Fabricating and Utilization of All in One WiFi Antenna in Covid Pandemic for Schools

V.Jayasundhar
Government Middle School, Manapet, Puducherry
Email: jaya.sundhar@gmail.com

Introduction- My School Government Middle School is located in a rural village called Manapet in Puducherry. It is 14 kilometres from the city and having about 250 students from I standard to 8th standard and following 1st to 5th CBSE Board and 6th to 8th Tamilnadu State Board with co-education. I have felt while teaching Physics that there was more creativity and innovation which can be done in day to day life which helps to think and live life simple and make it easy and also upgrade it to present scenario.

I always do science experiments and activities oriented to Physics from basic light, force, magnetism, pressure and lot more doing life oriented experiments which also include new experiments from the traditional experiments and make them to display in school level exhibitions at regional level, state level and even at national level and because of the new creative ideas and innovations. It brought more knowledge and prizes too.

But all of the sudden because of COVID Pandemic all the learning process stopped and also education system slowly changed to digital platform and online. But our school since is situated in rural area and most students were below middle class and even poor, the online classes could not be accessed by them due to now affordability of getting smart phones. So, I planned to fabricate an antenna inspired from my small age of Yagi antenna of absorbing TV signals for DOORDHARSAN which can receive and send Wi-Fi signals, FM signals and also TV signals from the long distance than normal antenna.

Objectives:

a. To fabricate an innovative low cost antenna to access Wi-Fi signals.
b. To access the electromagnetic signals like FM, intra signal transfer, TV signals.

Methodology:

All in one Wi-Fi Antenna is an innovative hybrid antenna invented by me which involves students to know about the technology and using it to send and receive Wi-Fi signals, radio signals of Walki-Talkie and receive electromagnetic waves for a Television to broadcast channels. Principle of All in one Wi-Fi Antenna: This is an antenna which is a hybrid of spiral, helical, Yagi and Parabolic antennas'. Methodology: The whole setup is of sequence of helical antenna to Yagi antenna to parabolic reflector antenna merging with each other. The parabolic

reflector antenna is a copper plate which is fixed with stand which can be rotated around 360 degree horizontally and 180 degree vertically.

This helps to send connect teachers like me to teach students the online classes from the school to either in nearby classes or to nearby houses where students cannot be able to access internet (mostly very useful in remote rural area like my school where the internet facility is too low).

Fabrication:

1. The axle rod is of aluminium metal of length 105 millimetre
2. Parabolic reflector is of a copper convex disc of diameter 90 millimetre which is connected to the control unit which may switch to Wi-Fi, walkie-talkie, and TV or dongle as per convenience to receive the signals
3. First signal receiving rod is made up of copper convex disc with diameter of 70 millimetre
4. Second signal receiving rod is made up of copper with length of 60 millimetre
5. Third signal receiving rod made up of copper with length of 50 millimetre
6. 4^{th} rod to 11^{th} rod the receiving rods are made of copper with length 40 millimetre
7. The rods from 4th to 11th or embedded in the axle aluminium rod with insulation to avoid leakage of signals
8. A spiral rod made of copper with total length of 20 millimetres is connected with the axle after the 11th rod in the anterior end.
9. The Parabolic reflector disc which holds all the other components in the posterior end can be mounted to any stand or holder of desirable heights for its installation
10. The first receiver rod is embedded to the axle from the parabolic reflector with the distance of 10 millimetre
11. The second receiver rod is embedded to the axle from the first rod with the distance of 12 millimetre
12. The third receiver rod is embedded to the axle from the second rod with the distance of 15 millimetres.
13. Fourth receiver rod is embedded to the axle from the third rod with the distance of 20 millimetres.
14. From 4th receiver rod to 11th receiver rod all the rods are embedded in the axle with the distance of 5 millimetre
15. The spiral antenna is fixed from the 11th receiver rod after 3 millimetre

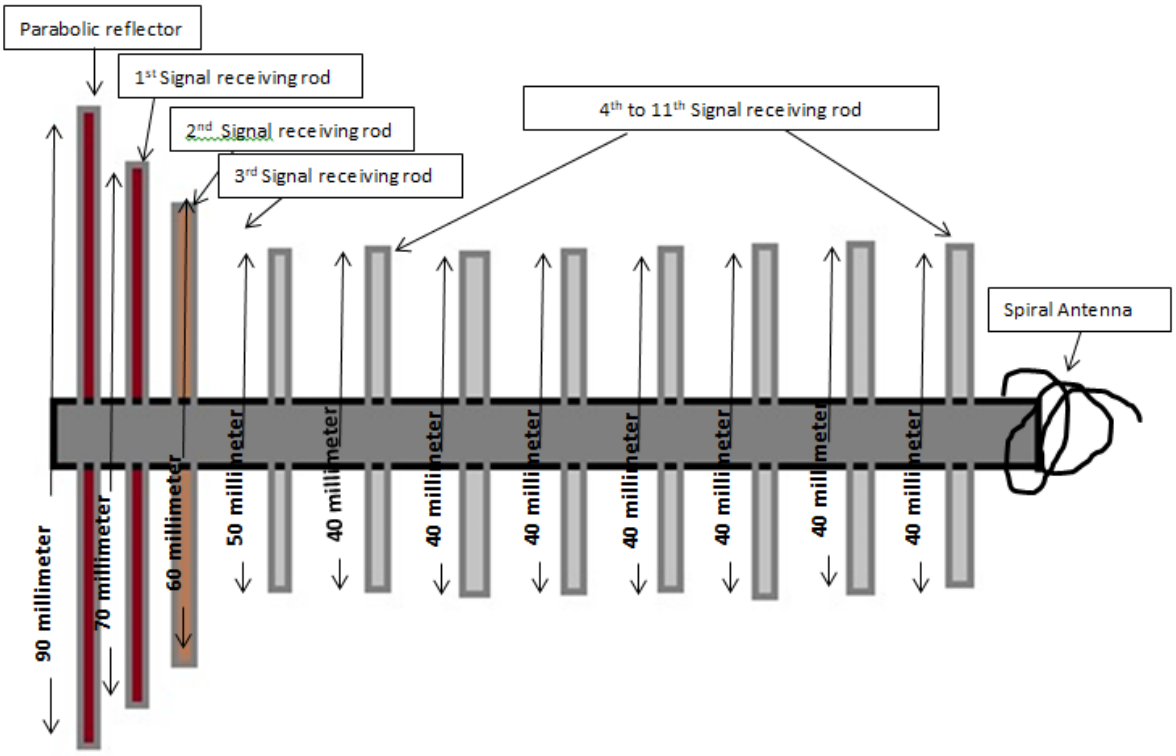

Figure: Wi-Fi Antenna with specifications

Procedure:

All the signals received are connected with central control unit with blue tooth supported by antenna operating application. The antenna operating application helps to shift the signals between Wi-Fi, walkitalki, and TV. This application is developed with own coding which can support both android and Mac versions. Spiral and Helical antenna is capable of sending and receiving electromagnetic signals according to resistance of the antenna and is dependent of the circumference of the helix and the wavelength. By making the circumference smaller and closer to the wavelength, the antenna will have a smaller input resistance but a smaller achievable gain so it will help to receive the walki talkie also since it is merged with Yagi and parabolic antenna it can be able to send and receive the signals greater than 2 kilometres if there is no hindrance in between.

Yagi antenna is a directional antenna which is also merged with parabolic reflector antenna so it can also able to receive and transmit the signals for a longer distance. Parabolic reflectors are shaped like a parabola; Electromagnetic waves can be focused into a beam and aimed at locations with accuracies. Because of this characteristic, this antenna is used in my project which can transmit Wi-Fi signals, radio signals and also TV signals.

Major findings and Implications:

1. I can use this technology wherever the Wi-Fi signals are weak and can send and receive Wi-Fi signals for a longer distance (more than 2 kilometres).
2. This model provides excellent strength of Wi-Fi signals in rural schools, hospitals and public places when compared to normal Wi-Fi modems.
3. This antenna is also having in extra the Walki-Talkie input and output setup which helps in disaster times to communicate with base station nearby.
4. This antenna is also having Yagi antenna which helps in receiving TV signals from longer distance which is useful to rural students, public to view education channels, and public awareness channels propagated by our Government of India.
5. It can be used in desktops and in laptops. I developed this model in aim to develop low cost affordable to all the citizens of India.

Testing the range

Control Unit

Figure: Testing of Wi-Fi Antenna in the school campus

6. YouTube Link of the Device: https://youtu.be/jC93wg9C3Kk

7. Audio lessons for Podcast and FM of my own website with name Pondicherry Podcast – Education FM: https://anchor.fm/educationfm

8. My YouTube Channel for e-contents to students: https://youtu.be/P6LoA3fQKs8

9. Google drive links for audio and video e contents of Physics for my students:
    a. For 6th Standard:https://drive.google.com/drive/folders/1Lqq6yo0guiQvWyBGJfEGwJBZZGJ0YtHP?usp=sharing

    b. For 7th Standard: https://drive.google.com/drive/folders/1EI32NonAH1VWQZ6jFu8Rw5ZeGXKWzULw?usp=sharing

    c. For 8th Standard: https://drive.google.com/drive/folders/12jX7Y0bx8PcarsXiSfCG064ASaGVlb6x?usp=sharing

10. Google forms for studying Physics online: https://drive.google.com/drive/folders/1bTlkeJwE9l05_QZTdpOI2k2Vgz7lzkWV?usp=sharing.

Result and Discussion:

1. The fabricated all in one Wi-Fi antenna received and sent Wi-Fi signals, FM signals, and TV signals to more than 1 kilometre to its surroundings.
2. It helped our students to learn video and audio lessons with the help of Wi-Fi hotspots and FM signals transmitted by the antenna even in lockdown.
3. This helped teachers to connect with students even in COVID pandemic to teach the lessons digitally using various platforms like Google meet, Anchor FM, Spotify etc.,

Conclusion and Implication of the Study:

1. The usage of All in One Wi-Fi Antenna helped me to connect with children of our school to study Physics without gap even in COVID Pandemic.
2. This helped students to innovate, creatively a hardware and its software with the guidance of technical experts their ideas for their problem of cannot able to come to school for learning with me.
3. They also learnt new domain of digital learning and its platforms for their learning of Physics.

Learning Outcomes:

1. Creativity and implication of knowledge of Physics in practical life
2. Innovation of ideas from Physics for present problems in the society
3. Analysis of problems in the society and trying to find out solutions for it by Physics.
4. Observation of concepts and emerging trends in Physics and implying it in day to day life

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