Mansi Uniyal
19EE10039

Assignment 2

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Sensors and Actuators in Cellphones

converts various physical properties and records in electrical signals

- **Microphone :-**
  Sound sensor, that detects & measures loudness.
  Google Assistant, Siri, Cortana etc.
- **Fingerprint Sensors :-**
  Capacitive Sensor enables biometric verification (records electrically) measures distance & pattern bet^n ridges on surface of finger
  Lock screen, Payement apps.
- **Touch Screen Sensors :-**
  have electric current which on touching causes change in signal.
  capacitive touchscreen for input and resistive screen for display (Apple)
  capacitive (nowadays)
- **Thermometer :-**
  measuring temp inside device and battery. Incase of overheating system shuts down.
- **Air Humidity Sensor :-**
  measure humidity and data collected tells if air temp and humidity is optimum or not.

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- **Heart Rate Sensor:—**

measure with LED and optical sensors. LED emits light towards skin and sensor looks for reflected make's difference in intensity due to pulse.

Fitness Health apps.

- **Barometer:—**

measure air pressure. used in detecting weather changes and calculating altitude.

- **Pedometer:—**

counts steps and fitness tracker, uses values by accelerometer to monitor movements while walking and joging.

Fitness Healthcare Apps.

- **Barcode / QR Scanner:—**

detects barcode by ~~de~~ reflected light from code. Generates analog signal with varying voltage that represents barcode.

Scanning products, Payement.

- **GPS (Global Positioning System):—**

communicate with satellite to get location. doesn't use internet.

Uber, Google maps, Ola.

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- **Ambient Light Sensor:-**
  detects lighting levels in the vicinity to adjust brightness display.
  Automatic Brightness Adjuster.
- **Magnetometer:-**
  Compass, Metal detector apps.
  detects magnetic fields to detect planet's north pole.
- **Gyroscope:-**
  provides orientation details and direction like up/down/left/right with tilt.
  Auto rotate, Google Sky map
- **Accelerometer:-**
  detects acceleration, vibration and tilt to determine movement and orientation, how fast phone is moving, orientation.

Actuators
↓
convert control signal to mechanical motion

- **Speaker:-**
  converts electrical ~~sound~~ signal to sound
- **Screen:-**
  converts electrical signal to display that becomes light creates images on display.

- ~~Auto fall detection~~ :- Phone ON/OFF :-
  Switch turn on/off the screen. with button.

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- Vibration :-

  While messaging, calls, notification, the buzzing vibration based on electrical signals commands.