Tongue driven speaking wheel chair with wireless device control

Tongue Drive system (TDS) is a tongue-operated unobtrusive wireless assistive technology, which can potentially provide people with severe disabilities with effective computer access and environment control. It translates users' intentions into control commands by detecting and classifying their voluntary tongue motion utilizing a small permanent magnet, secured on the tongue, and an array of magnetic sensors mounted on a headset outside the mouth or an orthodontic brace inside. We have developed customized interface circuitry and implemented four control strategies to drive a powered wheel chair (PWC) using an external TDS prototype.

The magnetic sensors are nothing but hall-effect sensors. A Hall Effect sensor is a transducer that varies its output voltage in response to changes in magnetic field. In its simplest form, the sensor operates as an analogue transducer, directly returning a voltage. With a known magnetic field, its distance from the Hall plate can be determined.

The control system consists of Hall Effect sensor and microcontroller. Microcontroller collects data from the sensor and transmits the encoded data through the RF transmitter. At receiver end RF receiver receives the data through the decoder and fed as input to the micro controller. The controller performs the corresponding actions i.e., wheel chair movement.

This Project consists of two Microcontroller Units, Wheel chair and Hall Effect sensor and wireless communication through RF. Wheel chair is made up of High torque Geared DC Motors, the Motors Directions can be changed through the set of instructions given from the Hall Effect sensor and the action of these Instructions is already loaded into the Microcontroller using Embedded C programming. The RF receiver provides the information to the microcontroller (on board computer) from RF transmitter and the

controller judges whether the instruction is right movement or left movement based on the tongue movement and controls the direction. Also, the system is capable of switching devices wirelessly and also has a provision of announcing needs through voice circuit interfaced to the wheel chair system.

The objectives of the project include:

1. Wheel chair controlling based on tongue motion.
2. Provision for wireless device switching.
3. Provision for announcing basic needs.
4. Usage of wireless RF technology.

The project provides the following learning's:

1. RF technology.
2. Interfacing of RF transmitter and RF receiver module to Microcontroller.
3. Switches Relay and Triac operation.
4. Hall Effect sensor characteristics.
5. Voice circuit characteristics.
6. Interfacing voice circuit to Microcontroller.
7. Embedded 'C' programming.

The major building blocks of this project are:

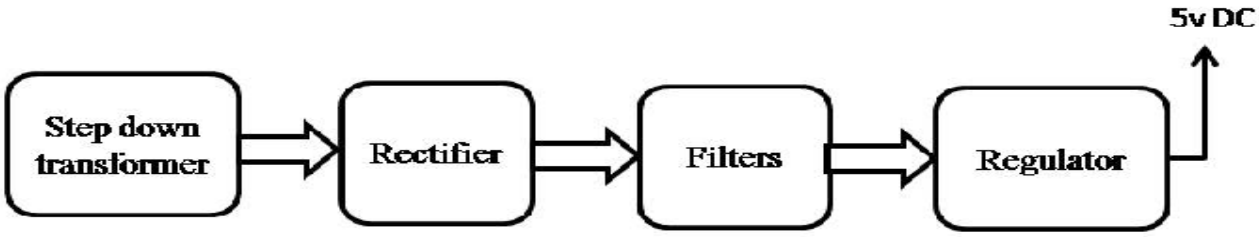
1. Regulated Power Supply
2. Hall Effect Sensor.
3. Micro Controller
4. RF transmitter
5. RF receiver.

6. Motor driver
7. High torque Geared DC Motors.
8. Voice circuit
9. Relay with driver.
10. Triac with driver.
11. Crystal oscillator.
12. LED indicators.
13. Reset.

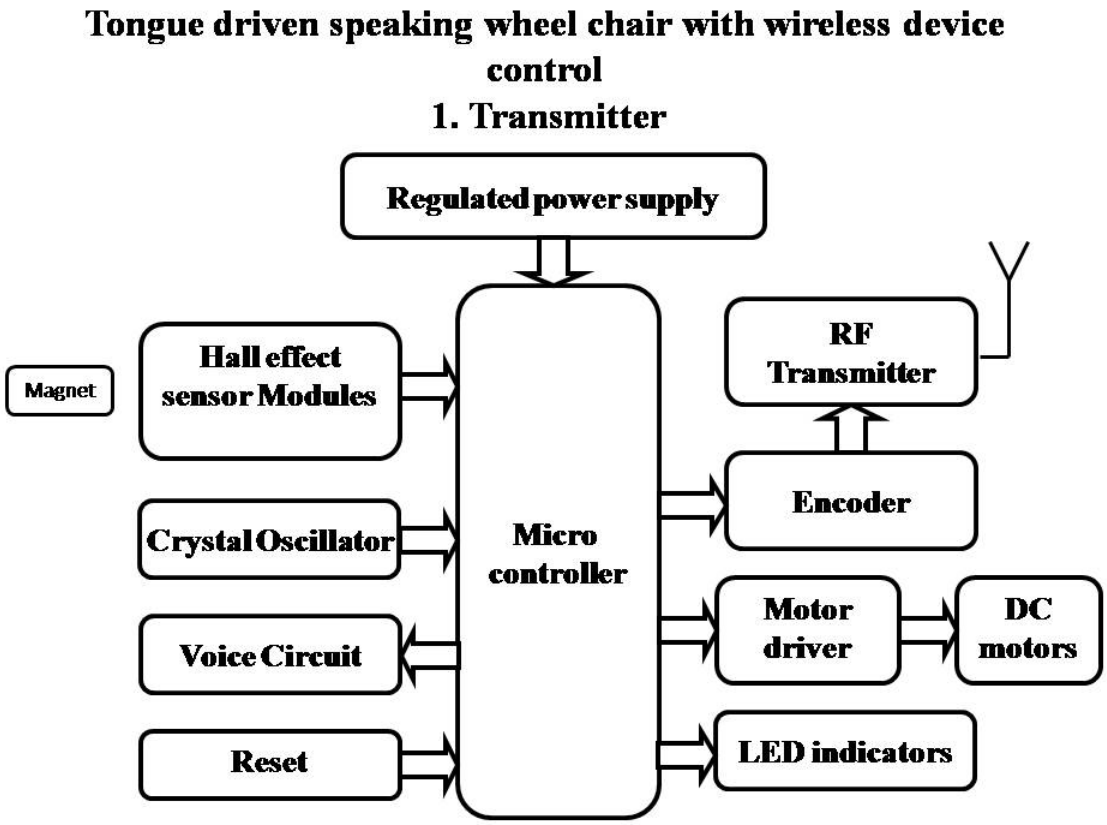
Software's used:

1. PIC-C compiler for Embedded C programming.
2. PIC kit 2 programmer for dumping code into Microcontroller.
3. Express SCH for Circuit design.
4. Proteus for hardware simulation.

Regulated power supply:



Block diagram:



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2. Receiver