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ROBOTICS AUTOMATION APPROACH THROUGH SIXTH SENSE TECHNOLOGY

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ABSTRACT
In Sixth Sense technology, a system could be trained to recognize and percept real world objects and react as desired. Sixth Sense technology bridges the gap between the physical world and the digital world, bringing intangible, digital information out into the tangible world, and allowing us to interact with this information via natural hand gestures. The technology is mainly based on hand gesture recognition, image capturing, processing, and manipulation, etc.

We have proposed that Sixth Sense technology for robotics automation systems. When hands are moved in front of camera with colored markers on the finger tips to form different movements, the camera captures these movements which will result in displacement of robot. We concentrate on the communication aspect of a human hand, especially the use of hand gestures for spatial communication transferred to the robot that is moving in Real-time.

KEYWORDS: Sixth sense, Hand gestures, Robot.

INTRODUCTION
Interpretation of human gestures by a computer is used for human-machine interaction to identify a particular human gesture and convey information to the user pertaining to individual gesture only for authorize person or user without depending on input devices such as keyboard and mouse. From the corpus of gestures, specific gesture of interest can be identified, and on the basis of that, specific command for execution of action can be given to robotic system. A prominent benefit of such a system is that it presents a natural way to send geometrical information to the robot such as: left, right, etc. Robotic hand can be controlled remotely by hand gestures.

What motivates us for this work is a robot navigation problem, in which we are interested in controlling a robot by hand pose signs given by a human. Hand gesture recognition can be used to enhance human computer interaction without depending on input devices such as keyboard and mouse. We concentrate on the communication aspect of a human hand, in particular the use of hand gestures for spatial communication transferred to the robot that is moving in Real-time.

Sixth Sense is a wearable gestural interface that augments the physical world around us with digital information and lets us use natural hand gestures to interact with that information The object in view and tracks the user's hand gestures. There are colour markers placed at the tip of users' finger.
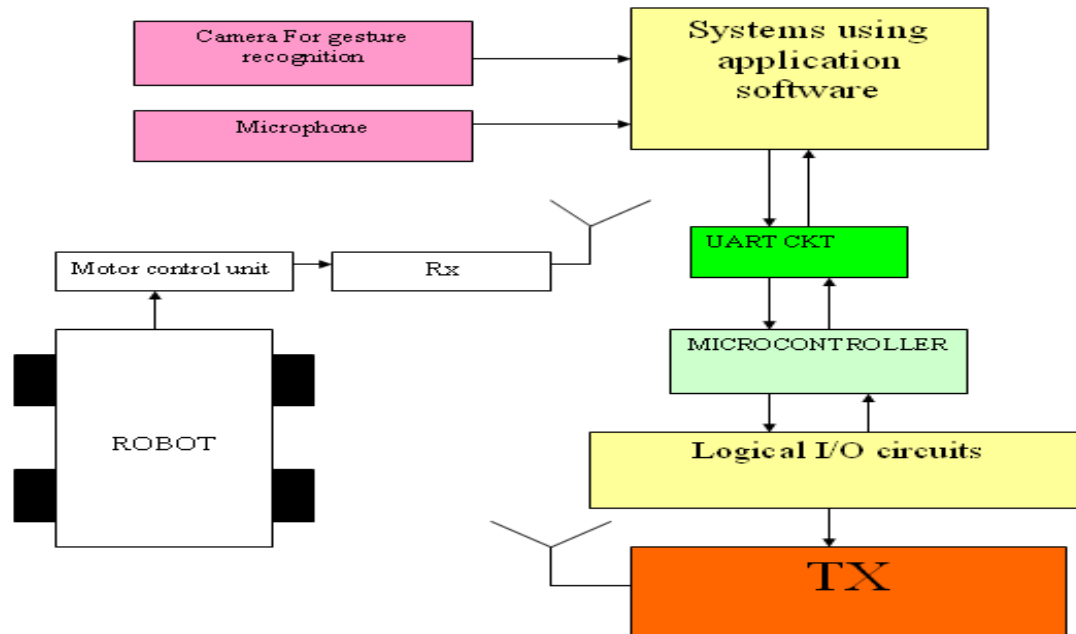
BLOCK DIAGRAM

Fig. Transmitter & Receiver section

WORKING PRINCIPLE

The sixth sense technology uses different technologies like gesture recognition, image processing, etc. The sixth sense prototype is made using very common and easily available equipments like mobile components, color markers and a camera.

When user moves their hands to form different movements with colored markers on the finger tips, the camera captures these movements. These markers act as visual tracking reference. The software program processes this video stream data and interprets the movements into gestures. The gestures are different from one another and are assigned some commands.

These gestures can act as input to application which is transmitted from transmission section to the receiver which will tend the robot to move.

For guiding this robot wirelessly we've developed a program in visual basic, since it's a very much friendly language when it comes to hardware interfacing. Whatever instructions we provide from our program which is developed in keil software it'll travel to microcontroller port in the form of a specific signal. From there, the wireless transmitter will transmit this signal and the receiver which is on robot receives the signal & act accordingly. The communication is between computer/transmitter and receiver end (robot).
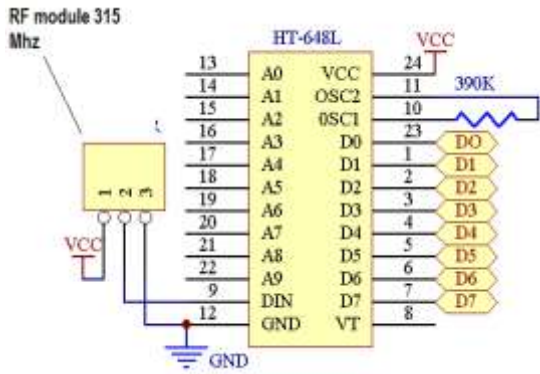
CIRCUIT DIAGRAMS

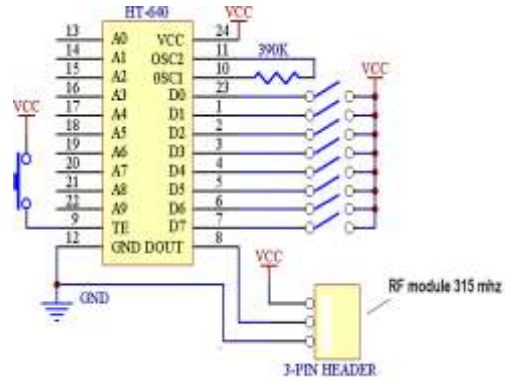

Fig. Circuit diagram of Transmitter
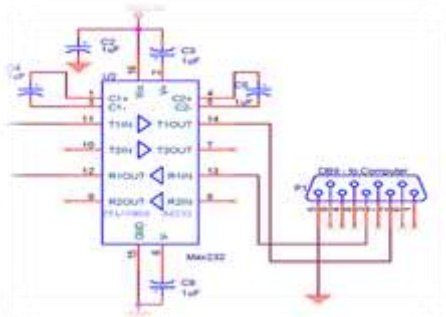

Fig. Circuit diagram of Receiver

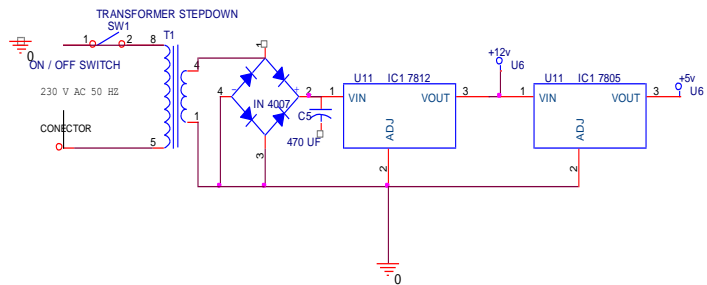*Fig. Serial Communication circuit*

Fig. Power supply circuit

HARDWARE REQUIREMENTS

MICROCONTROLLER 89C51

The AT89C51 is a low-power, high-performance CMOS 8-bit microcomputer with 8K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 and 80C52 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C51 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications.

Features:
- Compatible with MCS-51™ Products
- 8K Bytes of In-System Reprogrammable Flash Memory
- Fully Static Operation: 0 Hz to 24 MHz
- Three-level Program Memory Lock
- 256 x 8-bit Internal RAM
- 32 Programmable I/O Lines
- Three 16-bit Timer/Counters
- Eight Interrupt Sources
- Programmable Serial Channel
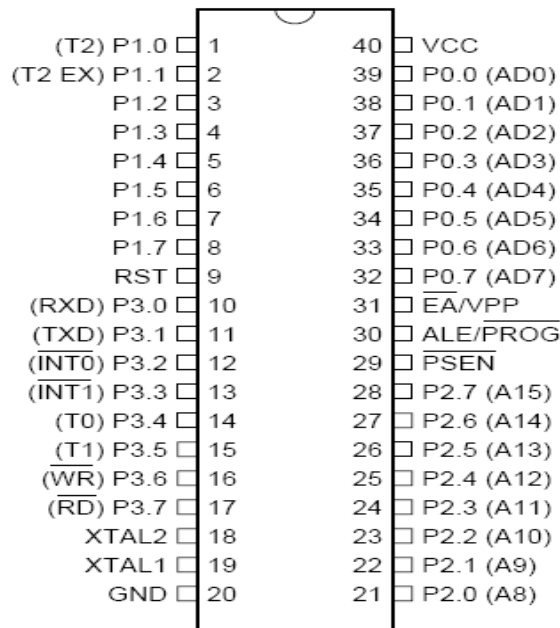
• Low-power Idle and Power-down Mode

Fig. Pin Diagram of microcontroller 89C51

MAX232

Introduction:

UART (Universal Asynchronous Receiver Transmitter) or USART (Universal Synchronous Asynchronous Receiver Transmitter) are one of the basic interface which you will find in almost all the controllers available in the market till date. This interface provides a cost effective simple and reliable communication between one controller to another controller or between a controller and pc.

RS-232Basics:

RS-232 (Recommended Standard 232) is a standard for serial binary data signals connecting between a DTE (Data terminal equipment) and a DCE (Data Circuit-terminating Equipment). Voltage Levels: The RS-232 standard defines the voltage levels that correspond to logical one and logical zero levels. Valid signals are plus or minus 3 to 25 volts. The range near zero volts is not a valid RS-232 level; logic one is defined as a negative voltage, the signal condition is called marking, and has the functional significance of OFF. Logic zero is positive, the signal condition is spacing, and has the function ON. So a Logic Zero represented as +3V to +25V and Logic One represented as -3V to -25V.

ZIGBEE AND IEEE802.11.4

Zigbee offers full wireless mesh networking capable of supporting more than 64,000 devices on a single network. It's designed to connect the widest range of devices, in any industry, into a single control network. The ZigBee Feature Set is designed to support smaller networks with hundreds of devices in a single network. The ZigBee PRO Feature Set is the most popular choice of developers and the specification used for most Alliance developed ZigBee Feature Set, plus facilitates ease-of-use and advanced support for larger networks comprised of thousands of devices. Both Feature Sets are designed to interoperate with each other, ensuring long-term use and stability. The ZigBee specification enhances the IEEE 802.15.4 standard by adding network and security layers and an application framework.

Some of the characteristics of ZigBee include:

- Global operation in the 2.4GHz frequency band according to IEEE 802.15.4
- Incorporates power saving mechanisms for all device classes
- Multiple star topology and inter-personal area network (PAN) communication
- Various transmission options including broadcast
- Security key generation mechanism

MOTOR DRIVER
Introduction:

One of the first realizations in robotics is that making something to move isn't an easy task. There are many ways to strengthen (buffer) a signal so it's strong enough to drive a large load like a motor. Transistor, H-bridges circuit, relays, and dedicated motor driving chips are all suitable devices, with their own benefits and limitations.

In these cases a relay will be needed, but note that a low power transistor may still be needed to switch the current for the relay's coil!

Advantages of relays:
- Relays can switch **AC and DC**, transistors can only switch DC.
- Relays can switch **high voltages**, transistors cannot.
- Relays are a better choice for switching **large currents** (> 5A).
- Relays can switch **many contacts** at once.

CAMERA

The camera used in this case will be overhead camera, it will take the snapshot of the object for color sensing purpose. The image captured by the camera will be processed by image processing using Visual Basics. Camera captures an object in view and tracks the user's hand gestures. It sends the data to computer. Camera recognizes and tracks user's hand gestures and physical objects using computer-vision based techniques. The camera used in this case is VGA/Web Cam whose technical specifications are:

- 256Kb Video RAM (the very fast card could be ordered with 64Kb or 128Kb of RAM, at the cost of losing some or all high resolution 16 colour mode).
- Usual line rate fixed at 31.469khz.
- Maximum of 600 lines.
- Refresh rates at upto 70Hz.
- Packed Pixel mode:256 colour.
- 0.7V Peak-to-Peak.
- 75ohm double terminate impedance(18.7mA, 13mW).

VOLTAGE REGULATOR (LM7812/7805)
Working:-

Voltage regulator limits the voltage that passes through it. Each regulator has a voltage rating; For example, the 7805 IC (these regulators are often considered to be ICs) is a 5-volt voltage regulator. What that means is that no matter how many volts you put into it, it will output only 5 volts. This means that you can connect a 9-volt battery, a 12-volt power supply, or virtually anything else that's over 5 volts, and have the 7805 give you a nice supply of 5 volts out.

LED

LEDs are based on the semiconductor diode. When the diode is forward biased (switched on), electrons are able to recombine with holes and energy is released in the form of light. This effect is called electroluminescence and the colour of the light is determined by the energy gap of the semiconductor. The LED is usually small in area (less than 1 mm2) with integrated optical components to shape its radiation pattern and assist in reflection.

RESISTORS

A resistor is a two-terminal electronic component designed to oppose an electric current by producing a voltage drop between its terminals in proportion to the current, that is, in accordance with Ohm's law:
$V = IR$

SOFTWARE REQUIREMENTS
VISUAL BASICS.NET
Visual Basic .NET (VB.NET) is a multi-paradigm , high level programming language, implemented on the .NET Framework. Microsoft launched VB.NET in 2002 as the successor to its original Visual Basic language. Along with Visual C# , it is one of the two main languages targeting the NET framework. Microsoft's integrated development environment (IDE) for developing in Visual Basic .NET language is Visual Studio. In addition, .NET Framework SDK includes a freeware command-line compiler called vbc.exe.

CONCLUSION
This device uses image processing and colour recognition to distinguish the items and separate them. This is an automatic device and if failed, it is controlled by the PC. In this way it would be working in either conditions.
It is being used now a days in large scale industries but we are modifying it for the small scale industries and making it cost effective

REFERENCES
1. **Implementation of Speech Recognition Based Robotic System** Md. Abdullah Al Ahasan, Md. Abdul Awal *and* Sheikh Shanawaz Mostafa **A FAST ALGORITHM FOR VISION-BASED HAND GESTURE RECOGNITION FOR ROBOT CONTROL**
2. Sang-Heon Lee, Myoung-Kyu Sohn, Dong-Ju Kim, Byungmin Kim, and Hyunduk Kim ,"	Smart TV	Interaction System Using Face and Hand Gesture Recognition",IEEE International Conference on Consumer Electronics – 2013
3. Raju M. Tugnayat & Nitin K. Choudhary, "Recognition techniques for human computer interaction", International Journal of Information Technology and Knowledge Management , Volume 2, No. 2, pp. 507-510, July- December- 2010
4. www.billbuxton.com/input14.Gesture.pdf
5. http://www.webopedia.com/TERM/G/gesture_recognition.html.