Design and construction of MEMS Accelerometer based tilt operated Touch Free Mobile Phone

This project aims at designing a GSM mobile with the help of a MEMS ACCELEROMETER SENSOR to help for a friendly hardware interaction for the user. The device is designed by interfacing a Micro Electro Mechanical System (MEMS ACCELEROMETER SENSOR) and a GSM modem. An onboard computer (Microcontroller) controls these two hardware modules. These three combined to form the project that can achieve the following innovative features.

- Horizontal Right Tilt based Phone Book (forward) reading system.
- Horizontal Left Tilt based Phone Book (backward) reading system.
- Vertical Upward Tilt for calling the phone number.
- Vertical Downward Tilt for disconnecting the call.

This kind of hardware interactions are made possible with the help of the MEMS ACCELEROMETER SENSOR technology. These kinds of mobile designs are helpful for user who is interested for fast and less complex operations and also for the illiterates who least prefers for button operation.

The objectives of the project are achieved by making use of an onboard computer. Onboard computer which we are making use can also be termed as a control unit or microcontrollers. Microcontroller interfaces with MEMS ACCELEROMETER SENSOR based tilt sensor and also with GSM Modem. GSM modem interfacing is done using Serial Communication and AT commands. This system also consists of a graphical LCD for better visibility. This displays the control options for tilt based commands, Address book, Mobile operator name and Number dialing/disconnection information. This system also enabled with the power saving features like disconnecting the power supply to GLCD in case of non-usage of mobile phone for few seconds.

The MEMS ACCELEROMETER SENSOR is the input module of the project and provides the information about the tilt in different directions. While the GSM modem is used for remote communication and it catch holds of a SIM card. It is operated with out the need of any control button interface and for this the control makes use of AT commands as per the interest of the user (as per the tilt).

The main features of this project are:

1. User friendly operation.
2. Dynamic phone book display with respect to the horizontal (left/right) tilt angle.
3. Dynamic calling option with respect to the forward vertical tilt angle.
4. Dynamic calling halting option with respect to the backward vertical tilt angle.
5. Very easy to operate.
6. GLCD with backlight control.
7. Power saving mode of operation.
8. Activities display on GLCD.
9. Buzzer for audible alerts.

The device provides learning's on the following advancements:

1. MEMS ACCELEROMETER SENSOR.
2. ADC Module.
3. GLCD interfacing.
4. GSM modem interfacing.
5. Buzzer interfacing.
6. Embedded C programming.
7. PCB design.

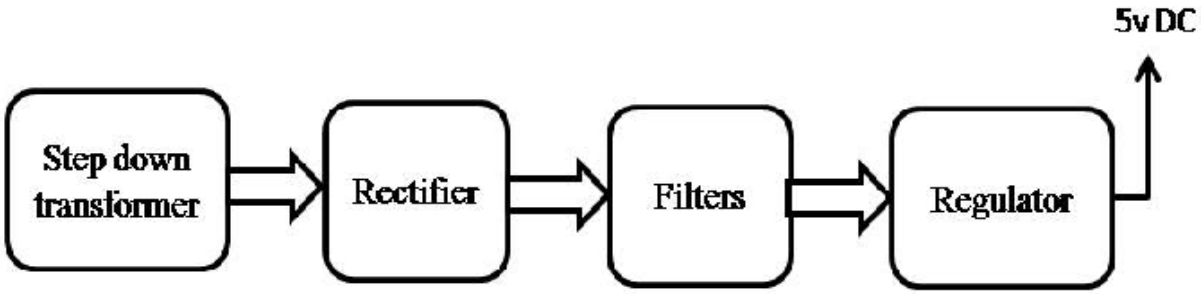
The major building blocks of this project are:

1. Microcontroller board with regulated power supply.
2. Crystal Oscillator.
3. GSM modem.
4. MEMS ACCELEROMETER SENSOR.
5. GLCD Display to display address book and calling pages.
6. LED Indicators.
7. Buzzer for audible alerts.

Software's used:

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

Regulated Power Supply:



Block diagram:

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