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# Design and Implementation of Air Mouse using Accelerometer Sensor

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**Abstract:** With the day to day advancements in technology, the interaction between the human and the digital world is diminishing. The main aim of this project is to work with accelerometer sensors and translate the motion or the tilt of the hand into various applications in virtual world. The advancement of technology in the field of wireless made it possible for any applications. Gesture based operation of electrical appliances is becoming increasingly desired technology. Here we are using accelerometer sensor in order to translate the hand motions or tilts into virtual world. The most commonly used hand motion control in a computer is that of a mouse. The mouse will be a hand mounted device. Appropriate gestures, such as hand swipes in which we will be wearing the accelerometer sensor and other interfacing devices as a virtual mouse, are a safer and faster way to control the device.

**Keywords:** Components: Accelerometer Sensor, Gestures, Zigbee transceiver, ARM-7 microcontroller, LCD Display, Power Supply.

# 1. INTRODUCTION

With the rapid development of technologies, intelligent and smart information products would be necessities of modern. Nowadays the wireless usage has become very popular by using the sensors. Gesture recognition technology identifies the human movements through mathematical representation. This technology has given the solution for the key topic that how to improve the interaction between machine and human. The touch screen technology is mature, but also the people would like to operate in a space freely. The use of accelerometer is to sense the motion of the hand particularly in any given direction; hence the mouse pointer will move. Different values have been fed into the accelerometer sensor with respect to their particular gestures or actions to be performed. Zigbee is used in order to transmit and receive the data sent by the accelerometer sensor and PC respectively. Here we use Zigbee as its transmission range is high compared to other transceivers.

#### 2. SYSTEM ARCHITECTURE

In this proposed system architecture we use accelerometer as a sensor in order to detect the motion of the hand. The accelerometer sensor is interfaced with ARM-7 microcontroller. The wireless module we use here is the zigbee transceiver. The power supply is given to the microcontroller. The LCD Display is interfaced with the ARM-7 microcontroller. A-D converter is interfaced in between the accelerometer sensor and the ARM-7 microcontroller.



Fig.1. Block Diagram of Air Finger Mouse using Accelerometer Sensor



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# 2.1 Accelerometer Sensor

An accelerometer is a micro electromechanical sensor that helps in detecting tilt or orientation. It consists of 5 pins, in which the pins X Y and Z give the tilt along each of the axis. It can be used to sense the movement of the human particularly in given direction.

# 2.2 Power Supply

A power supply is an electronic device that supplies electric energy to an electrical load. The function of a power supply is to convert one form of electrical energy to another form of energy. Therefore, power supplies are sometimes referred to as electric power converters.

# 2.3 ARM-7 LPC2148 Microcontroller

ARM is an acronym of Advanced RISC (Reduced Instruction Set Computer) Machine. It is a 32-bit RISC processor architecture. This architecture was developed by the British company Arm Holdings. Arm is neither a processor nor controller, it is an architecture used in many processors and microcontrollers. LPC2148 from ARM-7 family is the widely used IC. It is manufactured by NXP Semiconductors (Philips). It is pre-loaded with many inbuilt peripherals to make it more efficient.



Fig.2. ARM-7 LPC2148 Microcontroller

# 2.4 Zigbee Transceiver

Zigbee is a wireless networking standard. It is aimed at remote control and sensor applications. It is suitable for operation in harsh radio environments and in isolated locations. The distances that can be achieved transmitting from one station to the next extend up to about 70 feet.

# 2.5 LCD Display

A Liquid Crystal Display (LCD) is a flat panel display. A very basic display we use is 16x2 which is commonly used in various circuits and devices. A 16x2 LCD means it can display 16 characters per line. There are 2 such lines. LCD has 8 data lines. This 16x2 LCD has two registers. They are Command and Data.

#### 3. WORKING PRINCIPLE

The input is fed into the accelerometer sensor in the form of analog signals. The accelerometer sensor has 5 pins in which the data is fed to the 3 pins X Y and Z. In order to convert the analog signals into digital signals as the microcontroller works on digital input output, we use A-D converter. The power supply is given to the ARM-7 microcontroller. Then the A-D converter is interfaced with ARM-7 microcontroller. Thus, the digital signals are controlled by ARM-7 controller and pass these signals through the wireless module. In this system we use Zigbee as a wireless module. Zigbee transmitter transmits the data wirelessly. On the other side of the system, the Zigbee receiver receives the data. The receiver output is given as the input to the ARM-7 microcontroller which would be stored in the PC. The respective actions will be displayed on the LCD Display. Personal computer would then be processed according to the motion of the gesture.

#### 4. INNOVATION AND USEFULNESS

This paper presents a design and implementation of air mouse using accelerometer sensor. Gesture controls or the motion of the hand will contribute more to ease our interaction with the electronic devices. This reduces the need for a mouse, keys, a remote control or buttons. When compared with other technologies such as voice commands, face

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recognition etc. gestures can create a richer user experience. These gestures make the man and machine interaction very effectively.

# 5. MARKET POTENTIAL AND COMPETITIVE ADVANTAGE

Gesture recognition is achieving rapid market adoption as it evolves and matures. Adding support for various types of gestures to electronic devices enables using our natural "language" to operate these devices, which is much more intuitive and effortless when compared to screen touch, handling a mouse or remote control, tweaking a knob or pressing a switch.

# CONCLUSION

In this paper, we have developed air mouse in order to make the humans work more easily by transmitting the X Y and Z values to the ARM-7 microcontroller. This approach is completely based on gestures or the hand tilts. We used accelerometer sensor in order to sense the motion of the tilt in particular direction performed by the user. Accordingly the mouse cursor is moved with respect to the tilt performed.

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