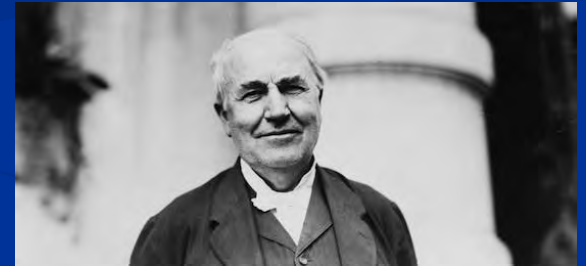
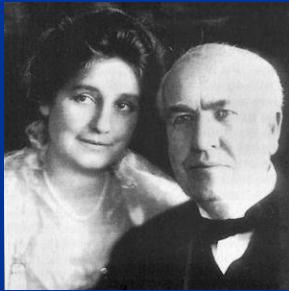




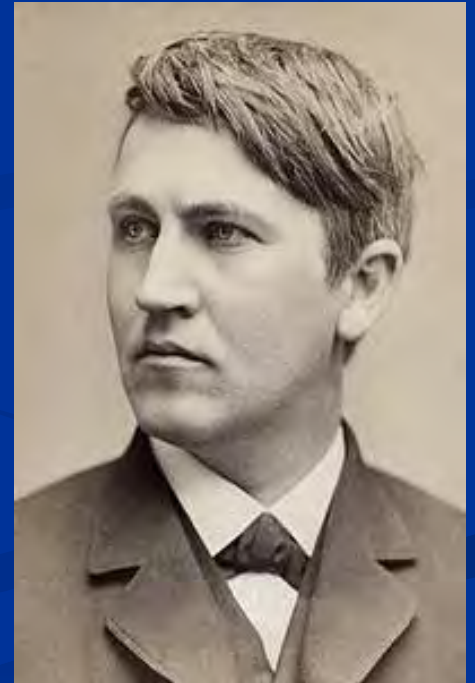
# New Jersey, the Invention State



Harry T. Roman  
Inventor, Retired Engineer, Author, Educator

# What Inventors and Entrepreneurs do for the World

- Agents of change and economic growth
- Commercialize new products and services
- Drive down costs to consumers
- Create new jobs and industries
- Improve our standards of living
- Clean the environment
- Make things safer



# Edison West Orange Labs

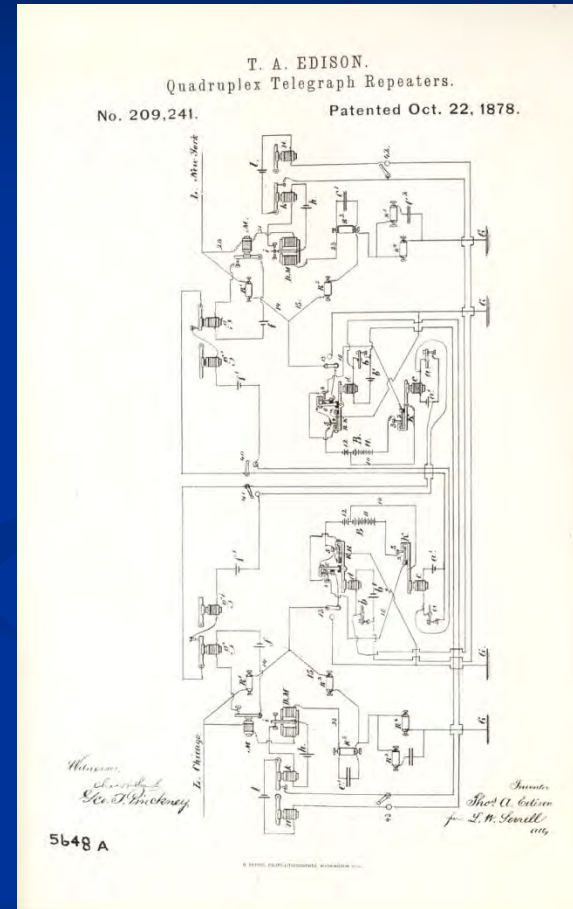
- Employed 10,000 people in 1910
- Shipped products around the world
- “The” world model for **vertically integrated manufacturing**—Edison managed 30 companies here



# New Jersey is a Patent Leader

[top ten states, rank order, [2015]; source-US PTO]

|                     |                |
|---------------------|----------------|
| ■ California        | 657,693        |
| ■ New York          | 270,810        |
| ■ Texas             | 206,433        |
| ■ <b>New Jersey</b> | <b>183,114</b> |
| ■ Illinois          | 177,960        |
| ■ Pennsylvania      | 162,813        |
| ■ Michigan          | 161,083        |
| ■ Ohio              | 150,235        |
| ■ Massachusetts     | 146,892        |
| ■ Minnesota         | 94,592         |



[NJ] is no longer the Garden State, but rather the “Invention State”; and STEM competent workers will keep us in a leadership role]

# U.S. Patent Growth Statistics

| ■ | Year | Patents   | Notes              | Doubling Time |
|---|------|-----------|--------------------|---------------|
| ■ | 1792 | 0         |                    | Doubling Time |
| ■ | 1847 | 5,000     | [Edison is born]   |               |
| ■ | 1911 | 1,000,000 |                    |               |
| ■ | 1935 | 2,000,000 | [Edison dies 1931] | 143 years     |
| ■ | 1961 | 3,000,000 |                    |               |
| ■ | 1976 | 4,000,000 |                    | 41 years      |
| ■ | 1991 | 5,000,000 |                    |               |
| ■ | 1999 | 6,000,000 |                    |               |
| ■ | 2006 | 7,000,000 |                    |               |
| ■ | 2011 | 8,000,000 |                    | 35 years      |

Note: 10 millionth patent was issued in June 2018



# The Legacy of Thomas Edison

- Edison codified the **process of invention**.
- His “invention factory” is all about **team-based, problem solving**; i.e. progress. Edison is the **great-grand-daddy of STEM**.
- Today over \$520 billion a year is spent on U.S. R&D-a direct legacy to **using STEM principles** to commercialize new product development.



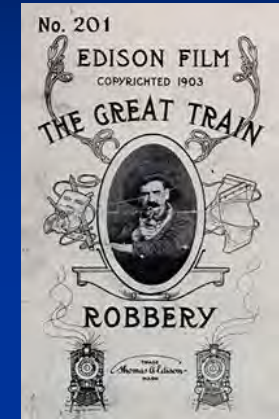
# The Value of Edison's Work Today

- His industries created, and technological achievements, **annually account for \$8-12 Trillion of the world's \$80 Trillion economy.**
- Economists believe his achievements are **responsible for 1/4 of all the jobs on Earth.**
- Life Magazine determined his incredible life and accomplishments earned him the title--the **Man of the Millennium** [that's the last 1,000 years!].

A black and white image of Thomas Edison's signature. The signature is written in a cursive, flowing script. It begins with a large, sweeping 'T' that arches over the rest of the name. The words 'Thomas A Edison' are written in a consistent cursive style, with the 'A' being particularly small and integrated into the flow between 'Thomas' and 'Edison'. The signature ends with a small, upward-pointing flourish.

# Major Edison Inventions

- Recorded sound
- Motion pictures
- Electric light bulb and central power systems
- R&D Labs
- Also: fluoroscopy, florescent lights, alkaline storage batteries, radio telegraphy, carbon button transmitter, appliances, telegraphy, the Edison Effect, concrete structures, and big champion of solar and EV's.

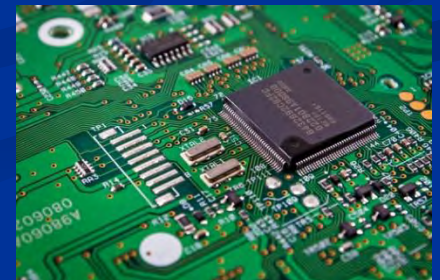
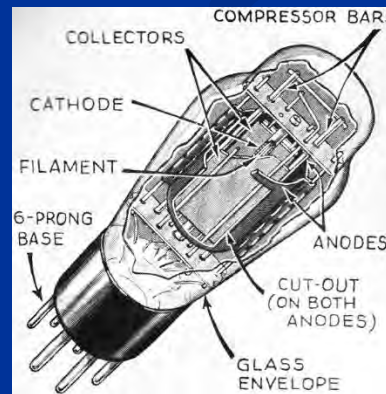




# The Light Bulb-The Taproot for Modern Electronics

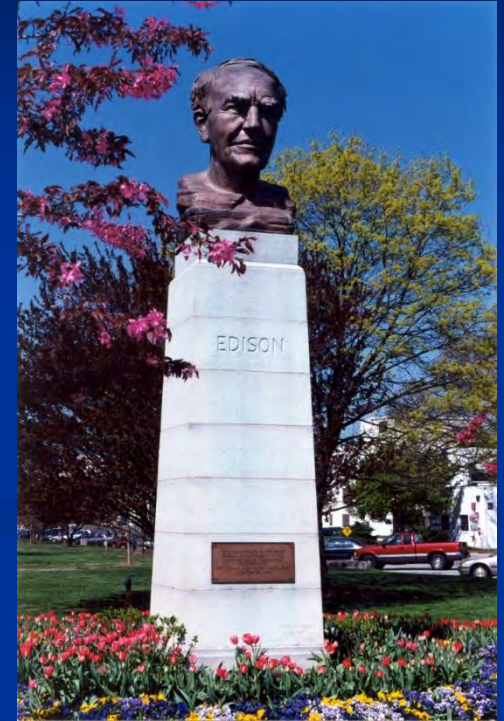
- Edison Effect with the light bulb....the **first electronic patent** [1880's]
- Vacuum tubes [Princeton-early 1900s] leads to radio and TV
- Transistor [Bell Labs-1946].... miniaturization of electronics

Later led to printed circuits [1950's/60's] and integrated circuits/micro chips [1970's]



# Edison Founded R&D Labs & Unleashed a Cornucopia of New Products

- Thomas Edison: Menlo Park (1876), West Orange (1887)
- General Electric 1885
- Johnson & Johnson 1891
- Merck 1891
- National Starch 1895
- Du Pont 1903
- Westinghouse 1904
- Benjamin Moore 1904
- Exxon 1919
- RCA 1920
- Englehard 1920
- Union Carbide 1925
- Bell Labs 1925
- Mobil 1925
- Hoffman La Roche 1929



# New Jersey Inventions in Various Sectors of the Economy

- Transportation
- Medical and Health
- Foods
- Entertainment
- Communications
- Home Saving
- Sports
- Energy
- Other





# Transportation Inventions

- Hovercraft
- Highway clover leaf
- Traffic circle
- Steam locomotive-  
steam powered boat
- Flight trainer /  
simulator
- Modern submarine
- Universal joint for  
vehicle drive trains
- Jersey barrier





# Medical and Health Inventions

[N]...the nation's medicine cabinet]

- Numerous medicines
- Life-saving drugs
- Anti-bacterial toothpaste
- Band aids
- Electron microscope
- Sunscreen
- Laboratory glassware
- Chlorination of water
- Heart stent



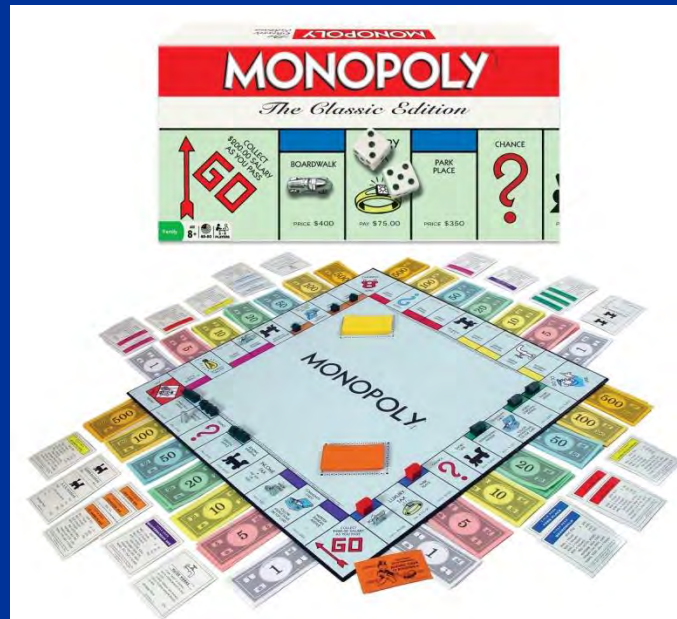
# Food Inventions

- Ice cream cone
- M&M's
- Bosco Chocolate Syrup
- Taylor Ham / Pork Roll
- Condensed Soup [Campbell's]
- Saltwater Taffy
- TV Dinners
- Cultivated blueberries, sweet corn
- Mason jars
- Graham crackers
- Fruit juice industry
- Egg candling and grading



# Entertainment Inventions

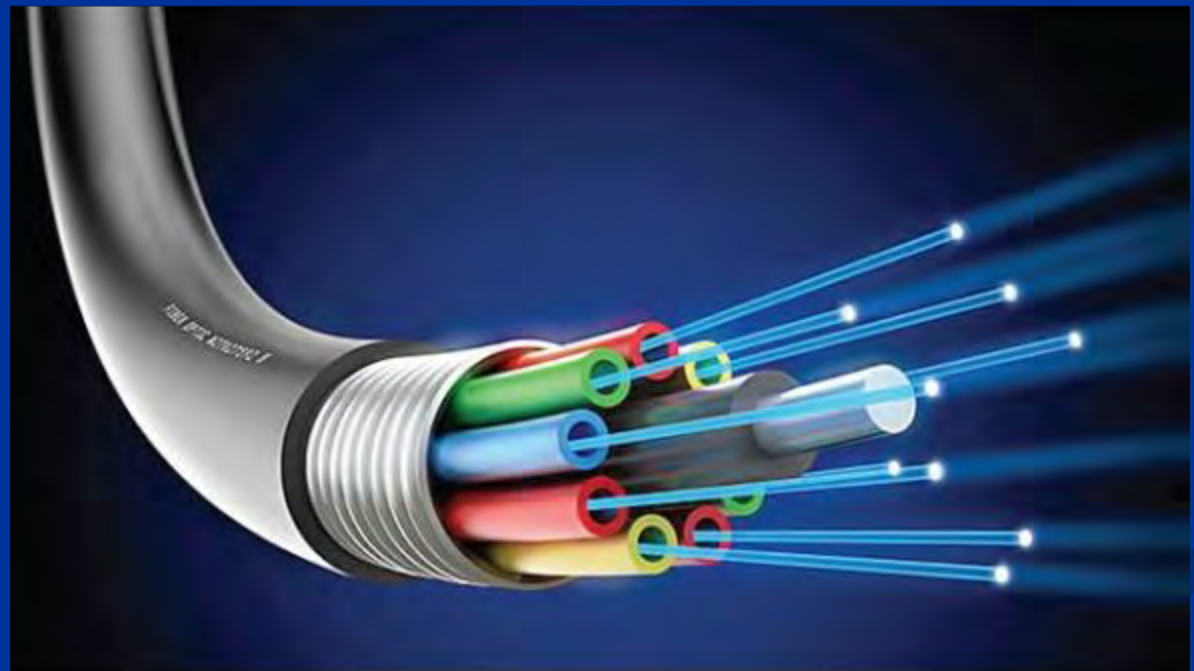
- Solid body electric guitar
- Sound mixing / multi track recording
- Compact file formats for music
- Stereo sound
- Phonograph and Movies [Edison]
- Flexible film
- Monopoly board game
- Play Doh
- Drive-in theaters
- Boardwalks
- Color TV, picture tubes





# Communications Inventions

- Cell phone and communication formats
- Mobile cellular communication system
- Fiber optics
- Telegraph code
- Wireless radio [Marconi]
- FAX machines
- FM radio
- Artificial larynx
- Telephone switching systems
- Touch-tone dialing
- Telstar communications satellite





# Home Saving Inventions

- Vacuum cleaner
- Pedal activated trashcan
- Microwavable pots and pans
- Refrigerator door shelves
- Electric food mixer
- Electric knife
- Various laundry detergents and cleaners
- Rotating lawn sprinkler



# Sports Inventions

- Baseball game
- Catcher's face mask
- Batter's cage
- Golf tee
- Flexible Flyer sled



# Energy Inventions

- Solar cells used in solar-electric systems today
- Improved wind turbines
- Alkaline family of storage batteries
- Electric vehicle batteries [Edison]





# Other NJ Inventions

- Radio astronomy
- Packing and shipping tapes
- Bar codes / scanners
- Lasers/masers
- Liquid crystal displays
- Numerous lubricants
- Bubble wrap
- Teflon
- Anti-theft tags for clothes
- Dictation machines [Edison]
- Bakelite





# Quotes from Mr. Edison

- There is a better way to do it. Find it.
- I find out what the world needs. Then I go ahead and try to invent it.
- To invent, you need a good imagination and a pile of junk.
- Hell, there are no rules here – we're trying to accomplish something.
- All progress, all success, springs from thinking.