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Design and Implementation of Novel WiFi Power Tracking System

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Abstract:

The receiving strong signal in wireless communications systems is one of the most prominent targets in practice it affects several transport as speed and accuracy factors. The use of motor type servo in order to achieve an integrated real system to learn and find the radio waves reflected (RF waves) provides much of the cost and accuracy compared with the traditional method of a lot of smart devices, which often have an antenna fixed transmission in a specific position, it is not sensitive to change the intensity of the waves around it and coming from nearby transmitters or was remote.

In this case there are a lot of points and angles that have weak signals or a strong one that it is so difficult to the antenna to know or monitoring it precisely. Whereas the proposed system, the motor can rotate the received antenna by all directions and all angles to know the points where the signal is strong.

The proposed system consists of received antenna to receive the radio waves (2.4 GHZ ISM), the antenna is tightly positioned on the servo motor using the bulk of the sensitive rotate at all angles and a resolution of up to 180 degrees each half-cycle in addition to the presence of computers in order to display data on the screen using the programming language and displayed in a statistical manner, in addition to the arduino for processing receiving data. It can be concluded that this system can be used in many applications, because

it increases accuracy in receiving highly precise data and operate many applications in high data rate in many smart devices. It has been corrected and the implementation of the system in practice and proved its accuracy and its technology in many of the test.

Key words: RF link, Wifi Power tracker, Servo motor, VB.NET, Arduino UNO

1- INTRODUCTION

Missile guidance refers to a variety of methods of guiding a missile or a guided bomb to its intended target. The missile's target accuracy is a critical factor for its effectiveness. Guidance systems improve missile accuracy by improving its "Single Shot Kill Probability" (SSKP), which is part of combat survivability calculations associated with the salvo combat model.[1][2]

These guidance technologies can generally be divided up into a number of categories, with the broadest categories being "active," "passive" and "preset" guidance. Missiles and guided bombs generally use similar types of guidance system, the difference between the two being that missiles are powered by an onboard engine, whereas guided bombs rely on the speed and height of the launch aircraft for propulsion.

Also

Figure 1 Satellite Concept

Satellite television is a system of delivering television programming using signals relayed from communication satellites. The signals are received via an outdoor parabolic reflector antenna usually referred to as a satellite dish and a low-noise block down converter (LNB). A satellite receiver then decodes the desired television programme for viewing on a television set. Receivers can be external set-top boxes, or a built-in television tuner. Satellite television provides a wide range of channels and services, especially to geographic areas without terrestrial television or cable television.

The most common method of reception is direct-broadcast satellite television (DBSTV), also known as "direct to home" (DTH).[3] In DBSTV systems, signals are relayed from a direct broadcast satellite on the Ku wavelength and are completely digital.[4] Satellite TV systems formerly used systems known as television receive-only. These systems received analog signals transmitted in the C-band spectrum from FSS type satellites, and required the use of large dishes. Consequently, these systems were nicknamed "big dish" systems, and were more expensive and less popular.[5]

The direct-broadcast satellite television signals were earlier analog signals and later digital signals, both of which require a compatible receiver. Digital signals may include high-definition television (HDTV). Some transmissions and channels are unencrypted and therefore free-to-air or free-to-view, while many other channels are transmitted with encryption (pay television), requiring a subscription.[6].

2- RF SPECTRUM

The radio spectrum is the part of the electromagnetic spectrum from 3 Hz to 3000 GHz (3 THz) allocated to some 40Radiocommunication services in line to the Radio Regulations (RR) of the International Telecommunication Union (ITU). The transmission, emission and / or reception

of radio waves for specific telecommunication purposes of radio waves is strictly regulated by the national administration. Different parts of the radio spectrum are allocated for different radio transmission technologies and applications. In some cases, parts of the radio spectrum is sold or licensed to operators of private radio transmission services (for example, cellular telephone operators or broadcast television stations). Ranges of allocated frequencies are often referred to by their provisioned use (for example, cellular spectrum or television spectrum).

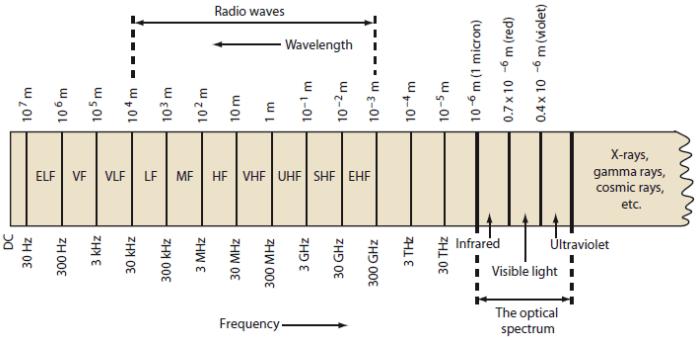

Figure 2 RF Spectrum

3- PROCESSOR (MCU)

The MCU is used to process the data coming from the serial port of the computer. The processor subunit used in this system is the Atmel MCU (ATmega328), we used the Arduino platform that contains the ATmega328 MCU and this platform is the open source platform which is easy to use in terms of software and hardware see Figure bellow. The most important specifications of the MCU are.

Digital I/O	14 Pin
Analog Input	6 Pin (10-bits ADC)
DC Current per I/O	40 mA
Flash Memory	32 KB (ATmega328)
Clock Speed	16 MHz

MCU is programmed through the Arduino programming language which is integrated development environment (IDE). This language based on C / C + + language. We programmed the MCU to control the unit tasks receives data from the serial port of the computer, processing and sending orders to relay shield for the purpose of control of the gate.

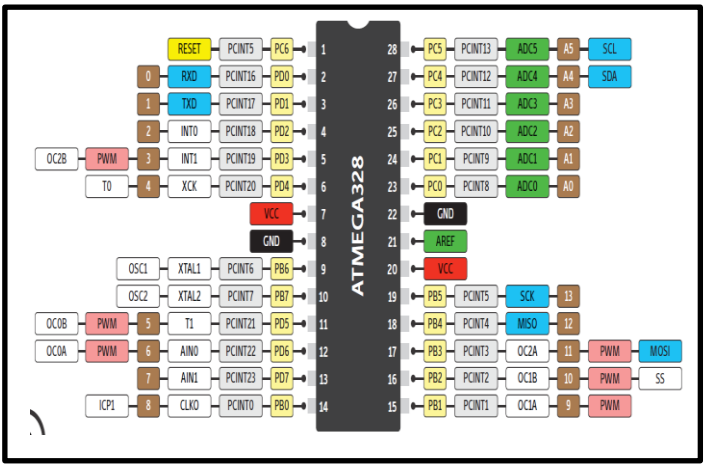

Figure 3 Atmel MCU (ATmega328) and the Arduino pin out

4- PROPOSED SYSTEM

The proposed system consists of two main parts which are hardware and software. The first one consists of Wifi Antenna, it is responsible for get information from the source, this antenna tightly positioned on the second part servo motor, this motor responsible for rotate the antenna by all directions and all angles which depend on the command get from the third part which is Microcontroller unit, this unit work as interfacing between servo motor and fourth part in order to get the highest strength power signal. The fourth part is base station (computer and GUI), this is the main control unit which is connect with all others parts.

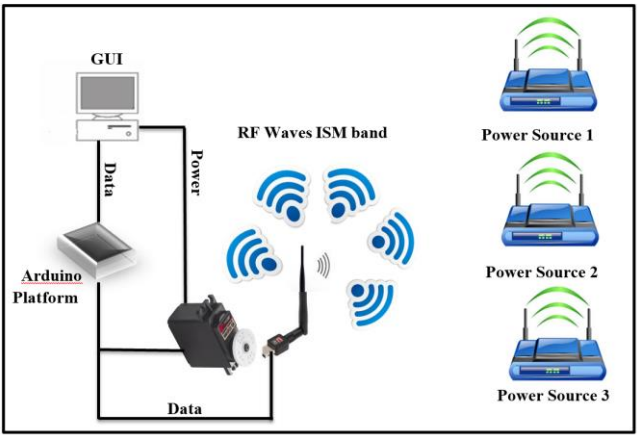

Figure 4 Block diagram of proposed system

The proposed system can be summarized by six main steps. In the first step check the communication port between the microcontroller and base station. Then getting information from antenna directly by the base station in order to give the commands to the microcontroller unit in order to begin the search about the right angle by check each angle and send it's information back to the base station. At the end the base station make a comparison among the get information from antenna and microcontroller in order to detect the angle the have highest strength signal power. Finally the servo motor rotates the antenna to the right one according the information that get from microcontroller. Figure5 below shows flow chart of proposed system.

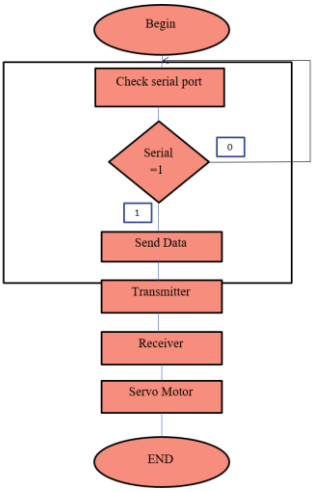

Fig.5 Overall flow chart proposed system

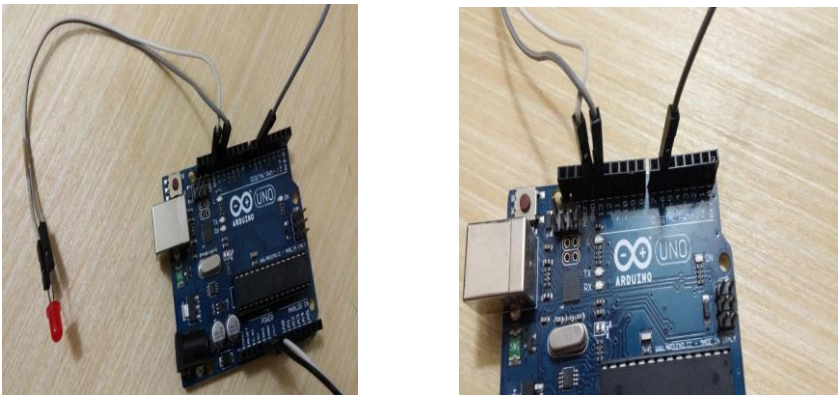

Figure 6 shows practical work (power LED and arduino)

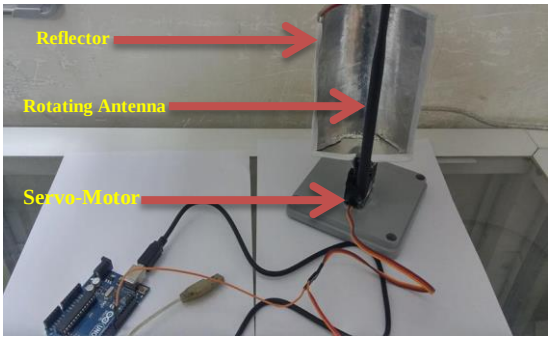

Figure7 Rotated antenna and servo motor

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