ARM 11 Based Location Positioning System

Kalipu Ashok & G S S Gowri

M.tech (embedded systems),Siddhartha Institute of Technology and Sciences

(Asst. Professor), Siddhartha Institute of Technology and Sciences

Abstract:

The project aims in designing location positioning system without using GPSCommunicationmodule. A positioning system is a mechanism for determining thelocation of an object in space. Technologies for this task exist ranging from world -wide coverage with meter accuracy to workspace coverage with sub-millimeter accuracy. A local positioning system (LPS) is a navigation system that provides location information in all weather, anywhere within the coverage of the network, where there isan unobstructed line of sight to three or more signaling beacons of which the exact position on earth is known. Unlike GPS or other global navigation satellite systems, local positioning systems don't provide global coverage. Instead, they use (a set of) beaconswhich have a limited range, hence requiring the user to be near these. Beacons include cellular base stations, Wi-Fi access points, and radio broadcast towers. A special type of LPS is the Real-time locating system; which also allows real-time tracking of an object or person in a confined area such as a building.

Introduction:

In this Project presents an automotive location positioning navigation system using GSM-SMS services. The system permits localization of the detection using base station network through GSM modem tower signals and transmitting the position to the ARM 11 processor the processor takes the responsibility to plot the positioning mapping onto the 3.5inch TFT LCD interfaced to Raspberry Pi 2 device.

The Raspberry Pi is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation. The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. It does not include a built-in hard disk or solid-state

drive, but uses an SD card for booting and long-term storage.

An embedded system is a combination of software and hardware to perform a dedicated task. Some of the main devices used in embedded products are Microprocessors and Microcontrollers.

Microprocessors are commonly referred to as general purpose processors as they simply accept the inputs, process it and give the output. In contrast, a microcontroller not only accepts the data as inputs but also manipulates it, interfaces the data with

Block diagram:
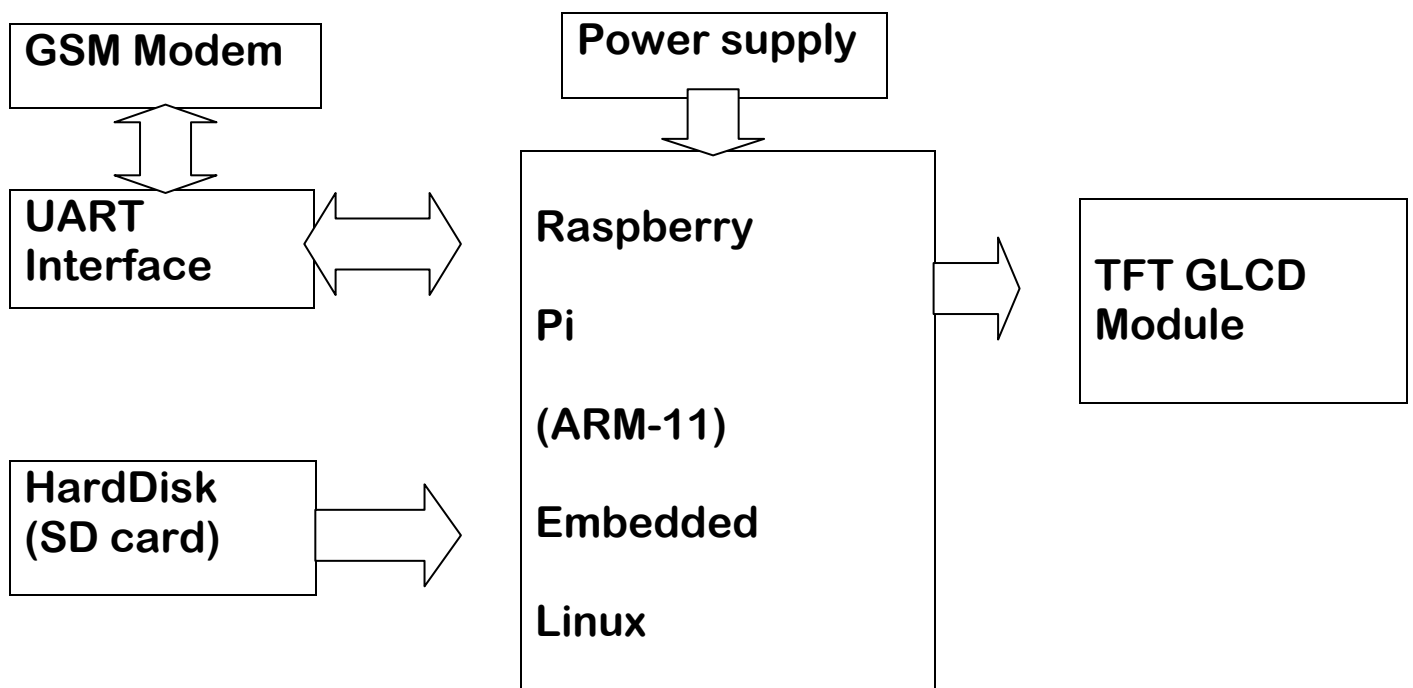
various devices, controls the data and thus finally gives the result. The project "ARM 11 based Local Positioning System" using ARM-11 processor is an exclusive project which can provide automated security access system for vehicle security applications.

Thesis:

The thesis explains the implementation of "ARM 11 based Local Positioning System" using ARM11 ARM1176JZF-S 700 MHz processor. The organization of the thesis is explained here with:

Power supply:

The AC adapter, AC/DC adapter or AC/DC converter is a type of external power supply, often enclosed in a case similar to an AC plug. Other names include plug pack, plug-in adapter, adapter block, domestic mains adapter, line power adapter, wall wart, or power adapter. AC adapters are used with electrical devices that require power but do not contain internal components to derive the required voltage and power from mains power. The internal circuitry of an external power supply is very similar to the design that would be used for a built-in or internal supply.

ARM Processor:

ARM designed basic core structure and licensed it to many partners who develop and fabricate new Micro Controllers and different chips.ARM processor is mainly intended in the development of embedded applications which involve complex computations (High-end applications)ARM architecture is based on Enhanced RISC architecture. Uniform and Fixed length instructions.Good speed/power consumption ratio and High code density

Control over ALU and Shifter (Barrel Shifter) which helps maximum usage of hardware on the chip. Auto increment and Auto decrement of addressing modes to optimize program loops. Load and Store multiple data elements through a single instruction, which increases data throughput.A lot of branch instructions which can be used in conjunction with a number of instructions, which maximizes execution throughput.

GSM modem:

GSM, which stands for Global System for Mobile communications, reigns (important) as the world's most widely used cell phone technology. Cell phones use a cell phone service carrier's GSM network by searching for cell phone towers in the nearby area. Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication.

GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz. It is estimated that many countries outside of Europe will join the GSM partnership.
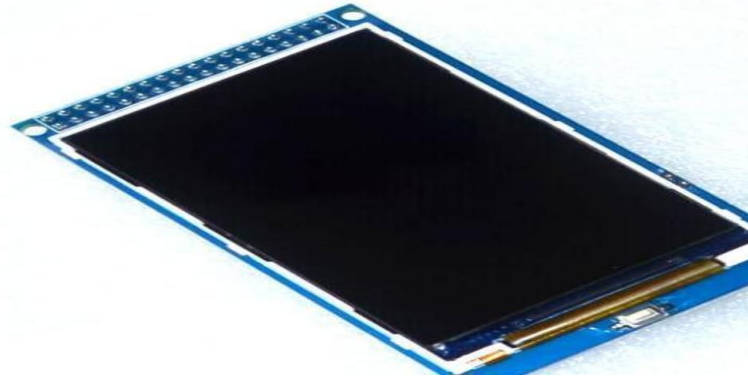
TFT GRAPHICAL LCD WITH TOUCH:

A **thin-film-transistor liquid-crystal display** (TFT LCD) is a variant of a liquid-crystal display (LCD) that uses thin-film transistor (TFT) technology to improve image qualities such as addressability and contrast. A TFT LCD is an active-matrixLCD, in contrast to passive-matrix LCDs or simple, direct-driven LCDs with a few segments.

TFT LCDs are used in appliances including television sets, computer monitors, mobile phones, handheld video gamesystems, personal digital assistants, navigation systems and projectors.

TFT LCDs are also used in car instrument clusters because they allow the driver to customize the cluster, as well as being able to provide an analogue-like display with digital elements.

Raspberry Pi:

The Raspberry Pi is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools.

The Raspberry Pi is manufactured through licensed manufacturing deals with Newark element14 (Premier Farnell), RS Components and Egoman. All of these companies sell the Raspberry Pi online. Egoman produces a version for distribution solely in China and Taiwan, which can be distinguished from other Pis by their red coloring and lack of FCC/CE marks. The hardware is the same across all manufacturers.

The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz

processor (The firmware includes a number of "Turbo" modes so that the user can attempt over clocking, up to 1 GHz, without affecting the warranty), VideoCore IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. It does notinclude a built-in hard disk or solid-state drive, but uses an SD card for booting and long-term storage.

Single-Board Computers
Raspberry Pi

	Raspberry Pi Model B	Raspberry Pi 2
Processor	ARM1176JZF-S core	Quad-core ARM7
Flash Memory	None	None
Clock Speed	700 MHz	800 MHz
RAM	512MB	1 GB
Price (approx, USD)	$39.95	$35.00
Other Features	2x USB ports 26x GPIO pins	4x USB2.0 40x GPIO pins

http://www.raspberrypi.org/

Image Source:http://www.techradar.com/news/computing-components/peripherals/raspberry-pi-2-outed-with-faster-cpu-double-ram-and-windows-10-support-1283075

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Result:

The project "ARM 11 based Local Positioning System" was designed such that to design location positioning system without using GPS communication module. Project presents an automotive location positioning navigation system using GSM-SMS services. The system permits localization of the detection using base station network through GSM modem tower signals and transmitting the position to the ARM 11 processor the processor takes the responsibility to plot the positioning mapping onto the 3.5inch TFT LCD interfaced to Raspberry Pi 2 device.

Conclusion:

Integrating features of all the hardware components used have been developed in it. Presence of every module has been

reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

Future Scope:

Our project "ARM 11 based Local Positioning System" is mainly intended to to design location positioning system without using GPS communication module. Project presents an automotive location positioning navigation system using GSM-SMS services.

In this Project presents an automotive location positioning navigation system using GSM-SMS services. The system permits localization of the detection using base station network through GSM modem tower signals and transmitting the position to the ARM 11 processor the processor takes the responsibility to plot the positioning mapping onto the 3.5inch TFT LCD interfaced to Raspberry Pi 2 device.

It was presented an Uploading a offline map and database comprising of latitude, longitude values in the database for further correspondence. Also Retrieving the LAC and CID codes from the GSM Module with the help of AT commands and Performs the string search in the database for the corresponding latitude and longitude values to be displayed on the map. Thus the position of the user will be displayed on the preloaded offline map with ease

This project can be extended using high efficiency GSM module. The GPRS enabled GSM a service gives the intimation of the vehicle racking directly on to the predefined web link for tracking the vehicle on Google maps. The project can be extended using USB camera for vehicle monitoring from longer distances. The project can be extended using memory card using which the traveled path can be stored which helps in storing the tracked path along with speed and time.

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