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Implementing an IOT based Antenna Positioning System

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Abstract: ***As we know wireless communication systems work on antennas for reception of signals. It is necessary to properly position the antennas in the direction of transmitter for effective wireless communication .So here we propose an IoT based antenna positioning system that allows for remotely positioning of antennas based over IoT. Here in this system sensors will be mounted on the antenna to detect its direction and its direction will be changed by motors using IoT. When the direction of a transmitting station changes over time, the antenna direction must also be changed accordingly. This system will help in monitoring antenna direction and transmitting new coordinates to position the antenna. This system appropriately positions the antenna accordingly. So basically using this system we can wirelessly position antennas in the desired directions using IoT***
Keywords: IoT (Internet of Things), Antenna, Sensors, Motors, Blynk, Wireless communication.

I. INTRODUCTION

The internet of things(IoT) being a fascinating and exciting concept has one of the major challenging and exciting concept has one of the major challenging aspects of having a secure ecosystem encompassing all building blocks of IoT architecture. RFID is a promising technology for the proliferation of IoT, and it can be used to detect and identify the items [2].In IoT (Internet of things) ,"things" refer to a wide range of devices such as heart monitoring implants, remotely handling home appliances, biochip transponders used on farm animals, cameras that are streaming live feeds of wild animals in coastal waters etc. Thus we can say that "things" are a "mixture of hardware, software, data and services". System engineering of a satellite based data communication baseline concept is presented to achieve terabit per second throughput [1].Along with IoT if sensors and actuators are augmented, the technology becomes as more general class of cyber-physical systems which can also encompass the technologies such as smart grids, virtual power plants, smart homes, intelligent transportation and smart cities. As we know wireless communication systems work on antennas for reception of signals. It is necessary to properly position the antennas in the direction of the transmitters for effective communication .So here we propose an IoT based antenna positioning system that allows for remotely positioning of antennas based over IoT. When the direction of a transmitting station changes over time, the antenna direction should also be changed accordingly. As the technology is increasing rapidly in the modern communication system, wireless communication system will be required to operate at more than one frequency without increasing the size of antenna [3]. The receiving antennas may be placed far apart from each other across the globe. So our system allows for antenna positioning over very long distances. The antenna positions are visible over internet to controlling operator on the IoT GUI. We here use IOT to develop the antenna monitoring GUI system. Our system allows for monitoring antenna direction as well as transmitting new coordinates to position the antenna and motor appropriately positions the antenna accordingly. As in directional antennas like Yagi antennas we need to point the antenna in direction of nearest cell towers. Contacting the antenna can produce inaccurate readings, which can lead to less than optimal yagi antenna positioning and reduced performance. Indoor antenna positioning depends on the layout the building and the area we want to cover. If we want to improve signal in one room indoor positioning of antennas comes into picture by using this system we can remotely position antennas to provide effective wireless communication.

II. SYSTEM WORKING

The project begins with a controller for handling all the operations .We are using Atmega328 low power 8-bit RISC Controller .An accelerometer sensor will be mounted on a dummy dish antenna to sense its current position .This accelerometer sensor ADXL335 gives the orientation of antenna in x-y direction. This analog output from accelerometer sensor is fed to the analog pins of Arduino .The receiving (Rx) and transmitting (Tx) pins of Arduino will be interfaced with Arduino board on which the Ethernet shield is mounted for serial data communication .The Rx and Tx pins will convert the analog data into digital, display it on LCD 20*4, give commands to the DC motor and will handle all the data transferred by the ethernet shield. The ethernet shield will handle all the data from internet. RJ45 jack on ethernet shield will be connected to WiFi module through LAN cable. WiFi module will transfer the data from controller on the internet .The values of x & y will be transferred on blynk application .A command button will be

provided here this will be triggered by the signal and will be transferred to the controller as a command. This command will be given to the DC motor.LN293Dis used as a driver IC to drive the DC motor. Two Dc motors are used to handle the x and y directions. So in this way antenna can be rotated in desired direction using sensors & motors as shown in Fig1.

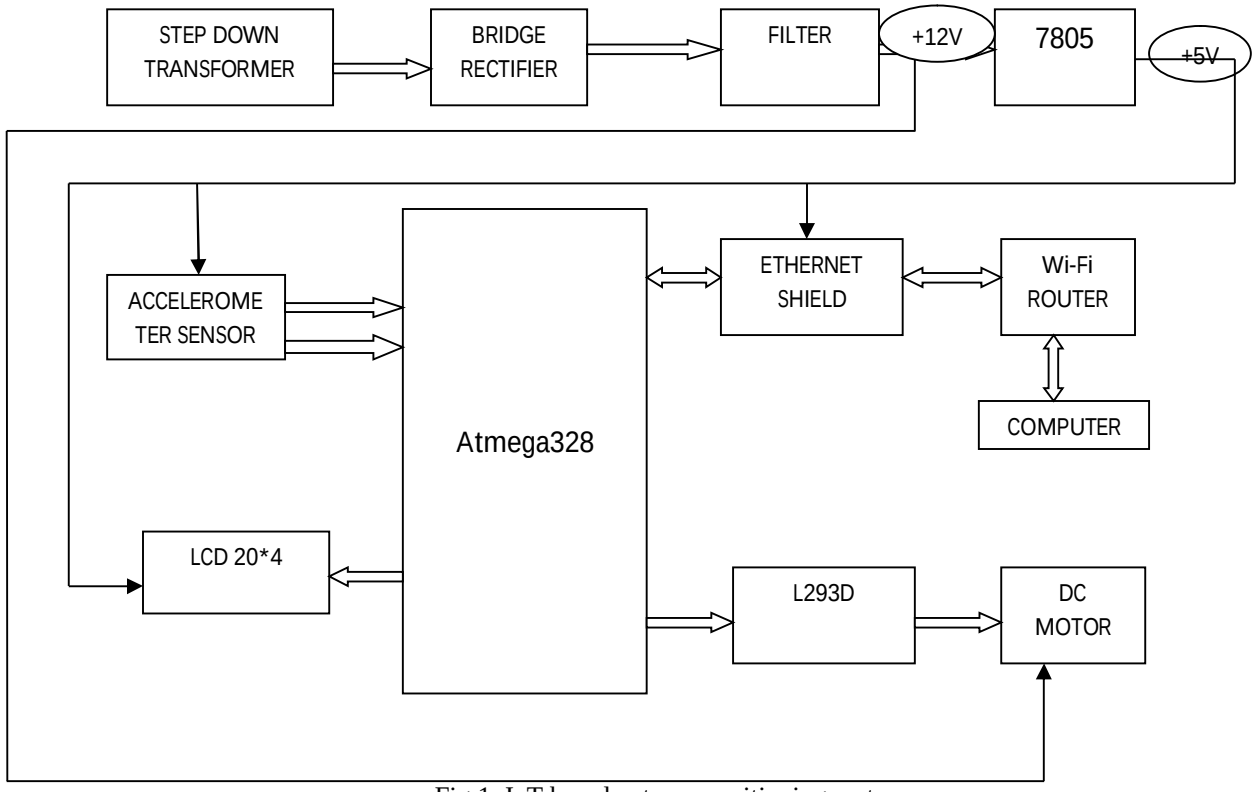

Fig 1: IoT based antenna positioning system

III. HARDWARE & SOFTWARE REQUIREMENT

A. Microcontroller Atmega 328

A low power CMOS 8-bit microcontroller based on AVR is used .It is an advanced RISC Architecture with 131 Powerful Instructions,32 x 8 General Purpose Working Registers.

B. Accelerometer Sensor ADXL335

Accelerometer sensor measures static (earth gravity) or dynamic acceleration in all three axes .ADXL335 sensor is used which measures accelerations in x and y directions.

C. Dc Motors and Driver IC l293D

A DC motor is a rotary electrical machine that converts direct current electrical energy into mechanical energy. Here we are using two Dc motors to move the antenna in x and y directions.

D. Ethernet Shield

The Arduino Ethernet is a microcontroller board which is based on ATmega328. It has 14 digital input/output pins, 6 analog inputs, a 16 MHz crystal oscillator, a RJ45 connection ,a power jack, an ICSP header, and a reset button.

E. LCD

A thin panel liquid crystal display (LCD) 20*4 is used. The basic property of the LCD in this system is to display the status of performance.

F. Power Supply

Power supply is the first and the most important part of our project. For our project we require +5V regulated power supply for LCD, Atmega328, Accelerometer and Ethernet shield. And +12V supply is required for DC motors.

G. Blynk Server

Blynk is an Internet of Things (IoT) service designed to make remote control and reading sensor data from your devices as quick and easy as possible. Blynk is a simple to use drag and drop system for building custom controls for your IoT setup.

IV. RESULT

In this project antenna positioning system relies on accurate calibration of the rotational velocity of the antenna to determine its angular position.

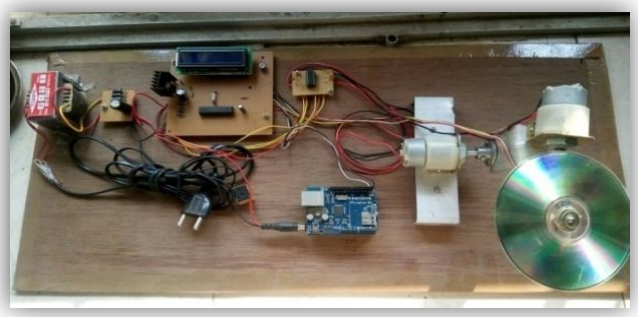

Fig 2: Project setup

As shown in Fig 2, the antenna direction is changed according to the new x and y values that are given on the blynk server .

V. CONCLUSION

Thus, using IoT based antenna positioning we can manually change the position of the antenna in desired direction. This system overcomes the problems like misalignment that occurred due to manually changing the position of antennas which was used earlier. IoT based antenna positioning system can be beneficial in remote areas. In future, this project can be developed with more sophistications and advanced facilities.

VI. ACKNOWLEDGEMENT

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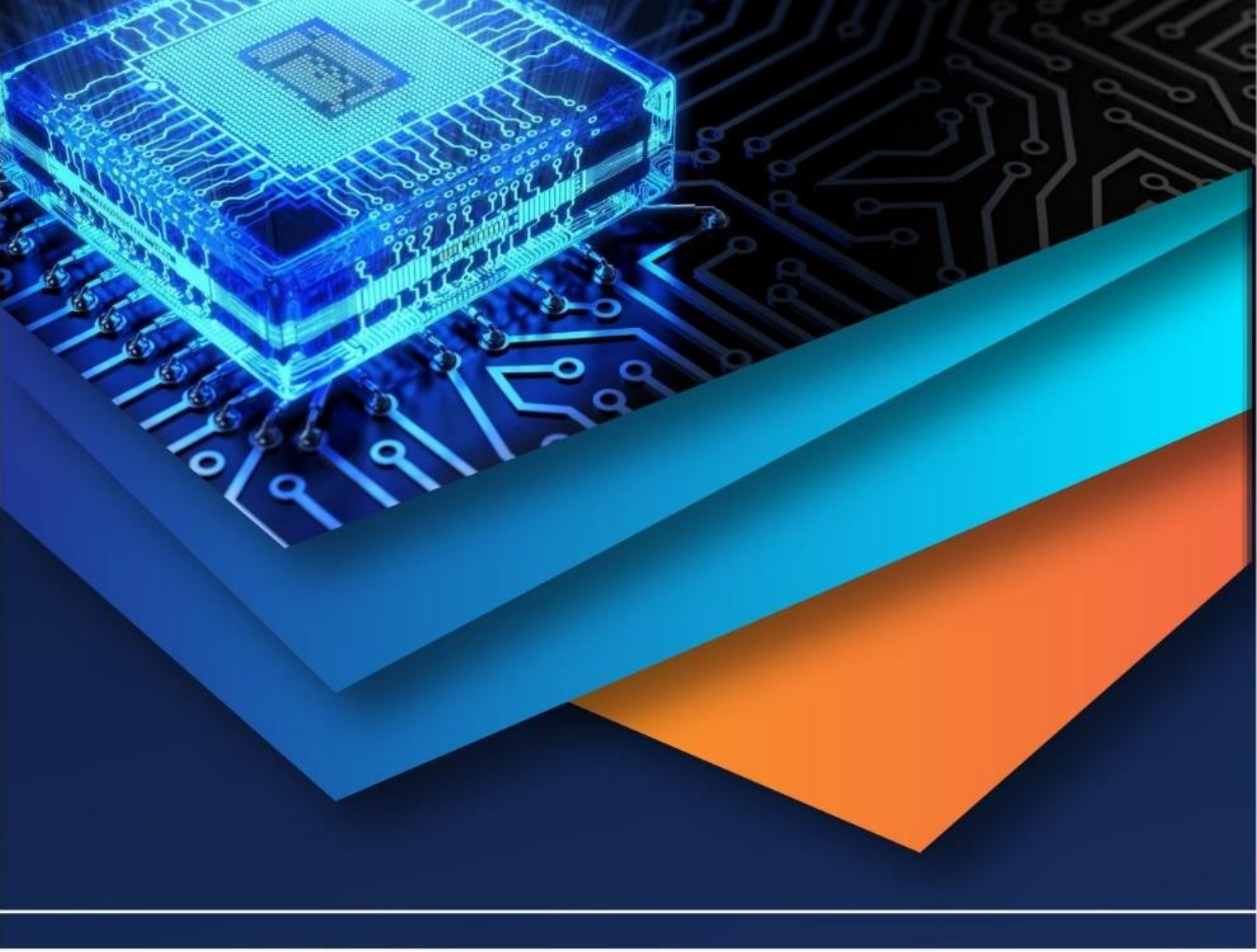

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