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GESTURED BASED ROBOT MOMEMTES CONTROLING AND OBJECT RECOGNISATION BASED ON ZIGBEE AND RFID TECHNOLOGIES

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Abstract:

A Gesture Controlled robot is a sort of robot which can be controlled by hand motions not by old catches. Simply need to wear a little transmitting gadget close by which incorporated a quickening meter. This will transmit a suitable order to the robot with the goal that it can do whatever we need. The transmitting gadget incorporated an ADC for simple to computerized transformation and a microcontroller IC which is use to encode the four piece information and after that it will transmit by a ZigBee Transmitter module. At the less than desirable end ZigBee Receiver modules gets the encoded information and translate it by microcontroller IC. This information is then prepared by a microcontroller to control the Robot directions. By including deferent sensor robot is improved to work in various circumstance and environment. A MEMS Sensor was used to carry out this and also an Ultrasonic sensor for convinced 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.

Key words: *Mems, Zigbee, Rfid, Motors, Wi -Fi,*

I. Introduction

In today's age robotic has the fundamental key for new invention. The development of human machine communications on an everyday basis has made the people to utilize the technology. Instead of giving rational methodology physical methods have been welcomed by everyone. Coding to some 100's of pages requires more instance, capital and power so to overcome that gesture recognition is enhanced. Using gesture recognition coding can be easily made by everyone. For gesture recognition many active devices such as a ―trackball, remote, joystick and touch tablet‖ are in practice. Some of the devices are used for giving motion recognizer but gesture recognition has the foremost utility. So gesture recognizer like accelerometers with 3- axes is extensively used. MEMS accelerometer measures the acceleration of the signal in three co-ordinates such as x axis, y-axis, and z-axis. To capture the hand motions online, the general MEMS sensor which can be operated without any external reference and limitation in working conditions is used.

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Why Gesture based robotic arm is needed At present day human race is becoming complex and difficult. In this situation most of cases human completed their task by using robotics system. Robotic controlling system varies in different cases. Gesture based control is unique phase and most popular way. It's performs task with users gesture. That's why this process is very easy, time saving and efficient. Gesture based negative shadow mode arm may helpful for hand missing autistic person. Not only for autistic person but also helpful for industrial automations which saves controlling complexity and time. Gesture based arm also helpful on rescue operations. The most unique feature is its synchronous movement with human hand gesture.

II. Related Work

Traditional Robots have some limitations in context to flexibility, bulkiness and limited functions. Our approach allows the users to use human gestures of movement like hands and synchronize them with the movement of the Robot's so that they can use it with comfort and ease on all kinds of terrains without the hurdle or cardiovascular problems or fatigue. Some existing robotic technologies are fitted with pc for the gesture recognition. But making use of the pc along with the chair makes it bulkier and increases complexity. This complexity is reduced by making use of the MEMS accelerometer [3], the size of which is very compact and can be placed on the fingertip of the Human. Other existing systems, which make use of the similar kind of sensors are wired, which again increases the complexity of the system. They also limit the long range communication. This complexity is removed by using the RF transmission. Signals through RF travel larger distances. Irrespective of line of sight communication, signals through RF travel even when there is obstruction between the transmitter and receiver. But in this we face the hurdle of security that will be eliminated by using Zigbee Protocol. [4] discussed about a system, GSM based AMR has low infrastructure cost and it reduces man power. The system is fully automatic, hence the probability of error is reduced. The data is highly secured and it not only solve the problem of traditional meter reading system but also provides additional features such as power disconnection, reconnection and the concept of power management. The database stores the current month and also all the previous month data for the future use. Hence the system saves a lot amount of time and energy. Due to the power fluctuations, there might be a damage in the home appliances. Hence to avoid such damages and to protect the appliances, the voltage controlling method can be implemented.

Vision-based Gesture Recognition This Recognition system basically worked in the field of Service Robotics and the researchers finally designed a Robot performing the cleaning task. They designed a gesture-based interface to control a mobile robot equipped with a manipulator. The interface uses a camera to track a person and recognize gestures involving arm motion. A fast, adaptive tracking algorithm enables the robot to track and follow a person reliably through office environments with changing lighting conditions. Two gesture recognition methods i.e. a template based approach and a neural based approach were compared and combined with the Viterbi algorithm for the recognition of gestures defined through arm motion. It results in an interactive clean-up task, where the user guides the robot to go to the specific locations that need to be cleaned and also instructs the robot to pick up trash.

Image Processing Based Hand Gesture Recognition Robot for Multiple Applications

In this system, user operates the robot from a control station that can be a laptop or a PC with a good quality inbuilt webcam or external webcam. This webcam is used to capture real time video stream of hand gestures to generate commands for the robot. Gesture commands are given using hand palm. We have used finger count techniques for giving gesture input. In which each finger count specifies the

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command for the robot to navigate in specific direction in the environment. After gesture recognition command signal is generated and passed to the robot, it moves in a specified direction. The pick and place arm is used to pick objects where human intervention is not possible.

III. Design Of Proposed Hardware System

The disadvantages mentioned in the literature survey are overcome and new methods are being implemented in this system.
In this proposed system consists of two sections one is the Robot and another one is controlling section.

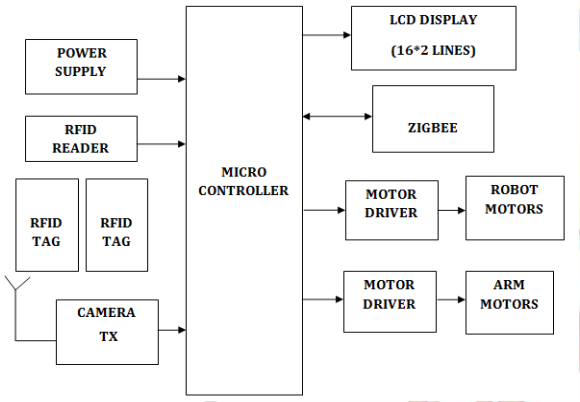

Fig.1.Robotic Section Block diagram

With the advancement of technology, we can overcome above drawbacks we are going this proposed method. In this method we are going to maintain a library using my controller based system. Here in this system we will be using touch panel to operate my robot section like move front, back, left, right and placing wireless camera on the robot section. It will capture the images of books in shelf and send data to receiver section. Then we can monitor the captured images using software and we will be using here MEMS technology to pick and place the objects like books and we are maintaining the information in memory. They maintain records for giving books and taking books from the users. This leads time consuming, wastage paper books and also maintaining of more workers that means cost is increased. These are the drawbacks of above system.

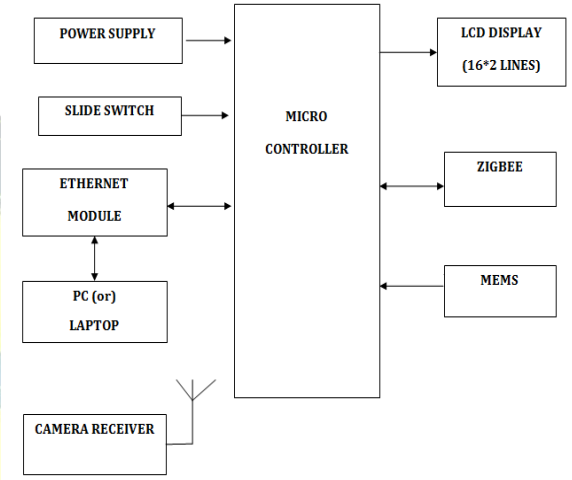

Fig.2. Monitoring Section Block Diagram

IV. Hardware Resources Features

LPC2148 CONTROLLER:
LPC2148 is ARM7TDMI-S Core Board Microcontroller that uses 16/32-Bit 64 Pin (LQFP) Microcontroller No.LPC2148 from Philips (NXP). All resources inside LPC2148 is quite perfect, so it is the most suitable to learn and study because if user can learn and understand the applications of all resources inside MCU well, it makes user can modify, apply and develop many excellent applications in the future. Because Hardware system of LPC2148 includes the necessary devices within only one MCU such as USB, ADC, DAC, Timer/Counter, PWM, Capture, I2C, SPI, UART, and etc.

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Fig.3. ARM7 Board.

ZIGBEE Technology

ZIGBEE is a new wireless technology guided by the IEEE 802.15.4 Personal Area Networks standard. It is primarily designed for the wide ranging automation applications and to replace the existing non-standard technologies. It currently operates in the 868MHz band at a data rate of 20Kbps in Europe, 914MHz band at 40Kbps in the USA, and the 2.4GHz ISM bands Worldwide at a maximum data-rate of 250Kbps.The ZIGBEE specification is a combination of Home RF Late and the 802.15.4 specification. The specification operates in the 2.4GHz (ISM) radio band - the same band as 802.11b standard, Bluetooth, microwaves and some other devices. It is capable of connecting 255 devices per network. The specification supports data transmission rates of up to 250 Kbps at a range of up to 30 meters. ZIGBEE's technology is slower than 802.11b (11 Mbps) and Bluetooth (1 Mbps) but it consumes significantly less power. 802.15.4 (ZIGBEE) is a new standard uniquely designed for low rate wireless personal area networks. It targets low data rate, low power consumption and low cost wireless networking, and its goal is to provide a physical-layer and MAC-layer standard for such networks.

Wireless networks provide advantages in deployment, cost, size and distributed intelligence when compared with wired networks. This technology allows users to set up a network quickly, and allows them to set up networks where it is impossible or inconvenient to wire cables. Wireless networks are more cost-efficient than wired networks in general. Bluetooth (802.15.1) was the first well-known wireless standard facing low data rate applications. The effort of Bluetooth to cover more applications and provide quality of service has led to its deviation from the design goal of simplicity, which makes it expensive and inappropriate for some simple applications requiring low cost and low power consumption. These are the kind of applications this new standard is focused on. It's relevant to compare here Bluetooth and ZIGBEE, as they are sometimes seen as competitors, to show their differences and to clarify for which applications suits each of them. The data transfer capabilities are much higher in Bluetooth, which is capable of transmitting audio, graphics and pictures over small networks, and also appropriate for file transfers. ZIGBEE, on the other hand, is better suited for transmitting smaller packets over large networks; mostly static networks with many, infrequently used devices, like home automation, toys, remote controls, etc. While the performance of a Bluetooth network drops when more than 8 devices are present, ZIGBEE networks can handle 65000+ devices.

Fig 4. ZIGBEE module

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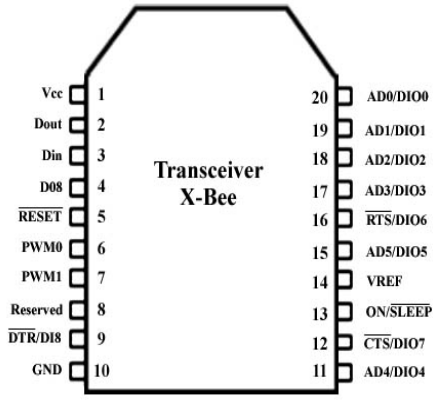

Fig.5. Pin diagram of X-Bee Transceiver

RFID:

Many types of RFID exist, but at the highest level, we can divide RFID devices into two classes:active and passive.

Fig.6. RFID Tages

Active tags require a power source i.e., they are either connected to a powered infrastructure or use energy stored in an integrated battery. In the latter case, a tag's lifetime is limited by the stored energy, balanced against the number of read operations the device must undergo. However, batteries make the cost, size, and lifetime of active tags impractical for the retail trade.

Passive RFID is of interest because the tags don't require batteries or maintenance. The tags also have an indefinite operational life and are small enough to fit into a practical adhesive label. A passive tag consists of three parts: an antenna, a semiconductor chip attached to the antenna and some form of encapsulation. The tag reader is responsible for powering and communicating with a tag. The tag antenna captures energy and transfers the tag's ID (the tag's chip coordinates this process). The encapsulation maintains the tag's integrity and protects the antenna and chip from environmental conditions or reagents.

MEMS:

Micro electro mechanical systems (MEMS) are small integrated devices or systems that combine electrical and mechanical components. Their size range from the sub micrometer (or sub micron) level to the millimeter level and there can be any number, from a few to millions, in a particular system. MEMS extend the fabrication techniques developed for the integrated circuit industry to add mechanical elements such as beams, gears, diaphragms, and springs to devices. Examples of MEMS device applications include inkjet-printer cartridges, accelerometers, miniature robots, microengines, locks, inertial sensors, micro transmissions, micromirrors, micro actuators, optical scanners, fluid pumps, transducers and chemical, pressure and flow sensors. Many new applications are emerging as the existing technology is applied to the miniaturization and integration of conventional devices.

These systems can sense, control and activate mechanical processes on the micro scale and function individually or in arrays to generate effects on the macro scale. The micro fabrication technology enables fabrication of large arrays of devices, which individually perform simple tasks, but in combination can accomplish complicated functions. MEMS are not about any one application or device, or they are not defined by a single fabrication process or limited to a few materials. They are a fabrication approach that conveys the advantages of miniaturization,

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multiple components and microelectronics to the design and construction of integrated electromechanical systems. MEMS are not only about miniaturization of mechanical systems but they are also a new pattern for designing mechanical devices and systems.

Fig.7. MEMS

V. Result

The proposed system "MEMS Based Assistive Robot for Human Collaborative Work" prototype existence is as shown below

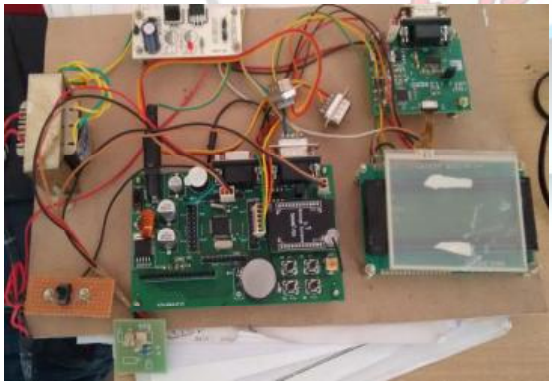

Fig.8. Prototype of Monitoring Section

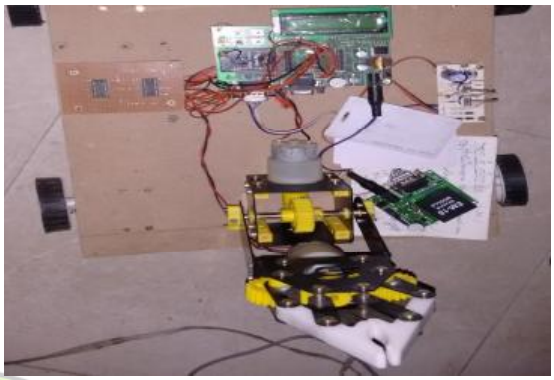

Fig.9. Prototype of Robot Section

VI. Conclusion

In the part of man v/c machine, hand gesture controlled concept comes as an e.g. of companionship of man and machine. Taking the technology to the next level from speech recognitions and wired connections is the technology of wireless hand gesture controlled system. Using a simple I2C based MEMS chip we can connect up to 128 slaves using a single remote. This mechanism gives the user independence and a psychological advantage of being independent. To avoid physical hardship to the user come the accelerometer to the rescue as with the slight movement of the hand the user gets the ability and freedom to turn the Robot into the desired direction. Of course some training is essential to use the acc as its quite sensitive but in the end there could not be a better use of technology for an individual who is deprived of the same physical strength. And also we are using RFID Technology for identifying the objects. And also Wi-Fi Technology for connecting more was monitoring stations to our application.

VII. Future Scope

1) Research is going on to use brain signals to control the robotic arm. This, if achieved will be of great help to the physically handicapped.

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2) Currently under research is the clothing retail industry which will help the users to feel, the texture of the clothes on the internet.
3) In Future our system will be upgraded to IOT environment for global controlling and monitoring.
4) This system can be extended by including GSM which sends an SMS during emergency by assigning particular gesture command. By including GPS, position of the wheelchair can also be known.

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