1. Problem statement:

The integration of the antenna and textile materials is very important in the army protective or data transmission clothing. In this project, a novel microstrip antenna integrated into a 3D orthogonal woven fabric will successfully design and fabricate. This type of antenna is design to work in wearable or conformal antenna applications. Simulation work using HFSS software will do for the determination of antenna size. Antenna performance including return loss, radiation pattern and gain will measure and the simulated results were found to have good agreement with the measured results. The measured return loss will -20.36dB with a resonant frequency of 1.75GHz. The VSWR under the frequency of 1.70GHz will (1.232). These results are considered to be very valuable, and this type of integrated antenna is expected to be useful as wearable antenna in the telecommunication or smart textile antenna field.

2. Aims and Objectives:

Following are the main objectives of our project.

* To design a conformal microstrip antenna integrated into orthogonal woven fabric.
* To design antenna as wearable item by doing hand-on practice.

3. Literature Review:

Since the concept of smart textile systems was introduced in 1990s, research on electro-textile has rapidly expanded. Nowadays, more and more attention has been given to the healthcare and protective clothing sectors. In these circumstances, the antenna, as an electronic element, plays an important role in wireless data transmission. In order not to lose the flexibility and comfort of garments, antennas should be fully integrated into the textile materials.

Among all types of antennas, microstrip patch antennas, as flat, thin and flexible antennas, seem most suitable for integration into clothing. A microstrip antenna in its simplest configuration consists of a radiating patch on one side of a dielectric substrate and a ground plane on the other. Microstrip antennas have several advantages compared with conventional microwave antennas.

They have low volume, low profile planar configurations and low fabrication cost. These advantages resulted in the microstrip antenna becoming the first choice in designing electro-textiles.

Up to now, many types of Integratable textile microstrip antennas have been proposed and nearly all of them are microstrip antenna integrated textiles. Salonen et al. introduced textile antennas in which the substrate was textile material, where both antenna and ground plane were made of copper tape. In this case, the phenomenon of peeling off will exist when the structure is subjected to a mechanical load such as impact. In the textile microstrip antennas investigated by Hertleer et al., the electro-textile patches were glued onto the substrate and additionally stitched to improve fixing and to prevent an intermediate air gap. However, continuity of the conductive materials was damaged using the stitching methods, thus, probably leading to malfunction of the antenna.

In this project, we propose a microstrip-fed microstrip antenna woven into a 3D orthogonal fabric. Different from the textile antennas mentioned above, the patch and ground plane will fully woven with the textile substrate using 3D woven fabric. This method will anticipate resulting in superior integrity and impact resistance. At the same time, it will feel that the peeling off phenomena could be avoided to a great extent. After fabrication, the electrical performance of the antenna will measure.

4.Methodology of Project:

* We will initially perform the simulation of our project and implement the hardware.

5. Utilization of Project Results:

* We will try to make this project marketable.

6. Work Schedule Plain:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Work Schedule** | **March-2015** | **April-2015** | **May-2015** | **June-2015** | **July-2015** |
| Study of conformal microstrip antenna |  |  |  |  |  |
| Data collection |  |  |  |  |  |
| Hardware/Software designing and implementation |  |  |  |  |  |
| Results compilation and thesis writing |  |  |  |  |  |

* Proposed starting date:
* 15th March 2015
* Expected completion date:
* 15th July 2015

7. Resources Required:

* **Major Hardware requirement:**
* 3D woven fabric.
* Pure copper sheet.
* Pure copper polyester taffeta fabric (PCPTF).
* **Software requirement:**
* High Frequency Structure Simulator **(HFSS).**

8. Supervisor’s Comments:

Signature of Supervisor: