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The Design of Multifaceted Robot using Embedded C# Interface on Bluetooth Communication

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Abstract - *This paper proposes a remote control system based on a user and humanoid robot via Bluetooth and IR sensors. A user can control the robot using a Embedded C# interface and each parts of robot can be moved independently around the robot about a remote location. Providing motor position change in a mechanical system and automatic controlling of the data from the measuring instrument reduce process time and reduce loss of labor. The automatic controlling of the data from the measuring instruments supplied with microcontroller. At the same time, it has been studied how to do data transfer is made via Bluetooth module using the EmbeddedC # interface and how it is used the incoming data for Johnson motors control on microcontroller in detail.*

Index Terms—*remote control, humanoid robot, control circuit, LED interface, johnson motors, Arduino microcontroller, Speakers*.

I. INTRODUCTION

Remote Control and monitoring techniques are so important for developing world. A person can manage his or her farm away from miles. Thus, he or she reduces energy losses and unnecessary costs. The most important point of these advantages is preventing waste of time [1]. Although severeal equipments connect to devices via wires, wireless equipments are offered for lots of advantages. These advantages are independent work space, no cable charge and not affecting by environmental conditions [2].

Wireless communication technology also increases space to move and reduces distance is between controller and the controlled system. Bluetooth is a kind of wireless communication technonlogy, is cheaper and more useful than other wireless communication technologies [3].

System offers a new approach to control home appliances from a remote terminal, with an option from a local server, using the intemet and radio connection. The system is accomplished by personal computers, interface cards, radio transmitters and receivers, microcontrollers, ac phase control circuits, along with window-type software and microprocessor control software. The system is designed to control home Appliances' on/off, to regulate their output power, and to set their usage timing. The prototype of this system was tested and responded successfully, which verifies the feasibility of this system's theory and concept [4].

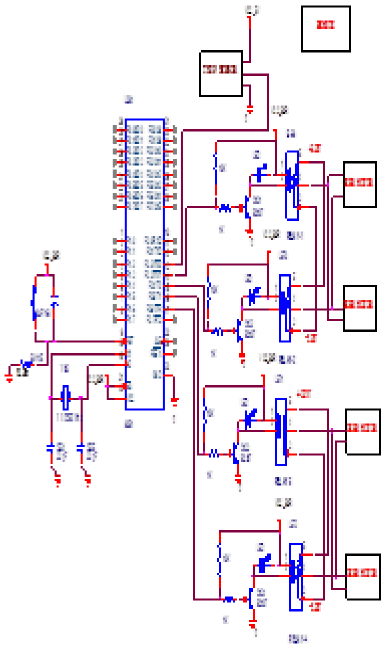
While some robots are controlled by connecting to the internet with servers remotely with the introduction of Social Network Services (SNS) and similar other services, the popularization of mobile devices such as smartphones and tablets, have been on the increase. These services are developed by Information Communication Technology (ICT) Software engineers [5].

Phase one comprised of the development of a 6 DoF left anthropomorphic arm and left exo-frame. Second phase is illustrated the development of the right arm, right exo-frame, torso, backbone, human machine interface and omni-directional locomotion system. Dexto:Eka: will be able to communicate with a remote user through IR Sensors. An exo-frame capacitates it to emulate human arms and its locomotion is controlled by joystick. A Graphical User Interface monitors and helps in controlling the system [6]. Independent move command is necessary for robots like humans. A human take some commands from other humans or from reflexes, though some commands are created by itself. The humanoid robot can be managed from EmbeddedC# commands. C# commands are transmit to microcontroller. These commands are translated to machine languages. Then motors move the humanoid robot according to microcontroller code.

II. CIRCUIT SCHEMA AND MICROCONTROLLER CODE

```
#include <reg51.h>
#include "delay.h"
sbit M0  = P2^0; sbit M1  = P2^1; sbit M2  = P2^2; sbit
M3  = P2^3; sbit M4  = P2^4; sbit M5  = P2^5;
sbit M6  = P2^6; sbit M7  = P2^7; sbit in1  = P3^3; sbit
in2  = P3^4; sbit in3  = P3^5; sbit in4  = P3^6;
//sbit led  = P3^0; sbit ir =P3^2; //tsop output
unsigned char i,key1,key; bit a;void ir_delay(void)
{
 unsigned int p,q;  for(p=0;p<55;p++) for(q=0;q<2;q++)
}
void recieve(void) interrupt 0       //remote    decoding
logic RC5 protocol
{
  unsigned char x;  key1=0;  for(x=0;x<8;x++) //leave the
first 8 bits  ir_delay();  for(x=0;x<6;x++)     //store  next
6 bits,these are command buttons
 {
 a=ir;  key1|a;  ir_delay();
  }
 if((key1>=0)&&(key1<23))
    {
 key=key1;
             }
 delay_ms(1000);
 }
void stop()
 {
 in1 = 0; in2 = 0; in3 = 0; in4 = 0;
}
void front()
 {
stop(); delay_ms(300); in1 = 1; in2 = 0; in3 = 1; in4 = 0;
 }
void back()
 {
stop(); delay_ms(300); in1 = 0; in2 = 1; in3 = 0; in4 = 1;
 }
void right()
 {
stop(); delay_ms(300); in1 = 0; in2 = 1; in3 = 1; in4 = 0;
delay_ms(300); stop();
}
void left()
 {
stop(); delay_ms(300); in1 = 1; in2 = 0; in3 = 0; in4 = 1;
delay_ms(300); stop();
 }
void main()
{
unsigned  char  k;  M0=M1==1;     M5=0;M6=0;M7=0;
for(k=0;k<2;k++)
  {
delay_ms(300);
  }
 EA=1;  EX0=1; while(1)
{
 if(key==13)
  {
 stop();  key=0;
 }
 if(key==16)
   {
   front();  key=0;
   }
   if(key==17)
   {
 back();  key=0;
   }
   if(key==22)
 {
 right();  key=0;
   }
   if(key==21)
   {
 left(); key=0;
   }
   if(key==1)
   {
 M0=0; delay_ms(1000);  M0=1;  key=0;
   }
   if(key==2)
 {
 M1=0; delay_ms(1000);  M1=1; key=0;
   }
   if(key==3)
   {
  M2=0; delay_ms(1000);  M2=1;  key=0;
   }
   if(key==4)
   {
 M3=0;  delay_ms(1000);  M3=1; key=0;
   }
    if(key==5)
   {
   M4=0; delay_ms(1000);  M4=1;  key=0;

   }
   if(key==6)
   {
    M5=0; delay_ms(1000);  M5=1; key=0;
   }
   if(key==7)
   {
 M6=0;  delay_ms(1000);  M6=1;  key=0;
   }
   if(key==8)
   {delay_ms(1000); M7=1; key=0;
   }
 }
}
```



III. BLUETOOTH MODULE

HC06 Bluetooth-Serial Module Card is designed for use Bluetooth SSP (Serial Port Standart) and application of wireless serial communication. PINs that taken out have the advantage to rapid prototyping and can be used easily with Arduino microprocessor, a breadboard, various circuits, etc. Standard PIN structure provides opportunity to control easily in any required area. In addition connections can be made easily with Jumper cables, which accompany with Bluetooth module. This card supports Bluetooth 2.0, provides communication at the 2.4GHz frequency and also has communication distance about 10 meters. This module has a common usage of area as robotic, hobby etc. Specifications;

- Bluetooth Protocol: Bluetooth2.0+EDR(Enhanced Data Rate)
- 2.4GHz communication frequency
- Sensitivity: ≤-80 dBm
- Output Power: ≤+4 dBm
- Asynchronous Speed: 2.1 MBps/160 KBps
- Synchronous Speed: 1 MBps/1 MBps
- Security: Authentication and Encryption
- Supply Voltage: 1.8-3.6V(Recommended 3.3V)
- Current: 50 mA
- Dimension: 43x16x7mm

IV. ARDUINO MICROCONTROLLER:

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (ArduinoNano 3.0) or ATmega168 (Arduino Nano 2.x). It hasmore or less the same functionality of the Arduino Duemilanove, but in adifferent package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one. The Nano was designed and is being produced by Gravitech.

Specifications:

- Microcontroller Atmel ATmega168 or ATmega328.
- Operating Voltage (logic level) - 5 V.
- Input Voltage (recommended) - 7-12 V.
- Input Voltage (limits) 6-20 V.
- Digital I/O Pins 14 (of which 6 provide PWM output).
- Analog Input Pins 8.
- DC Current per I/O Pin 40 mA.
- Flash Memory 16 KB (ATmega168) or 32 KB (ATmega328) of which 2 KB.
- used by boot loader.
- SRAM 1 KB (ATmega168) or 2 KB (ATmega328).
- EEPROM 512 bytes (ATmega168) or 1 KB (ATmega328).
- Clock Speed 16 MHz

V. JOHNSON GEAR MOTORS

A Johnson gear motor can be either an AC (alternating current) or a DC (direct current) electric motor. Most gear motors have an output of 1,200 to 3,600 revolutions per minute (RPMs). These types of motors also have two different speed specifications: normal speed and the stall-speed torque specifications.

CONCLUSION

In this study, a humanoid robot is controlled with a Embedded C# interface using Bluetooth communication. Embedded C# interface and Bluetooth device supply remote control and command. It can be easily moved whatever desired position. However each Johnson motor of humanoid robot can moved independently owing to the EmbeddedC# interface. For developing this project, Humanoid robot can walk, stand up or serving anything (especially elder people)

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