of the type of response, for example a general status update. The third byte of the response is the argument that indicates the value of the response, for example an acknowledge or negative acknowledge (error).**

**In addition to the display of text and images/video transmitted from a remote control device via Bluetooth, the Shirt can also collect local data. Images captured by camera 20 can be transmitted by the Bluetooth connection to the coupled smartphonc. while the microphone 22 can capture sounds which can be stored and played back through the speakers. Because of the provision of both the microphone and speakers, the Shirt can also be used to answer telephone calls directed to the coupled smartphone using well known methodology and can likewise broadcast music streamed by the smartphone. Accelerometer 24 can be used to trigger certain events. If the wearer of the shirt has the controlling smartphone, for example, the wearer can issue a command for the Shirt to take a particular action when the accelerometer has a certain input, such as sensing a jump. In that regard the accelerometer can function as a switch.**

**Fig. 5 depicts the orientation of components of the invention.**

**Garment body 42 is in the form of a t-shirt, w ith the video display screen 16 and other Shirt components shown in phantom, as they are mounted upon the inner surface of the shirt front. PC B 32, bearing the main processor, camera and other components, is located in an internal pocket adjacent the video display which, as set forth above, is directly laminated upon the shirt inner surface. While the construction of the video display is such that the hand of the shirt is substantially retained, a zipper 44 is preferably provided at the back of the shirt to facilitate donning and removing the shirt. As further shown in Fig. 6, the components are not visible for the garment exterior, save for an entrance slot 50 for the internal PCB pocket, a small hole 46 in the garment aligned with the lens of camera 20 on the PCB board, and a hole 48 aligned with the audio and microphone jack 36, which at present provides the audio output and input through coupling with a plug of a headset (not shown) having earphones and a microphone. Control signals are sent by the remote transmitter, such a smartphone 54. Other audio systems, such as an external speaker system or garment- mounted speakers and a microphone can alternatively be provided to be plugged into the jack**

# Applications for Multimedia System

**Multimedia systems are powerful tools, but many people don’t use them to their full potential.**

[**Multimedia**](https://www.fiberplusinc.com/helpful-information/technology-trends-for-2017/)**applications typically involve programming code, enhanced user interaction, and multiple different types or forms of media. There are five core categories of multimedia that can be used as part of your multimedia system.**

## Text

**This seems so obvious that many people forget about it. Text content is the most common type of media used throughout multimedia systems and applications. Chances are, your multimedia system uses text and at least one other type of media to have functionality. Whether your text relays information or reinforces information, it is a crucial part of any multimedia system.**

## Images

**Many**[**multimedia systems**](https://www.fiberplusinc.com/systems-offered/integrate-your-audio-and-video-systems/)**include digital images as part of the application. Many applications use custom buttons or interactive elements to further customize the application. Other images can include basic digital image files like JPEGs or PNGs. These file types allow for good image quality without a large file size.**

## Audio

**In many multimedia systems, audio provides a crucial link between text and images. In applications, many audio files automatically play. If you are using your audio on the web, the end user might need to have a plug-in media player installed to access it. Common audio formats include MP3, WMA, and RealAudio.**

## Video

**Another common type of media found in multimedia applications is video. Digital video can be streamed or downloaded and compressed as needed to reduce the file size. The most common file formats are Flash, MPEG, AVI, WMV, and QuickTime. Just like audio files, the end user might need a plug-in installed before they can watch the video.**

## Animation

**Animation is a fun and common part of both online and desktop multimedia systems. Whether it means an interactive element that invites the user to engage with the application or simply a fun animation to watch, animation is a unique multimedia system element. Adobe Flash is commonly used to create animations viewable online.**

## Multimedia Systems from FiberPlus

**Whether you need an electronic security system installation, audio/visual support, structured cabling, or distributed antenna systems, FiberPlus has the expertise and experience to get the job done. We pride ourselves on offering our customers the best possible products, the best possible customer service, and the best possible prices.**