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Gestures in Robotics

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ABSTRACT:

This Project is based on Gesture Controlled Robot is a kind of robot that can be by our hand gestures rather than an ordinary old switches or keypad. In Future there is a chance of making robots that can interact with humans in an natural manner. Hence our target interest is with hand motion based gesture interfaces. An innovative Formula for gesture recognition is developed for identifying the distinct action signs made through hand movement. A mercury Sensor was used to carry out this operation. In order to full-fill our requirement a program has been written and executed using a microcontroller system. Upon noticing the results of experimentation proves that our gesture formula is very competent and it's also enhance the natural way of intelligence and also assembled in a simple hardware circuit.

Index-Terms:
Raspberry Pi processor, Arduino, Zigbee module, sensor array, embedded technology.

I.INTRODUCTION:

In this project, we are giving the complete description on the proposed system architecture. Here we are using Raspberry Pi board as our platform. It has an ARM-11 SOC with integrated peripherals like USB, Ethernet and serial etc. On this board we are installing Linux operating system with necessary drivers for all peripheral devices and user level software stack which includes a light weight GUI based on XServer, V4L2 API for interacting with video devices like cameras, TCP/IP stack to communicate with network devices and some standard system libraries for system level general IO operations. The Raspberry Pi board equipped with the above software stack is connected to the outside network and a camera is connected to the Raspberry Pi through USB bus.

II. PROJECT IMPLEMENTATION:
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.

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. HTTP protocol continuously requests the server for control (turn on or turn off) the devices. In this way we can monitor and control the devices through remote PC.

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2.3 BLOCK DIAGRAM:
Transmitter:

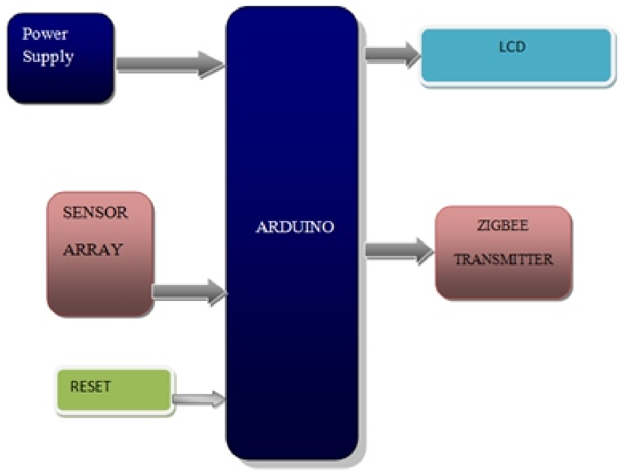

Figure-1: Block diagram of transmitter

RECEIVER:

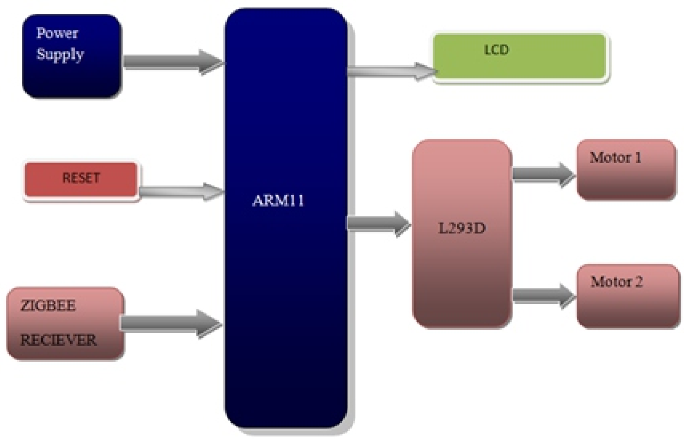

Figure-2: Block diagram of receiver

III. HARDWARE IMPLEMENTATION:
3.1 RASPBERRY PI PROCESSOR:

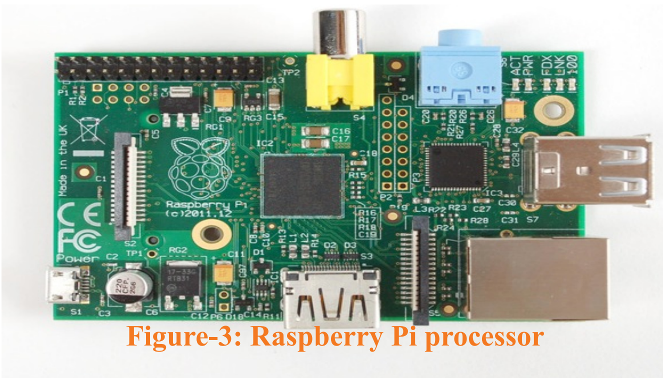

Figure-3: Raspberry Pi processor

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 in two board configurations through licensed manufacturing deals with Newark element14 (Premier Farnell), RS Components and Ego man. These companies sell the Raspberry Pi online. Ego man 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, 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 persistent storage. The Foundation provides Debian and Arch Linux ARM distributions for download. Tools are available for Python as the main programming language, with support for BBC BASIC (via the RISC OS image or the Brandy Basic clone for Linux),C, Java and Perl.

3.2 ARDUINO:

The Arduino Uno is a microcontroller board based on the ATmega328. 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 converter. The Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

3.3 ETHERNET:

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

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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

3.4 ZigBee Technology:

ZigBee is a low-cost, low-power, wireless mesh net¬working proprietary standard. The low cost allows the technology to be widely deployed in wireless control and monitoring applications, the low power-usage al¬lows longer life with smaller batteries, and the mesh networking provides high reliability and larger range.

The ZigBee Alliance, the standards body that defines ZigBee, also publishes application profiles that allow multiple OEM vendors to create interoperable prod¬ucts. The protocols build on recent algorithmic research (Ad-hoc On-demand Distance Vector, neuRFon) to au¬tomatically construct a low-speed ad-hoc network of nodes.

In most large network instances, the network will be a cluster of clusters. It can also form a mesh or a single cluster. The current profiles derived from the ZigBee protocols support beacon and non-beacon en¬abled networks.

IV. RESULTS:

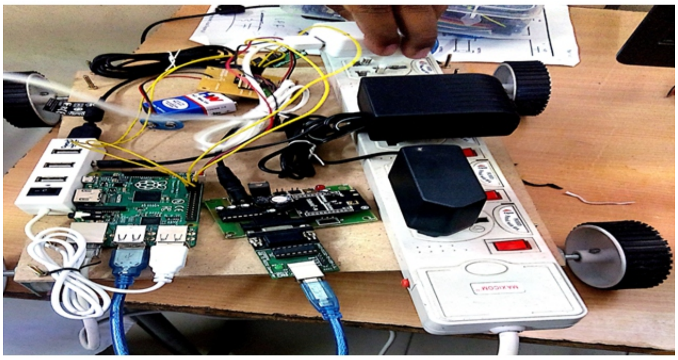

Figure-5: Hardware implementation of project

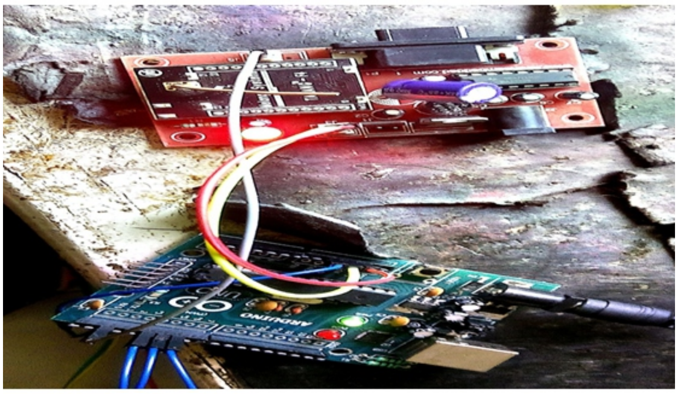

Figure-6: Arduino Interfacing

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.
» As the storage space is also less in future we can also record these live streaming data by connecting external memory storage.
» We can complete our project using wireless technology.
» In future we can provide more security to data by using encryption, decryption techniques.

VI. CONCLUSION:

The project "GESTURES IN ROBOTICS" 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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