

- . - Basic optical research that laid foundation for today's fiber optics technologies
- . - Discovery of optical harmonics generated by lasers leads to birth of field of non-linear optics
- . - Nobel Prize to Donald Glaser (1960) for invention of the "bubble chamber"
- . - Development of first practical (battery-less) arc lamps (1876!)
- . - Invention of positron microscope and applications to materials science and biological imaging
- . - Clinical trials of 1.8 million children in 1953-55 demonstrate safety and effectiveness of Salk vaccine against infantile paralysis
- . - Invention of first artificial knee joint
- . - "Tecumseh Project" yields first good data on epidemiological risks associate with cardiopulmonary disease
- . - Development of techniques for treating thyroid disorders with radioactive iodine
- . - Pioneering of 3-D computerized techniques for imaging, targetting, and radiation treatment of human tumors
- . - Invention of EMCO, the life-saving heart-lung machine to treat infants with cardiopulmonary problems
- . - Invention/development of first efficient holographic instruments, theory and techniques (the "birth of holography")
- . - Invention in 1957-58 of synthetic aperture radar (SAR) with vast improvement of radar imaging techniques
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- Early (1960's) and continuing invention/development of multispectral scanning providing foundation for modern remote sensing/imaging technology
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- Invention (shared elsewhere?) of the ruby maser, extending optical capabilities of the laser into the microwave range
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- Approval of first clinical trials (outside of NIH) of new gene therapy treatment of hypercholesterolemia (rare cholesterol disorder). In 1991.
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- Identification of specific genes associated with cystic fibrosis and neurofibromatosis
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- Development and commercialization of new influenza vaccine that can be nasally administered and quickly changed to adapt to new strains of "flu"
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- In collaboration with MSU, development of new methods for bacterial bioremediation of petroleum/gasoline-contaminated sites

The foregoing are achievements "in the bag", but there are projects in the works that may "work to make life better through research" (per Glen Stevens). The following are a few examples.

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- Tim Vogel and colleagues in COE have developed laboratory-scale techniques for bacterial breakdown of polychlorinated biphenyls (PCB's) and are now trying to extend to large-scale natural systems
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- A team of engineers and Kresge researchers are trying to develop new hearing aids neurally connected to, and thus responsive to signals from the brain
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- In a Stanford collaboration, U-M researchers have successfully grown huge numbers of myoblasts from pinhead sized muscle samples, genetically modified them, and reinjected them into mice where they cause secretion of growth factors into the bloodstream
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- Collaboration of researchers from Chemical Engineering, Internal Medicine and Pediatrics has resulted in successful growth of bone marrow nad progenitor cells IN VITRO. This work has the potential to avoid major surgical marrow extraction by growing marrow outside the body. Genetically modified, externally produced cells can then be introduced to patients by simple aspirations. This technology is now being developed for commercialization by Aastroms Biosciences, Inc., - a Michigan based Biotechnology firm.

- A team in our Medical School has just received funding to develop an exciting new technique for acoustic cancer therapy in which anti-cancer reagents introduced at low (non-damaging) levels in the bloodstream are activated at tumor sites by focused acoustic waves.

- As you know, the extensive collaborations of our chemists, physicians and engineers - utilizing silicon chip technology - is producing microsensors of pinhead for the measurement of various biological molecules, inorganic reactants, etc., and these devices have significant medical and other applications. These U-M technologies are currently being evaluated for commercialization by Motorola.

Finally, and as you are well aware, there have been long-range established programs at the U-M that have clearly benefited society, but which are hard to capture in "snipits" or bullets. I thin here, for examples of:

- ISR's pioneering work in establishing contemporary protocols and standards for econometric, sociological and political surveys

- U-M collaborations with MSU over the years and through the Michiagn Sea Grant Program in studying the problems and environmental/ecological systematics of the Great Lake and their utilization as fisheries, inland waterways and recreational playgrounds

- Ted Birsall's decades-long, pioneering studies of acoustic transmisson and tomography in submarine media

- The numerous contributions of UMTRI to the auto industries in terms of testing highway and vehicular safety and their current emphases on human factors as well as intelligent vehicle highway systems.

Other (JJD)

Development of methods for modern survey research (ISR)

Development of modern organizational science (Lippert, Campbell)

Project Michigan

Stealth technology