Development of A Hand Motion Controlled Robotic Arm

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ABSTRACT: The system allows controlling a robotic arm by hand movements. The system uses RF receiver which is interfaced to the 8051 microcontroller which controls the driver IC which is responsible to control the moving of the arm. The transmitter circuit contained an accelerometer sensor which is interfaced to the AT mega microcontroller. The transmitter circuit sends commands to the receiver circuit. That the commands indicate whether to move the robotic arm in upward or downward direction or whether the commands indicates to grip an object or release it.

KEYWORDS: Robot arm, Hand motion, signal processor, driver circuit.

I.INTRODUCTION

An Embedded System is a combination of both hardware, software, and perhaps additional mechanical or other parts, designed to perform a specific function. An embedded system is a microcontroller-based, software driven or human or network interactive, operating on diverse physical variables and in diverse environments and sold into a competitive and cost conscious market.An embedded system is used primarily for processing, not a software system on Personal computer, not a traditional business or scientific applications. High-end embedded system – Generally 32, 64 Bit microcontrollers used with OS. Example Personal Digital Assistant and Mobile phones, camera etc. Lower end embedded systems - Generally 8, 16 Bit microcontrollers used with an minute operating systems and hardware layout designed for the specific purposes.

II. METHODOLOGY

This project uses a 6V battery for power supply. A diode is used to get about 5V DC supply. One LED is connected of this 5V point in series with a resistor of 330Ω to the ground i.e., negative voltage to indicate 5V power supply availability. ATMEL series of 8051 family of microcontroller contain standard connectors. The actual number of the Microcontroller could be 89C51, 89C52, 89S51, 89S52. The 4 set of I/O ports are used based on the project requirement. Every microcontrollers that requires a timing reference for its internal program executor therefore an oscillators that need to be the functional with a desired frequency to obtain that the timing reference as $t =1/f$.Pin no 9 is provides with an re-set arranged by a combinatory of an electrolytic capacitor and a register forming RC timer constant. At the time of the switch on, the capacitors gets charged, and it behavior as a full short circuits from the positive to the pin number 9. After the capacitors that gets fully charged the current stops flowing and pin number 9 go to low which is pulled down by a 10k resistors to the ground level. This arrangement of reset at pin number 9 going high initially and then to logic 0 i.e., low helps the program which executes to start from the beginning level.Pin no 31 of 40 pin 8051 microcontrollers that termed as EA⁻ is required to be connected to 5V for accessing the programmable form that the on-chip program memory. If it is connected to the ground then the controller accessed the programs from external memory. However it will be using the internal memory it is always connected to +5V.

L293D has 2 set of arrangement where one set have the input 1, input 2, output 1 and output 2 and other set have input 3, input 4, output 3 and output 4, according to the block diagrams if pin no 2 & 7 are high then pin no 3 & 6 are also high. If enable 1 and pin number 2 has high leaving pin number 7 as the lower then the motor rotates in forward direction. If enable 2 and pin number 10 are high leaving pin number 15 as lower than the motor rotates in the forward

direction. If enable 1 and pin number 2 are having low leaving pin number 7 as high then the motor rotates in the reverse direction.If enabler 2   and pin number 15 are high leaving in the pin number 10 as lower than the motor rotates in theforwarddirection.ENCODER in the IC IS HT12E and DECODER IC IS HT12D. Basically that they have operating voltages from 2.4V to 12V and they are CMOS IC's. ENCODER into the HT12E has 8 address / data lines. The data which has set on these 12 lines is serially be transmitted. When the transmission enabler pin i.e. pin 14 is from high to the low and that data appears serially on DOUT. This data is transmitted to the 4 times in succession, it consists of different lengths of +ve and –ve pulses. The RF modules are having 433 MHz RF Transmitter and Receiver modular. These are typical in AM/ASK transmitter and receiver (Tx-433)& (Rx-433) amplitude shift keying i.e. ASK or OKK i.e. off hooks keying type RF transmitter and receiver modular. OKK transmitters draws no power with when transmitting "zero" while in fully suppressing that the carrier frequency of those consumes significantly low power (about 1mA only) in battery operation.

III SIGNAL PROCESSOR

 It is a specialized microprocessor with its architecture optimized for the operational needs of digital signal processing. The goal of DSP is usually to measure, filter and/or compress continuous real-world analog signals. Most microprocessors can also execute digital signal processing algorithms successfully, but dedicated DSPs usually have better power efficiency thus they are more suitable in portable devices such as mobile phones. The algorithm typically requires a large number of mathematical operations to be performed quickly and repeatedly on a series of data samples. Signals are converted from analog to digital, manipulated digitally and then converted back to analog form. Many DSP applications have constraints on latency; that is, for the system to work, the operation must be completed within some fixed time and deferred processing is not viable.Most general purpose microprocessor and operating system can execute DSP algorithm successfully, but are not suitable for use in portable devices because of power efficiency constraints. A specialized digital signal processor will tend to provide a low cost solution with better performance, lower latency and no requirements for specialized cooling or large batteries. The architecture of a digital signal processor is optimized specifically for digital signal processing.

IV.DRIVER CIRCUIT

It is an electrical circuit or other electronic components are used to control another circuit or components such as a high power transistor, liquid crystal display and numerous others. They are usually used to regulate the current flow through a circuit or to control other factors such as other components, some devices in the circuit. That term is often used, for example for a specialized integrated circuits that controls high power switches in switched mode power convertor. An amplifier can also be considered the driver for loud speaker or a constant voltage circuit that keeps attached components operating within a broad range of input voltages typically that driver stage of a circuit requires different characteristics to other circuit stages. For example in a transistor power amplifier, technically the driver circuits require current gain, often the ability to discharge the following transistor bases rapidly and low output impedance to avoid or minimize distortion

V. CONCLUSION

It provides a good way with the control of robotic arm using accelerometers which will be more intuitive and easy to work beside offering the possibility to control a robot by other wireless means using this system non experience robotic arm controller can easily control robotic arm quickly and in a natural way also many applications which require precise control and work like human beings can be easily implemented using this approach and it provide more flexible control mechanism. Accelerometer equipped with gyro-sensor can help to make movement smoother although the gesture control is achieved but problem of noise and jerks can be there which can be further removed by calibrating and taking more observation and using much precise smooth algorithm.

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