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LOW HARDWARE BASED POINT AND PRESS METHODOLOGY FOR HOME APPLIANCES CONTROLLING

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Abstract: The goal of this paper is to develop an intelligent universal remote control system for home appliances called Point-n-Press. Point-n-Press automatically detects the device (or appliance) when a user points the controller at it. The infrared (IR) remote control devices are used to operate in the most of modern household applications. With the development of the society and smart home, there are more and more home appliances and more infrared remote control devices used to operate them. A single IR remote controller can't be used to manipulate the different kinds of home appliances. This paper proposes an application and design of single-chip microcontroller based IR remote system, which can control multiple devices, code and decode all of the infrared remote control protocol, and integrate with the transmission and receiver. Accelerometer is used to index the direction of appliance for more reliable and connection less setting. RF instead of IR is used for direction less and non-uni transfer improvements.

Keywords: infrared(IR), radio frequency (RF), global system for mobi;e communication (GSM)

INTRODUCTION

Remote control for home appliances is an absolute necessity in our fast passed life. one of the most common is that which makes use of IR radiations as particular frequencies. The IR remote control consists of two sections on is transmitter section and another one is Receiver section. convenience for user to remotely control and monitor the appliances and it provides a finer use of electricity. The efficient use of electricity makes the HOME automation to play an vital role in daily life. As by the growth of PC (personal computers), internet, mobile phone and wireless technology compose it easy for a user to remotely access and controls the appliances. A lot of research has been done and many solutions have been suggested to remotely access the HOME appliances. Some of them used internet, wireless technology to convey and control home appliances, others used Bluetooth and GSM technology for controlling the home appliances but all execution is not efficiently useful because some require a mobile device or internet which is not commercial for domestic uses as well as it required a network so these devices is not properly work when there is no network or signal strength weak. Advanced method reduces the wiring and complexity of the system. It has no drawback of network, coverage and any GSM network. It provides flexibility to the system. It is mainly focused on the elderly people, stables and for the people who are unable to stand up or face difficulties in speaking. It is affordable to everyone, moderate and easy to install. As there is no wired communication between the remote user and appliances control width and the electronic devices used to check are easily available making it a cost effective solution. The goal of this paper is to develop an intelligent universal remote control system for home appliances. Internet of Things (IOT) is a technology that connects all things and the Internet in smart spaces .By implementations of intelligence with sensing devices, IOT has been widely applied to different fields such as smart homes. The application fields in smart homes, incorporate smartness into home areas for comfort, safety, security, healthcare, and energy conservation. The need for comfort and a convenient life are especially important in smart homes. Thus, home automation is one of the most essential and critical components for the IOT-based smart home technology. Home automation systems are used to control home devices or appliances in smart homes and provide automatic remote control inside or outside home.[2]Remote e controls are one of the most ubiquitous symbols of our modern technologies. In consumer electronics, a remote control is a component of an electronic device such as a television set, DVD player, or other home appliance, used to operate the device wirelessly from a short distance. Serious electronics connoisseurs might have a dozen remotes scattered around them; even people who are less fond of electronics likely have a handful of remotes at their disposal, controlling everything from TVs and air conditioners. Remote controls have allowed humans to perform many tasks that would be difficult, if not impossible. [2] As we continue to weave technology into every aspect of our lives, it's very likely that we'll need remotes to keep things under control. This being said, the solution that arises Is Universal Remote controller (URC). A universal remote is a remote control device that can be programmed to operate various brands of one or more types of consumer electronics devices. INTERNET of Things (IoT) [1]

is a technology that connects all things and the Internet in smart spaces. By implementations of intelligence with sensing devices, IoT has been widely applied to different fields, such as smart homes [2], [3]. The application fields in smart homes [4] incorporate smartness into home areas for comfort, safety, security, healthcare, and energy conservation [5], [6]. The need for comfort and a convenient life are especially important in smart homes. Thus, home automation is one of the most essential and critical components for the IoT-based smart home technology. Home automation systems are used to control home devices or appliances in smart homes and provide automatic remote control inside or outside homes [7]. Nevertheless, although remote control provides convenience and ease of use, some major problems require consideration and improvement, such as how to provide an intuitive and user-friendly remote control scheme in IoT-based smart homes [8]. The goal of this paper is to develop an intelligent universal remote control system for home appliances called Point-n-Press. Point-n-Press automatically detects the device (or appliance) when a user points the controller at it. Also, a user interface (UI) for controlling this device is immediately displayed on the screen of the controller. Only the functional buttons that are relevant to the current control context appear on the UI. The UI provides intuitive operations and user-friendly interfaces, which enable users to simply enable and control the target device among the increasingly complex functionalities of home devices in a shared space for IoT-based smart homes. Note that a finite state machine (FSM) is used to model all operational states of a device and dependencies among these states. Multiple bit-string formatted control codes (modeled as bit-vector forms), which represent the control operations, are also applied in the proposed scheme to decrease the bandwidth consumption. Two real prototypes are implemented in smart homes to demonstrate the feasibility of the proposed scheme. Fig. 1 shows one of the prototypes for controlling a fan. In this control prototype, Point-n-Press is implemented in a mobile phone; a fan can be directly controlled by pointing to an external control box near the fan. Note that two state dependencies are included in the control process of the fan. First, the fan can only be started by pressing the "Power" button when it is powered off, whereas pressing other buttons is useless. Second, the "wind speed" button has no effect on the fan when the fan is in sleep or natural mode, because the wind speed is automatically adjusted. Thus, by considering the state dependencies, only functional buttons that are relevant to the current context aredisplayed on the screen of the controller. Internet of Things (IoT) is a network or connection of physical objects or "things" embedded with electronics, software, sensors, making these objects capable of collection of data. The basic idea of smart homes using universal remote controller is to broaden the working of a normal home automation system in such a way that the home appliances can be accessed pervasively. The universal remote controller is anticipated to enable the user to access the automation system remotely which is made possible through an android application to interact with the devices through only basic internet access. In our day to day life, we use various gadgets such as television, set top box, air conditioners, home theater, DVD player and many other remote operated devices for comfort and happiness. Different gadgets mean maintaining different remote controls which are not only clumsy but also difficult to manage. Universal remote control simplifies our life because it helps us control any IR devices like TV, air conditioner, home theater including lights and fans. But, because of many technological complexities it becomes difficult to build a single IR based universal remote which can control all available IR based electronic gadgets from different manufacturers. The rapid growth in mobile communication system in present era is changing people's life and work style. Fast development of mobile technology has brought the world in our grasp. Functionalities of electronic gadgets like computer, IPod, camera etc. are now made available in a single mobile phone. Smart phones are already feature-perfect and can be made to communicate to any other devices in an ad-hoc network with connectivity options like Bluetooth and Wi-Fi. Most of the home appliances use Infrared based controlling systems. Therefore, a simple mobile phone cannot be used directly to control any such appliances. Some special hardware is required to turn a mobile phone into a universal remote capable of controlling the IR based home appliances. Automation of the surrounding environment of a modern human being allows increased work efficiency and comfort.

EXISTING SYSTEM

EXISTING ARCHITECTURE:

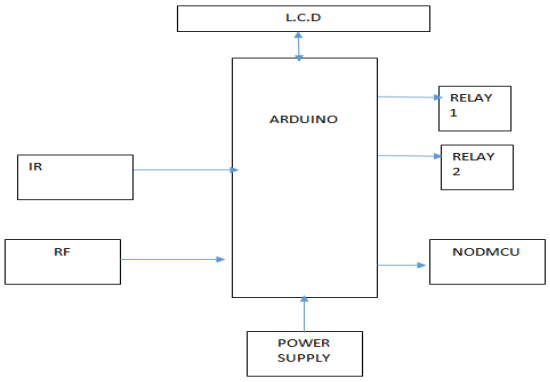

Fig.1 Architecture of PPRC

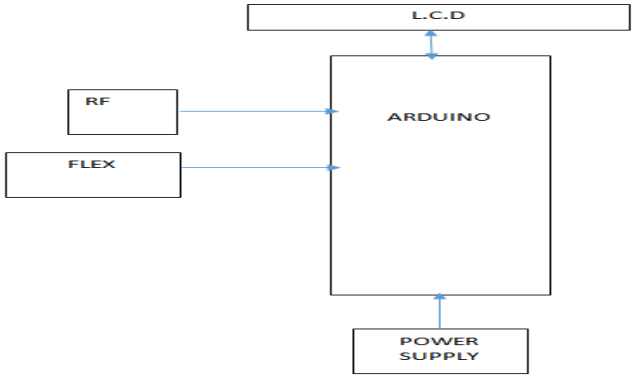

Fig.2 Architecture of PPCB

The architecture of Point-n-Press consists of two parts: 1) the Point-n-Press remote controller (PPRC) and 2) a number of

target devices, which embed in the Point-n-Press control box (PPCB) for interacting with the PPRC, as shown in Fig. 3.1. The detailed architectures of the PPRC and target devices are illustrated in Fig. 3.2. The functions of the components in the PPRC are described as follows.

• Interface Generator creates a UI according to the properties and descriptions of the target device and its current state.

• Device Profile Registry stores the information of the current target device, such as its current state and dependency between each state.

Underlying communication interfaces are used between the PPRC and the target devices, including IR, Wi-Fi, and Bluetooth. A gravity sensor (G sensor) is utilized to detect the movement of the PPRC. An IR transceiver is used to detect and identify a certain target device as the PPRC is pointed to a specific target device. Each target device, which is controlled by the PPRC, is composed of two parts:

(1) the PPCB and

(2) the home appliance. Note that even a non-UPnP conventional and legacy appliance with IR capability can be adapted and controlled with the proposed control system via the PPCB mechanism. The functions of the components in the PPCB are detailed as follows With the G sensor in the PPRC, the system can detect that the PPRC has been shaken (i.e., preparing to perform some control operations) and may be used for controlling appliances. The PPRC then sends a "Be Ready" signal to the PPCB in the vicinity via a Bluetooth or Wi-Fi wireless network. When a PPCB receives the "Be Ready" signal, the PPCB initializes and enables its internal IR receiver. Once the PPRC is fixed on and pointed to a specific PPCB, the IR receiver of the PPCB subsequently receives the signal that was transmitted from the IR transmitter of the PPRC using directionality of the IR characteristic. During this time, the Target Control component of the PPCB simultaneously transmits the DCP to the URC Control component of the PPRC via a Bluetooth or Wi-Fi wireless network. After registering the received DCP to the Device Profile Registry component, the URC Control component generates a control UI via the Interface Generator component according to the DCP and state dependencies of the FSM.

PROPOSED SYSTEM

PROPOSED ARCHITECTUE:

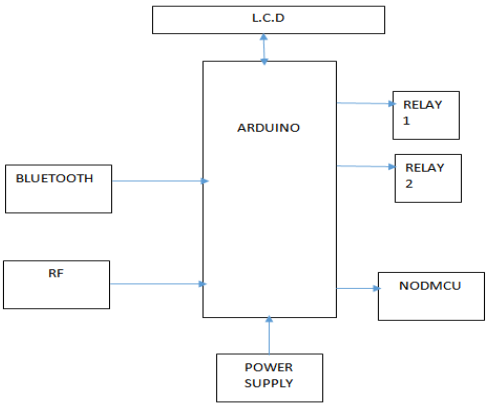

Fig.3 Architecture of PPCB

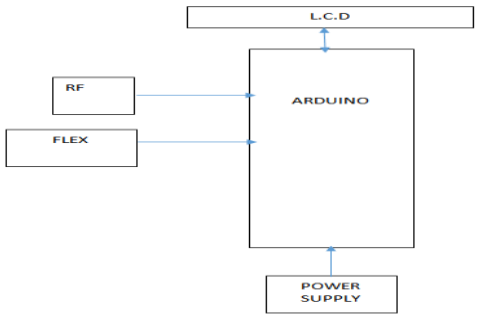

Fig.4 System Architecture of the Proposed Control System

BLUETOOTH COMMUNICATION:

INTRODUCTION:

Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz) from fixed and mobile devices, and building personal area networks (PANs). Invented by telecom vendor Ericsson in 1994, it was originally conceived as a wireless alternative to RS-232 data cables. It can connect several devices, overcoming problems of synchronization.

Bluetooth is managed by the Bluetooth Special Interest Group (SIG), which has more than 19,000 member companies in the areas of telecommunication, computing, networking, and consumer electronics. Bluetooth was standardized as IEEE 802.15.1, but the standard is no longer maintained. The SIG oversees the development of the specification, manages the qualification program, and protects the trademarks. To be marketed as a Bluetooth device, it must be qualified to standards defined by the SIG.

IMPLEMENTATION:

Bluetooth operates in the range of 2400–2483.5 MHz (including guard bands). This is in the globally unlicensed (but not unregulated) Industrial, Scientific and Medical (ISM) 2.4 GHz short-range radio frequency band. Bluetooth uses a radio technology called frequency-hopping spread spectrum. The transmitted data are divided into packets and each packet is transmitted on one of the 79 designated Bluetooth channels. Each channel has a bandwidth of 1 MHz Bluetooth 4.0 uses 2MHz spacing which allows for 40 channels. The first channel starts at 2402 MHz and continues up to 2480 MHz in 1 MHz steps. It usually performs 1600 hops per second, with Adaptive Frequency-Hopping (AFH) enabled.

Originally, Gaussian frequency-shift keying (GFSK) modulation was the only modulation scheme available; subsequently, since the introduction of Bluetooth 2.0+EDR, π/4-DQPSK and 8DPSK modulation may also be used between compatible devices. Devices functioning with GFSK are said to be operating in basic rate (BR) mode where an instantaneous data rate of 1 Mbit/s is possible. The term Enhanced Data Rate (EDR) is used to describe π/4-DPSK and 8DPSK schemes, each giving 2 and 3 Mbit/s respectively.

COMMUNICATION:

A master Bluetooth device can communicate with a maximum of seven devices in a piconet (an ad-hoc computer network

using Bluetooth technology), though not all devices reach this maximum. The devices can switch roles, by agreement, and the slave can become the master (for example, a headset initiating a connection to a phone will necessarily begin as master, as initiator of the connection; but may subsequently prefer to be slave).

The Bluetooth Core Specification provides for the connection of two or more piconets to form a scatter net, in which certain devices simultaneously play the master role in one piconet and the slave role in another.

At any given time, data can be transferred between the master and one other device (except for the little-used broadcast mode.) The master chooses which slave device to address; typically, it switches rapidly from one device to another in a round-robin fashion. Since it is the master that chooses which slave to address, whereas a slave is (in theory) supposed to listen in each receive slot, being a master is a lighter burden than being a slave. Being a master of seven slaves is possible; being a slave of more than one master is difficult. The specification is vague as to required behaviour in scatter nets.

Many USB Bluetooth adapters or "dongles" are available, some of which also include an IrDA adapter.

BLUETOOTH PROFILES:

To use Bluetooth wireless technology, a device has to be able to interpret certain Bluetooth profiles, which are definitions of possible applications and specify general behaviours that Bluetooth enabled devices use to communicate with other Bluetooth devices. These profiles include settings to parameterize and to control the communication from start. Adherence to profiles saves the time for transmitting the parameters anew before the bi-directional link becomes effective. There are a wide range of Bluetooth profiles that describe many different types of applications or use cases for devices.

Bluetooth vs. Wi-fi Technology:

Bluetooth and Wi-Fi (the brand name for products using IEEE 802.11 standards) have some similar applications: setting up networks, printing, or transferring files. Wi-Fi is intended as a replacement for high speed cabling for general local area network access in work areas. This category of applications is sometimes called wireless local area networks (WLAN). Bluetooth was intended for portable equipment and its applications. The category of applications is outlined as the wireless personal area network (WPAN). Bluetooth is a replacement for cabling in a variety of personally carried applications in any setting and also works for fixed location applications such as smart energy functionality in the home (thermostats, etc.).

Wi-Fi and Bluetooth are to some extent complementary in their applications and usage. Wi-Fi is usually access point-centred, with an asymmetrical client-server connection with all traffic routed through the access point, while Bluetooth is usually symmetrical, between two Bluetooth devices. Bluetooth serves well in simple applications where two devices need to connect with minimal configuration like a button press, as in headsets and remote controls, while Wi-Fi suits better in applications where some degree of client configuration is possible and high speeds are required, especially for network access through an access node. However, Bluetooth access points do exist and ad-hoc connections are possible with Wi-Fi though not as simply as with Bluetooth. Wi-Fi Direct was recently developed to add a more Bluetooth-like ad-hoc functionality to Wi-Fi.

Devices

Bluetooth protocols simplify the discovery and setup of services between devices. Bluetooth devices can advertise all of the services they provide. This makes using services easier, because more of the security, network address and permission figuration can be automated than with many other network types.

HARDWARE INTRODUCTION

ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter..

THE BOARD HAS THE FOLLOWING NEW FEATURES:

1.0 pinout: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible with both the board that uses the AVR, which operates with 5V and with the Arduino Due that operates with 3.3V. The second one is a not connected pin, that is reserved for future purposes.

Stronger RESET circuit.

Atmega 16U2 replace the 8U2.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards.

ARDUINO PIN DIAGRAM:

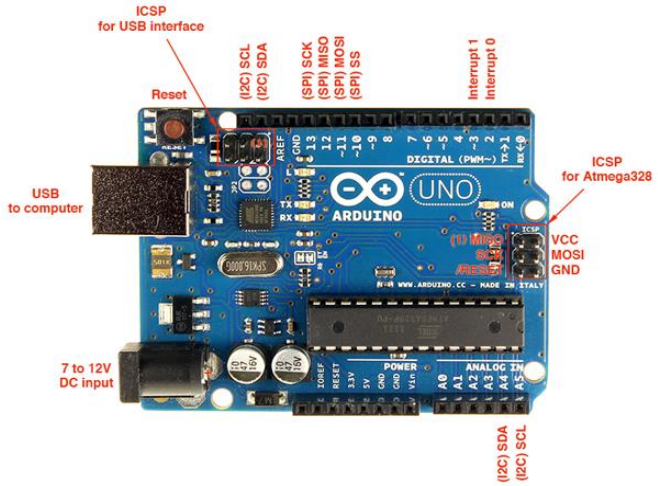

Fig.5 AURDINO BOARD

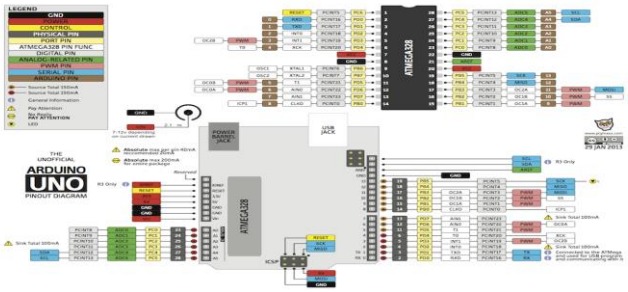

Fig.6 PIN DESCRIPTION

POWER:

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically.

External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector.

The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

MEMORY:

The ATmega328 has 32 KB (with 0.5 KB used for the bootloader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library).

Input and Output:

Each of the 14 digital pins on the Uno can be used as an input or output, using pinmode,digitalwrite , and digitalreadfunctions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kOhms.

Communication:

The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The '16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1).

USB Overcurrent Protection:

The Arduino Uno has a resettable polyfuse that protects your computer's USB ports from shorts and overcurrent. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed.

Automatic (Software) Reset:

Rather than requiring a physical press of the reset button before an upload, the Arduino Uno is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the ATmega8U2/16U2 is connected to the reset line of the ATmega328 via a 100 nanofarad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip. The Arduino software uses this capability to allow you to upload code by simply pressing the upload button in the Arduino environment. This means that the bootloader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload.

This setup has other implications. When the Uno is connected to either a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half-second or so, the bootloader is running on the Uno. While it is programmed to ignore malformed data (i.e. anything besides an upload of new code), it will intercept the first few bytes of data sent to the board after a connection is opened. If a sketch running on the board receives one-time configuration or other data when it first starts, make sure that the software with which it communicates waits a second after opening the connection and before sending this data.

The Uno contains a trace that can be cut to disable the auto-reset. The pads on either side of the trace can be soldered together to re-enable it. It's labeled "RESET-EN". You may also be able to disable the auto-reset by connecting a 110 ohm resistor from 5V to the reset line; see this forum thread for details.

Physical Characteristics

The maximum length and width of the Uno PCB are 2.7 and 2.1 inches respectively, with the USB connector and power jack extending beyond the former dimension. Four screw holes allow the board to be attached to a surface or case. Note that the distance between digital pins 7 and 8 is 160 mil (0.16"), not an even multiple of the 100 mil spacing of the other pins.

16x2 LCD DISPLAY

Liquid crystal displays (LCD's) have materials which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in liquid, but are grouped together in an ordered form similar to a crystal.

The LCD's are lightweight with only a few millimetres thickness. Since the LCD's consume less power they are compatible with low power electronic circuits and can be powered for long durations.

The LCD's are used extensively in watches, calculators and measuring instruments is the simple seven-segment displays, having a limited amount of data.

Fig.7 LCD

HT12E:

HT12E is an encoder integrated circuit of 212 series of encoders. They are paired with 212 series of decoders for use in remote control system applications. It is mainly used in interfacing RF and infrared circuits. The chosen pair of encoder/decoder should have same number of addresses and data format.

Simply put, HT12E converts the parallel inputs into serial output. It encodes the 12 bit parallel data into serial for transmission through an RF transmitter. These 12 bits are divided into 8 address bits and 4 data bits.

HT12E has a transmission enable pin which is active low. When a trigger signal is received on TE pin, the programmed addresses/data are transmitted together with the header bits via an RF or an infrared transmission medium. HT12E begins a 4-word transmission cycle upon receipt of a transmission enable. This cycle is repeated as long as TE is kept low. As soon as TE returns to high, the encoder output completes its final cycle and then stops.

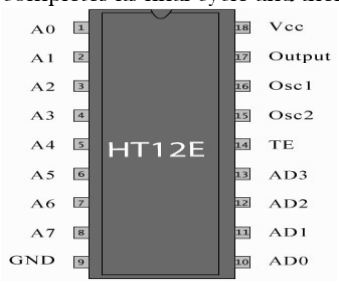

Fig.8 Pin diagram

HT12D:

HT12D is a decoder integrated circuit that belongs to 212 series of decoders. This series of decoders are mainly used for remote control system applications, like burglar alarm, car door controller, security system etc. It is mainly provided to interface RF and infrared circuits. They are paired with 212 series of encoders. The chosen pair of encoder/decoder should have same number of addresses and data format.

In simple terms, HT12D converts the serial input into parallel outputs. It decodes the serial addresses and data received by, say, an RF receiver, into parallel data and sends them to output data pins. The serial input data is compared with the local addresses three times continuously. The input data code is decoded when no error or unmatched codes are found. A valid transmission in indicated by a high signal at VT pin.

HT12D is capable of decoding 12 bits, of which 8 are address bits and 4 are data bits. The data on 4 bit latch type output pins remain unchanged until new is received.

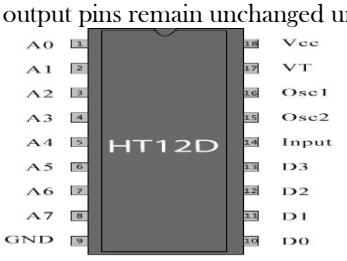

Fig.9 Pin diagram

WIFI MODULE:

The ESP8266 is a System on a Chip (SoC), manufactured by the Chinese company Espressif. It consists of a Tensilica L106 32-bit micro controller unit (MCU) and a Wi-Fi transceiver. It has 11 GPIO pins* (General Purpose Input/Output pins), and an analog input as well. This means that you can program it like any normal Arduino or other microcontroller. And on top of that, you get Wi-Fi communication, so you can use it to connect to your Wi-Fi network, connect to the Internet, host a web server with real web pages, let your smartphone connect to it, etc ... The possibilities are endless! It's no wonder that this chip has become the most popular IOT device available.

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existance interfaces, it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts.

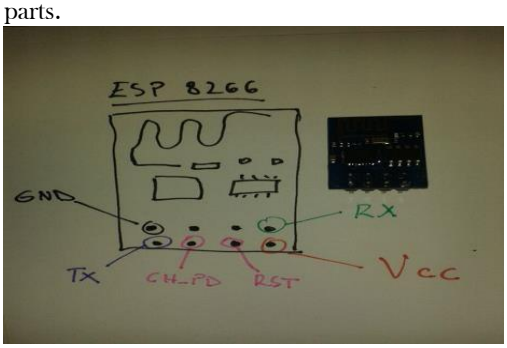

Fig.10 ESP8266 pin diagram

As shown in the picture, ESP8266 has 8 pins, 4 in the row of 2. The first pin on the top left is GND. The two pins right from the GND are GPIO 2 and 0. I'm not going to use these pins, as they are not impirtant for the operation. The pin on the top right side is the RX pin and the pin on the lower left is TX. These are the pins for comunication. The middle pins on the bottom are CH_PD(chip power-down) and RST(reset).

The main thing to remember is, that this device works with 3.3V;even the RX and TX pins. Arduino or many USB to serial converters work with 5V. The solution for this project is in the next step.

Talking to the ESP8266

RELAY

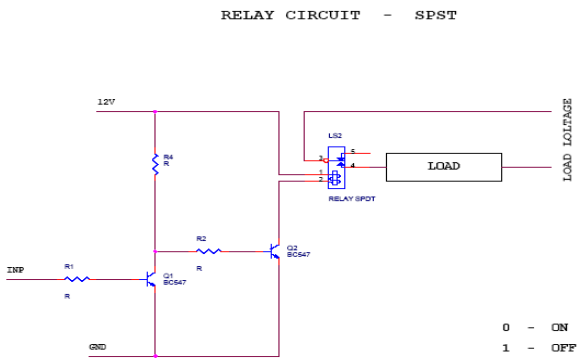

Fig.11 Spst relay

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical.

The coil of a relay passes a relatively large current, typically 30mA for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages. Most ICs (chips) cannot provide this current and a transistor is usually used to amplify the small IC current to the larger value required for the relay coil. The maximum output current for the popular 555 timer IC is 200mA so these devices can supply relay coils directly without amplification.

Fig.12 relays

Relays are usually SPDT or DPDT but they can have many more sets of switch contacts, for example relays with 4 sets of changeover contacts are readily available. Most relays are designed for PCB mounting but you can solder wires directly to the pins providing you take care to avoid melting the plastic case of the relay. The animated picture shows a working relay with its coil and switch contacts. You can see a lever on the left being attracted by magnetism when the coil is switched on. This lever moves the switch contacts. There is one set of contacts (SPDT) in the foreground and another behind them, making the relay DPDT.

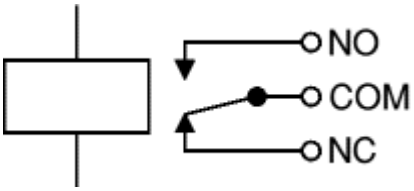

Fig.13 Relay internal diagram

The relay's switch connections are usually labeled COM, NC and NO:

COM = Common, always connect to this, it is the moving part of the switch.

NC = Normally Closed, COM is connected to this when the relay coil is off.

NO = Normally Open, COM is connected to this when the relay coil is on.

Circuit description:

This circuit is designed to control the load. The load may be motor or any other load. The load is turned ON and OFF through relay. The relay ON and OFF is controlled by the pair of switching transistors (BC 547). The relay is connected in the Q2 transistor collector terminal. A Relay is nothing but electromagnetic switching device which consists of three pins. They are Common, Normally close (NC) and Normally open (NO).

The relay common pin is connected to supply voltage. The normally open (NO) pin connected to load. When high pulse signal is given to base of the Q1 transistors, the transistor is conducting and shorts the collector and emitter terminal and zero signals is given to base of the Q2 transistor. So the relay is turned OFF state.

When low pulse is given to base of transistor Q1 transistor, the transistor is turned OFF. Now 12v is given to base of Q2 transistor so the transistor is conducting and relay is turned ON. Hence the common terminal and NO terminal of relay are shorted. Now load gets the supply voltage through relay.

TEMPERATURE SENSOR:

LM35 is a precision IC temperature sensor with its output proportional to the temperature (in oC). The sensor circuitry is sealed and therefore it is not subjected to oxidation and other processes. With LM35, temperature can be measured more accurately than with a thermistor. It also possess low self heating and does not cause more than 0.1 oC temperature rise in still air.

The operating temperature range is from -55°C to 150°C. The output voltage varies by 10mV in response to every oC rise/fall in ambient temperature, i.e., its scale factor is 0.01V/ oC.

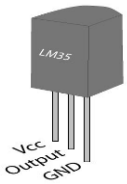

Fig.14 Pin Diagram

In general, a temperature sensor is a device which is designed specifically to measure the hotness or coldness of an object.LM35 is a precision IC temperature sensor with its

output proportional to the temperature (in °C).With LM35,the temperature can be measured more accurately than with a thermistor. It also possess low self heating and does not cause more than 0.1 °C temperature rise in still air. The operating temperature range is from -55°C to 150°C.The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy.It has find its applications on power supplies,battery management,appliances,etc.click here for datasheet. The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in °C).It can measure temperature more accurately than a using a thermistor. The sensor circuitry is sealed and not subject to oxidation.The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplified.The LM35 has an output voltage that is proportional to the Celsius temperature.The scale factor is .01V/°C.

The LM35 does not require any external calibration or trimming and maintains an accuracy of +/-0.4°C at room temperature and +/-0.8°C over a range of 0°C to +100°C.Another important characteristic of the LM35 is that it draws only 60 micro amps from its supply and possesses a low self-heating capability.The LM35 comes in many different packages such as TO-92 plastic transistor-like package,T0-46 metal can transistor-like package,8-lead surface mount SO-8 small outline package.

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air. The LM35 is rated to operate over a −55° to +150°C temperature range, while the LM35C is rated for a −40° to +110°C range (−10° with improved accuracy). The LM35 series is available pack aged in hermetic TO-46 transistor packages, while the LM35C, LM35CA, and LM35D are also available in the plastic TO-92 transistor package. The LM35D is also available in an 8-lead surface mount small outline package and a plastic TO-220 package

LDR:

A Light Dependent Resistor (LDR) or a photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive devices. They are also called as photo conductors, photo conductive cells or simply photocells. They are made up of semiconductor materials having high resistance. There are many different symbols used to indicate a LDR, one of the most commonly used symbol is shown in the figure below. The arrow indicates light falling on it.

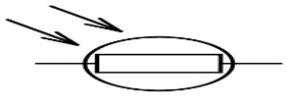

FIG.15 LDR

Lighting switch

The most obvious application for an LDR is to automatically turn on a light at certain light level. An example of this could be a street light or a garden light.

Camera shutter control

LDRs can be used to control the shutter speed on a camera. The LDR would be used the measure the light intensity and the set the camera shutter speed to the appropriate level.

SOFTWARE:

The Arduino Software (IDE) allows you to write programs and upload them to your board. In the Arduino Software page you will find two options:

1. If you have a reliable Internet connection, you should use the online IDE (Arduino Web Editor). It will allow you to save your sketches in the cloud, having them available from any device and backed up. You will always have the most up-to-date version of the IDE without the need to install updates or community generated libraries.
2. If you would rather work offline, you should use the latest version of the desktop IDE.

RESULT ANALYSIS

RESULTS

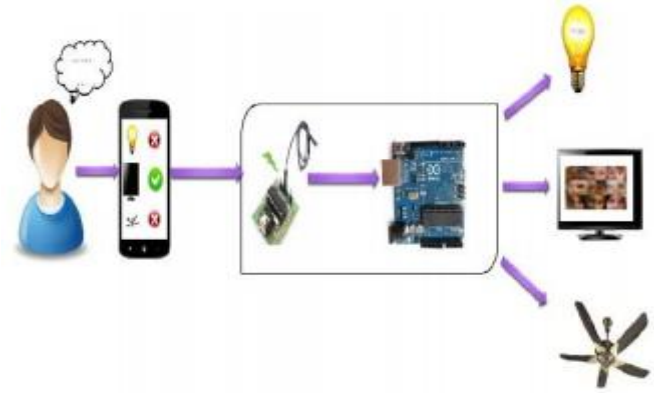

Fig. 16 Pictorial Representation

Fig. 17 Kit Output

Fig. 18 Android Application

Android's releases prior to 2.0 (1.0, 1.5, 16) were used exclusively on Android mobile phones. Most Android SmartPhone and some Android tablets now use a 2.x release and Android 3.0 was a tablet-oriented release but does not officially run on mobile phones. The current Android version is 4.3. Android's releases are nicknamed after sweets or dessert items like Frozen Yogurt ("Froyo") (2.2), Ginger Bread (2.3), Honeycomb (3.0), Ice Cream Sandwich (4.0), Jelly Bean (4.1) and KitKat (4.4) being the recent one. Android applications are written in the Java language. The Android Software Development Kit (SDK) provides all necessary tools to develop Android applications (API). This includes a compiler, debugger and a device emulator, as well as its own virtual machine (emulator) to run Android programs. The Android SDK provides tools for code compilation and packaging data and resource files into an archive file with „.apk" extension called as an Android package. Android devices used the „.apk" file to install the application. Android's application framework allows for the creation of extremely feature rich and novel applications by using a set of reusable components. The amalgamation of the Android development environment with the Bluetooth wireless technology is known by Android"s support for the Bluetooth network stack, which permits a device to wirelessly exchange data with another Bluetooth device (SmartPhone Bluetooth with Bluetooth Module). The application framework enables access to the Bluetooth functionality using the Android Bluetooth APIs. These APIs allow wireless applications to connect to other Bluetooth devices for point-to-point and multipoint wireless features. Using the Bluetooth APIs, an Android application can carry out the following functions:

Scrutinize for other Bluetooth devices

Enquire about the local Bluetooth adapter for paired . Bluetooth devices

Establish the RFCOMM channels

Connect to other devices through service discovery.

Exchange data to and from other devices and smart phones

CONCLUSION

Remote controller is one of the applications of electronics to increase the facilities of life. It gives one the ability to control multiple home appliances from a distance within the specification. Using this enhanced features, everyone can control the multiple devices with extra added programming features. A single RF, Bluetooth remote controller can be used to manipulate the different kinds of home appliances; as they are compatible which leads to the wastage of resources. Reduced complexity and area is achieved goal in this concept.

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