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GSM – GPS Based Transport Management with Passenger Monitoring System

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ABSTRACT:

In this project we going use Raspberry Pi (ARM11) based microcontroller, which the current dominant microcontroller in mobile based products and software development Tool Embedded Linux OS and also we are using GSM, GPS and Ethernet through Ethernet we are monitoring the location of the bus in every 10 sec with live feed of passengers can also seen on internet and whenever driver presses the switch the GPS takes location and send to the prescribed number by using GSM. One of the major issues now a day is controlling of traffic. The main motive in bringing up this paper is to develop a user friendly system for transportation purpose by involving wireless technologies like GSM and GPS. The application consists of modules like Base Station module, In-Bus module, Bus-Stop module and Bus- Station module. The first module consists of a PC and GSM. The second module consists of Micro-controllers, GSM Modem, GPS, and Infrared Sensor. Any of the micro-controllers like arduino and ARM11 processor can be employed in building this application.

Index-Terms: ARM11 processor, GSM, GPS, Micro-controller, Ethernet, Embedded Technology.

I.INTRUDUCTION:

Transportation plays a dominant role in our day to day life.T he primary Obstacle of using transportation is the uncertainty of waiting at bus stops for longer duration, non availability of tickets due to some bands and curfews, due to traffic jam, due to any other factors like poor maintenance of buses, all these directly effects the people. This application helps us to overcome all these factors. The operation of this application is broadly classified into a series of phases, where in the first phase if at all the route is deviated/any problem in the route, the driver gets the information from the base station through GSM and the response is sent from the base station to the bus driver.

If any driver is in want of any data they will message to the base station and acquire the specified data. A good approach would be to introduce a technology based transportation management system that will help the passengers in getting informed about the exact schedule of buses. The existing wildly used & proven technology known as Global Positioning System (GPS) can be used to manage his traffic chaos very intelligently and more economic manner.

These systems offer an effective tool for improving he operational efficiency and utilization of vehicles along with Global System for Mobile (GSM) & General Packet Radio Service (GPRS) technology can be used to communicate the real-time location, velocity & time data from moving Bus to central monitoring & control authorities on application like Google map or any customized city map.

If his application is being used in city bus with purpose of centralize monitoring & control to enable the authorities or third party to track the vehicle's location, collecting data in the process from the field and deliver it to the base of operation to rack the fleet throughout the city in real-time on city map & It will also help commuter as navigation aid tool and bus stop information in audio and visual mode.

II. RELATED WORK:

2.1 EXISTING METHOD:

In the existing system the Lab monitoring system is design and controlled by using RF technology which can monitor and control the system inside the lab only in places where network availability is more. They are bit more costly because cost of components is increased. Not so easy to implement as you have to take great care of noise, Because of antennas it is bulkier.

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2.2 PROPOSED METHOD:

The proposed method is used to overcome the drawbacks present in existing method. Here we are using ARM Intelligent Monitoring Center which uses Samsung's processor as its main controller. The environmental conditions present inside the lab can be monitored using sensors like temperature, gas and LDR. All the sensors are connected to sensor board. From the sensor board we are sending monitored values to control room (ARM board) through RS232 serial cable. The serial cable is connected to one of UART port of ARM board. Whenever a person is entered inside the lab, the person's image can be captured by camera and send it to controller. The controller transmits the data to remote PC through Ethernet by using FTP. FTP is a protocol through which users can upload files from their systems to server. Once data is placed at server we can view the data at remote PC (with internet) on web page with unique IP address. We can view continuous streaming of video as well as senor's data. If we want to control the devices based on sensor's information we can control through web page from remote location using HTTP protocol.

2.3 BLOCK DIAGRAM:

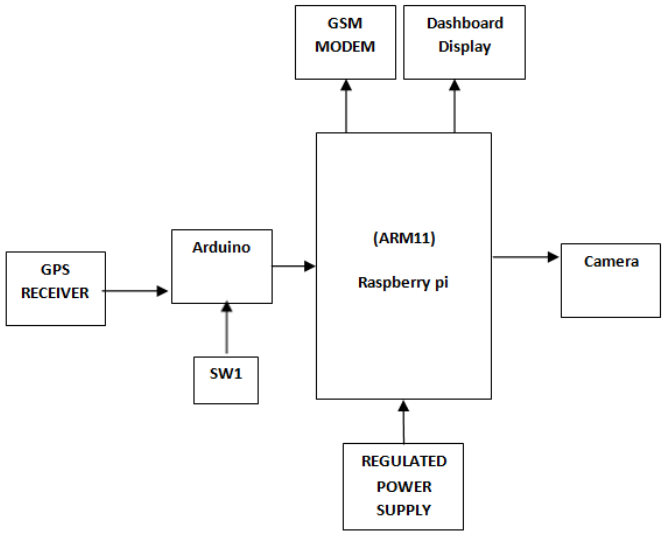

Figure-1: Block diagram

III. HARDWARE IMPLEMENTATION:

3.1 ARDUINO:

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. The Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

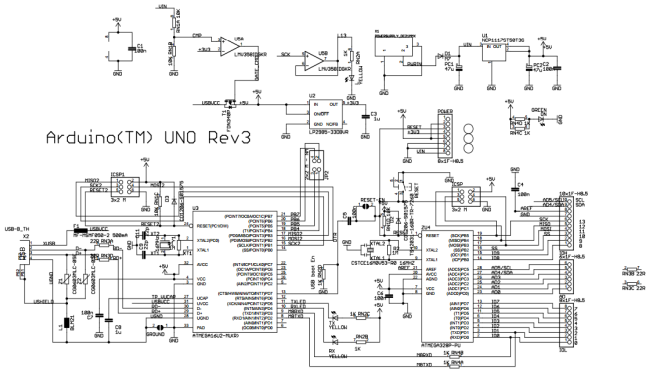

Figure-2: Schematic diagram

3.2 RASPBERRY PI:

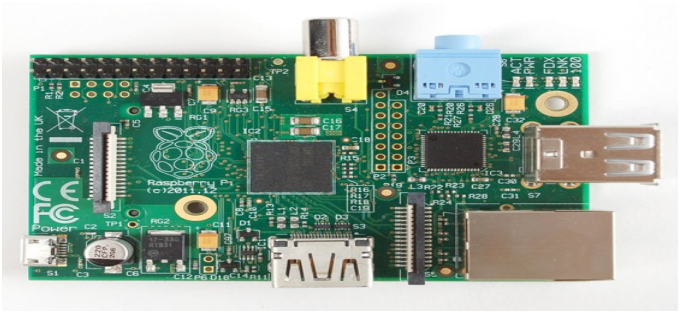

Figure-3: Raspberry Pi processor

The SoC used in the first generation Raspberry Pi is somewhat equivalent to the chip used in older smartphones (such as iPhone / 3G / 3GS). The Raspberry Pi is based on the Broadcom BCM2835 system on a chip (SoC), which includes an 700 MHz ARM1176JZF-S processor, Video Core IV GPU, and RAM. It has a Level 1 cache of 16 KB and a Level 2 cache of 128 KB. The Level 2 cache is used primarily by the GPU. The SoC is stacked underneath the RAM chip, so only its edge is visible.

3.3 ETHERNET:

Ethernet is a family of computer networking technologies for local area networks (LANs) commercially introduced in 1980.

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Standardized in IEEE 802.3, Ethernet has largely replaced competing wired LAN technologies. Systems communicating over Ethernet divide a stream of data into individual packets called frames. Each frame contains source and destination addresses and error-checking data so that damaged data can be detected and re-transmitted. The standards define several wiring and signaling variants.

The original 10BASE5 Ethernet used coaxial cable as a shared medium. Later the coaxial cables were replaced by twisted pair and fiber optic links in conjunction with hubs or switches. Data rates were periodically increased from the original 10 megabits per second, to 100 gigabits per second.

Figure-4: Ethernet diagram

3.4 UVC CAMERA:

A UVC (or Universal Video Class) driver is a USB-category driver. A driver enables a device, such as your webcam, to communicate with your computer's operating system. And USB (or Universal Serial Bus) is a common type of connection that allows for high-speed data transfer. Devices that are equipped with a UVC driver, such as the Logitech® QuickCam® Pro 9000 for Business, are capable of streaming video.

In other words, with a UVC driver, you can simply plug your webcam into your computer and it'll be ready to use. It is the UVC driver that enables the webcam to be plug and play. A webcam with a UVC driver does not need any additional software to work. Once you plug your webcam in, it can work with a video-calling application, such as Skype®, Windows Live Messenger®, or Microsoft Office® Communicator.

3.5 GSM (GLOBAL SYSTEM FOR MOBILE COMMUNICATION):

GSM (GLOPAL SYSTEM FOR MOBILE COMMUNICATION) is the most popular standard for mobile telephony systems in the world. The GSM Association, its promoting industry trade organization of mobile phone carriers and manufacturers, estimates that 80% of the global mobile market uses the standard. GSM is used by over 1.5 billion people across more than 212 countries and territories. This ubiquity means that subscribers can use their phones throughout the world, enabled by international roaming arrangements between mobile network operators. GSM differs from its predecessor technologies in that both signaling and speech channels are digital, and thus GSM is considered a second generation (2G) mobile phone system. This also facilitates the wide-spread implementation of data communication applications into the system.

3.6 GPS:

The Global Positioning System (GPS) is a Global Navigation Satellite System (GNSS) developed by the United States Department of Defense. It is the only fully functional GNSS in the world. It uses a constellation of between 24 and 32 Medium Earth Orbit satellites that transmit precise microwave signals, which enable GPS receivers to determine their current location, the time, and their velocity. Its official name is NAVSTAR GPS. Although NAVSTAR is not an acronym, a few backronyms have been created for it. The GPS satellite constellation is managed by the United States Air Force 50th Space Wing. GPS is often used by civilians as a navigation system.

3.7 HTTP (Hyper Text Transfer Protocol):

Internet (or The Web) is a massive distributed client/server information system as depicted in the following diagram.

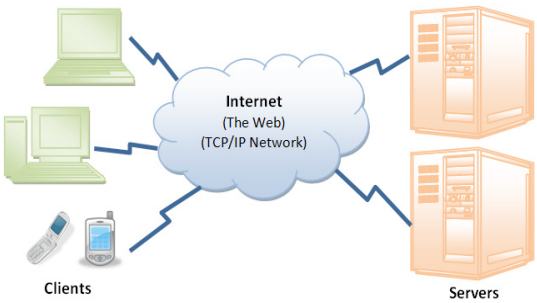

Figure-5: HTTP diagram

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Many applications are running concurrently over the Web, such as web browsing/surfing, e-mail, file transfer, audio & video streaming, and so on. In order for proper communication to take place between the client and the server, these applications must agree on a specific application-level protocol such as HTTP, FTP, SMTP, POP, and etc.

IV. RESULTS:

Figure-6: Hardware implementation

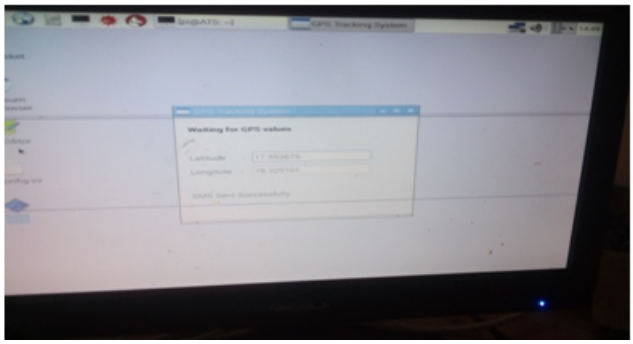

Figure-7: Output on PC

V. FUTURE SCOPE:

» The cost of ARM11 is more that's why in future we can implement this system using ARM CORTEX A8, Beagle bone etc as well as updated processors with high frequencies will work fine.
» In future we can provide more security to data by using encryption, decryption techniques.

VI. CONCLUSION:

The project "GPS-GSM INTEGRATION FOR ENHANCING PUBLIC TRANSPORTATION MANAGEMENT SERVICES" has been successfully designed and tested.

It has been developed by integrating features of all the hardware components and software used and tested. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced ARM Cortex A8 Processor board and with the help of growing technology the project has been successfully implemented.

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