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USE OF SHAPE MEMORY ALLOYS TO REALIZE A CUSTOMIZABLE MULTI-BAND ANTENNA  
FOR COMMUNICATION.**Abstract**

The use of multiple antennas in a space mission for communication is common. There are antennas specifically designed to serve a particular purpose. In many projects like STARLINK of SpaceX, the satellites have been specifically equipped with an antenna for uplink and another for downlink communication. Use of separate antennas for communicating in different bands increases the weight and reduces the total available space on the body of the test vehicle. This paper intends to develop an antenna using Shape Memory Alloys(SMA) like Nitinol(Alloy of Ni and Ti). Because of Shape Memory Effect of SMA's, the antenna retains a particular shape at an initial temperature  $T_1$  and then change the shape at another temperature  $T_2$  after a controlled heating procedure. The antenna then will radiate and transmit information in a particular communication band at  $T_1$  and due to a change in the dimension and shape of the antenna at a temperature  $T_2$ , it'll transmit the information in another communication band. As the antenna itself is made of SMA, the temperature change of the antenna is controlled via an external power source heating up the material leading to change of shape up to the temperature  $T_2$  and the cooling of the antenna is monitored by an indigenously designed cooling mechanism across the antenna to retain back the original shape at the temperature  $T_1$ . This mechanism effectively facilitates the security of data or information being transmitted by efficiently changing the band of communication between the satellite and the ground station. The proposed mechanism effectively reduces the use of separate antennas for communication and also increase the multi band data security. The paper elegantly introduces the concept of customizable multiband form of communication with the help of one antenna.