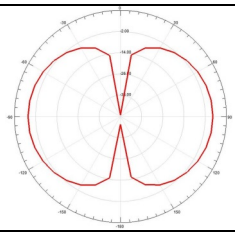
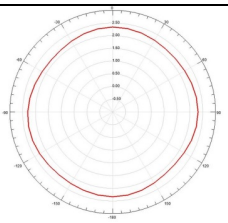
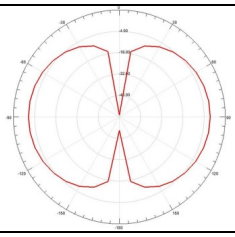
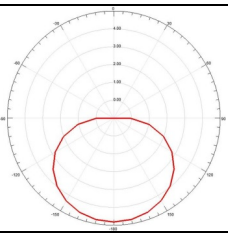
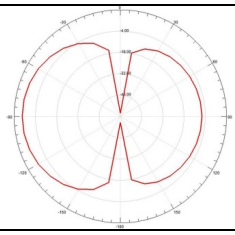
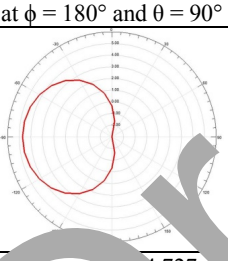
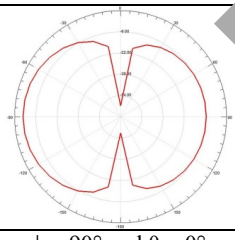
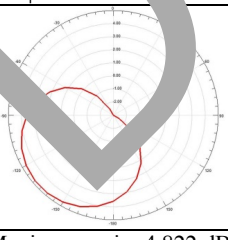
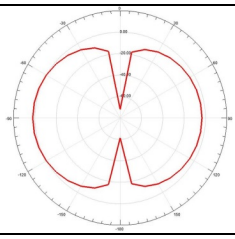
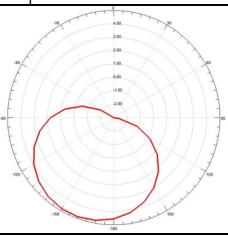
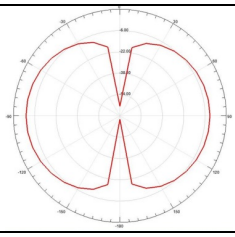
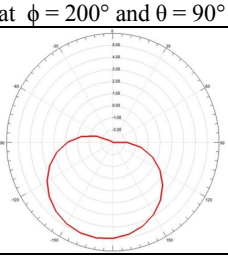
III. Result and Discussion

The simulated result shows that the proposed antenna provides maximum gain in different direction depending on which metal cylinder is switched on. The results show the radiation pattern at 1.06 GHz when the metal cylinder is activated with specific beam angle respectively.

TABLE II. BEAM DIRECTION FOR DIFFERENT CASES STUDIED

Case A		
	$\phi = 90°$ and $\theta = 0°$	Maximum gain:2.34 dBi at ϕ=All direction and θ=90°
Case B		
	$\phi = 90°$ and $\theta = 0°$	Maximum gain: 4.839 dBi at $\phi = 180°$ and $\theta = 90°$
Case C		
	$\phi = 90°$ and $\theta = 0°$	Maximum ga[illegible]727 dB at $\phi = 270°$ and [illegible] = 90°
Case D		
	$\phi = 90°$ and $\theta = 0°$	Maximum gain: 4.822 dBi at $\phi = 230°$ and $\theta = 90°$
Case E		
	$\phi = 90°$ and $\theta = 0°$	Maximum gain: 4.923 dBi at $\phi = 200°$ and $\theta = 90°$
Case F		
	$\phi = 90°$ and $\theta = 0°$	Maximum gain: 4.994 dBi at $\phi = 190°$ and $\theta = 90°$

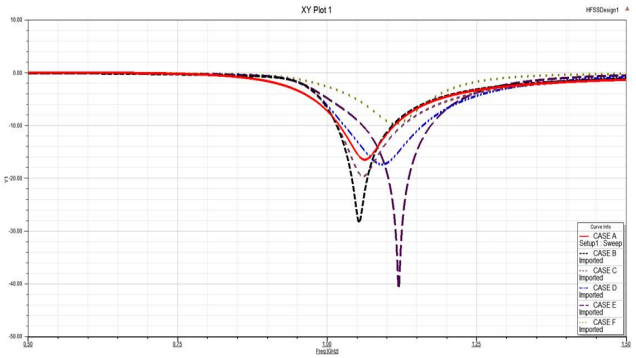


Fig. 3. Return loss for different case studied

Return loss in Case A for the proposed antenna is -16.47 dB with bandwidth of 92 MHz. The result of return loss and bandwidth for each case improved as more number of metal cylinder attached around the dipole antenna. In the earlier case where less number of metal cylinders attached, the result of beam direction does agree with the position of designated metal cylinder which is turned on. The direction of the beam is inconsistent when more metal cylinders are attached to the structure.

Th[illegible]exact[illegible]ue of maximum gain in the specific direction as e[illegible] cas[illegible]tudied is shown in Table II. The proposed dipole[illegible]nna giv[illegible]n omnidirectional maximum radiation of 2.34 d[illegible]1.06 GHz[illegible]he[illegible]no metal cylinders attached to the antenna. Th[illegible]maximum gain for each cases increase as the [illegible]a workin[illegible]n more reconfigurable directions.

IV. Conclusion

A pat[illegible]rn reconfigurable half-wave antenna that can switch bea[illegible]n numerous directions has been designed and tested using Ansys HFSS. By controlling pin diodes, the beam direction of the antenna can be switched accordingly. The design is working at low frequency with improved bandwidth. However, the design has a high profile structure which is not desirable in small communication devices. Future work will consider these issues and look into low profile wide bandwidth designs.

References

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