

# CHAPTER ONE

## INTRODUCTION

### 1.1 Preface:

An artificial satellite is an object that relays and amplifies radio telecommunication signals via a transponder; it creates a communication channel between a source transmitter and receiver(s) at different locations on Earth. Satellites are used for television, telephone, radio, internet, navigational, purpose, locating and military.

Satellite TV is one of the most spread services offered these days. It requires a receiver and a satellite dish which must be pointed to a certain satellite in the sky to receive its signal. When the signal reaches the viewer's house from the satellite, it is captured by the satellite dish. A satellite dish is just a special kind of antenna designed to focus on a specific broadcast source. The standard dish consists of a parabolic (bowl-shaped) surface and a central feed horn. To transmit a signal, a controller sends it through the horn and the dish focuses the signal into a relatively narrow beam.

The dish on the receiving end can't transmit information; it can only receive it. The receiving dish works in the exact opposite way of the transmitter. When a beam hits the curved dish, the parabola shape reflects the radio signal inward onto a particular point, just like a concave mirror focuses light onto a particular point[1].

To receive a clear satellite picture, the dish must not only have a clear line of sight to the satellite but also the correct vertical and horizontal

alignment. The vertical alignment refers to moving the dish up and down the horizontal alignment refers to moving the dish left and right.

Nowadays people watch channels that belong to different satellites that require moving satellite dish from one satellite to another one. Automatic satellite dish positioner provides a mechanism for moving Satellite dish from one satellite to another one by using mobile phone.

## **1.2 Problem Statement:**

Receiving signals from multiple satellites using a single satellite dish antenna require moving it manually to receive the intended satellite signal which is too difficult because it take long time and much effort.

## **1.3 Proposed Solution:**

The proposed solution is to design, simulate and implement a remotely automatic satellite positioning system using an android application, controller (ARDUINO) and motors.

## **1.4 Aim and Objectives:**

The aim of this project is to design and simulate an automatic Satellite dish positioning to multiple satellites.

The objectives from this project are:

- To develop an android application for selecting the desired satellite.

- To develop an ARDUINO code for controlling motors' movement.
- To simulate the system for controlling the motors.
- To implement automatic satellite positioning system.
- To evaluate the look angles that are rotated by motors using Serial Monitor.

## **1.5 Methodology:**

Automatic satellite dish positioner used to align the dish to the desired satellite. It composed from android application, controller and motors. It uses android application for calculating the dish look angles that are required for perfect alignment with the satellite. Look angles calculations depend on user location, desired satellite position and current satellite position. Android application locate the user using GPS and allow the user to select both of the desired and current satellites positions. Android application send two values to a controller (ARDUINO) which is responsible for moving two motors. The controller uses the sign of each received value as direction for moving the intended motor and uses the absolute value of each received value as the angle that the intended motor must be moved to it. Motors adjust the dish antenna to the correct position depending on the controller commands. As a result, the user will receive the strongest signal from the satellite.

## **1.6 Research Outlines:**

This project is composed from five chapters that explain all of the steps that are required to satisfy the goal of the project. the following paragraphs contain a brief description about each chapter.

Chapter one is an introduction that gives a preface about the project, its aim and its objectives, the problem statement, proposed solution and brief description about the methodology to achieve the intended goal from the project.

Chapter two is the literature review that first gives technical background about the satellite and its types, types of motors and the global positioning system(GPS). The second part of this chapter is related works that include the analysis of works that were in the field of positioning satellite dish and the benefits and drawbacks of each work.

Chapter three is the system design that contains all the methods and steps in great details that were followed to achieve the goal of the project.

Chapter four is the simulation and results that contains system components, system simulation, a discussion of the simulation and the resulted outcome from it, system design and the results obtained from the android application.

Chapter five is the conclusion of the achieved goals from the project and the recommendations for future developments.