Smart Dust

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***Abstract*— Smart dust is a tiny dust size device with extra-ordinary capabilities. Smart dust combines sensing, computing, wireless communication capabilities and autonomous power supply within volume of only few millimeters and that too at low cost . These devices are proposed to be so small and light in weight that they can remain suspended in the environment like an ordinary dust particle. These properties of Smart Dust will render it useful in monitoring real world phenomenon without disturbing the original process to an observable extends . Presently the achievable size of Smart Dust Is about 5mm cube ,but we hope that It will eventually be as small as a speck of dust. Individual sensors of smart dust are often referred to as motes because of their small size. These devices are also known as MEMS, which stands for micro electro-mechanical sensors**

I. INTRODUCTION

It was first developed by Professor Kris Pister at the University of California, Berkeley.

- Smart Dust is a self-contained network of tiny motes each having the capability of sensing and monitoring the environment conditions.
- They are tiny particles which will be around the size of a grain of sand.
- They contain sensors which have the computational capability, power supply, programmable microprocessor, analog circuitry.
- A network of these motes leads to SMART DUST project.
- They can communicate with a base station or with other motes depending on the application.

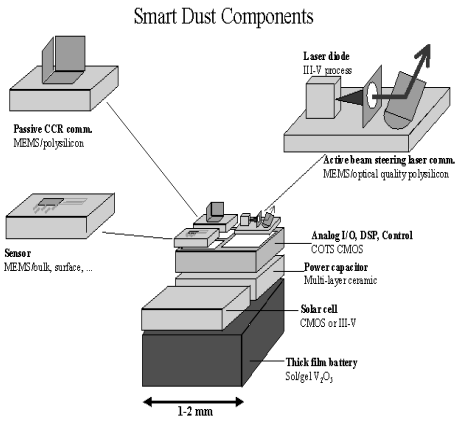
Proposed web based disease diagnosis system uses linear search is presented in section 3 and evaluation of proposed system is shown in section 4, section 5 concludes the paper.

II. REQUIREMENTS

Smart Dust nodes otherwise known as ³motes´ are usually of the size of a grain of sand and each mote consists of the following:

1. Sensors.
2. Transmitter & receiver enabling bidirectional wireless communication.
3. Processors and control circuitry
4. Power Supply Unit.

III. COMPONENTS OF SMART DUST



IV. MEMS TECHNOLOGY

Micro-Electro-Mechanical Systems (MEMS) is the integration of mechanical elements, sensors, and electronics on a common silicon substrate through micro-fabrication technology.

V. CORNER CUBE RETROREFLECTOR FOR SMART DUST

CCR comprises three mutually perpendicular mirrors of gold-coated polysilicon. The CCR has the property that any incident ray of light is reflected back to the source (provided that it is incident within a certain range of angles centered about the cube's body diagonal). If one of the mirrors is misaligned, this retro-reflection property is spoiled. The micro-fabricated CCR includes an electrostatic actuator that can deflect one of the mirrors at kilohertz rates. It has been demonstrated that a CCR illuminated by an external light source can transmit back a modulated signal at kilobits per second. Since the dust mote itself does not emit light, the passive transmitter consumes little power. Using a micro-

fabricated CCR, we can achieve data transmission at a bit rate up to 1 kilobit per second, and over a range up to 150 meters, using a 5milliwatt illuminating laser.

One should note that CCR-based passive optical links require an uninterrupted line-of-sight path. Moreover, a CCR-based passive transmitter is inherently directional; a CCR can transmit to the BTS only when the CCR body diagonal happens to point directly toward the BTS, within a few tens of degrees.

A passive transmitter can be made more omni-directional by employing several CCRs oriented in different directions, at the expense of increased dust mote size. If a dust mote employs only one or a few CCRs, the lack of omni-directional transmission has important consequence on feasible network routing strategies.

VI.ADVANTAGES

- Reducing systems and infrastructure costs
- Increasing plant/factory/office productivity
- Improving safety, efficiency and compliance

DISADVANTAGE

- Privacy
- High cost
- Difficult to retrieve

VII. APPLICATIONS

- Environmental protection (identification and monitoring of pollution).
- Habitat monitoring (observing the behavior of the animals in there natural habitat).
- Military application (monitoring activities in inaccessible areas, accompany soldiers and alert them to any poisons or dangerous biological substances in the air).
- Indoor/Outdoor Environmental Monitoring.
- Security and Tracking
- Health and Wellness Monitoring (enter human bodies and check for physiological problems).
- Factory and Process Automation.
- Seismic and Structural Monitoring.

VIII.CONCLUSION

With the base technology of manufacturing ICs already available in our country and just by employing a little extra on micro-fabrication technology the Indian firms like BEL, SCL and other semiconductors giants can take the initiative to conquer the world markets in this sector and take India into a dominating position as in the IT sector.

The employment of smart dust would mean better measurement data, therefore a better control of various industrial and nonindustrial parameters, and thereby enhancing the standard of life in general