

# Applications of MEMS accelerometers and gyroscopes in consumer products

| Consumer product   | Function   | Examples of products   | MEMS inertial device(s)  | Status of commercialisation   |
|--|--|--|--|---|
| <b>Cell phones</b>                                       | Pedometer, image rotation, menu scroll, gaming, free-fall detection (HDD protection), navigation | NTT DoCoMo pedometer (2003)<br>Vodafone image rotation (2004)<br>Samsung SGH E760<br>Nokia 3230 (navigation and gaming)        | 2- or 3-axis accelerometer,<br>1- or 2-axis gyroscope                      | Accelerometer in cell phone since 2003<br>Gyroscope expected in 2007–2008 |
| <b>PDA</b>   | Navigation IMU, Web content navigation   | Toshiba PocketPC e740  | 2- or 3-axis accelerometer<br>2-axis gyroscope                             | Demonstrator in 2002 at Paris PDA show                                    |
| <b>Digital still cameras (DSC)</b>                       | Image stabilisation  | All Panasonic DSCs, e.g. Lumix (\$200), Pentax Optio A10 (\$350)<br>Canon, Sony DSCs   | Two 1-axis gyroscopes or one 2-axis gyroscope<br>Two 2-axis accelerometers | Gyroscope established since late 1990s<br>Accelerometer emerging          |
| <b>Camcorders</b>  | Image stabilisation, free-fall detection (HDD protection)  | Upper end: Panasonic (over \$1500)<br>High end: JVC 30 Gb, Toshiba 60 Gb   | Two 1-axis gyroscopes or one 2-axis gyroscope                              | Gyroscope established since late 1990s                                    |
| <b>Laptops</b>   | Free fall detection (HDD protection), GPS dead-reckoning assist (anti-theft)                     | IBM, Toshiba, Apple laptops  | 2- or 3-axis accelerometer   | Free-fall detection established<br>Other applications emerging            |
| <b>MP3 players</b>                                       | Free fall (HDD protection)   | iPod with hard disc drive  | 3-axis accelerometer   | Established   |
| <b>Others: toys, games, personal transporter, robots</b> | Realistic motion   | Nintendo's Kirby "Tilt-n-Tumble" GameBoy<br>Microsoft gamepad<br>"Sidewinder Freestyle Pro", Segway, Sony Aibo robot, Sony PS3 | 2- or 3-axis accelerometers,<br>1- or 2-axis gyroscopes                    | Established   |

**Source: WTC**