My Astronomy Journey

"The beginning of awe is wonder, and the beginning of wonder is wisdom." -Abraham Heschel

Things That Piqued My Interest in Astronomy

- Apollo Moon Shot
- July 20, 1969
- Buzz Aldrin (photo at right)
- Like millions, I watched on TV in awe.



Some Science Fiction Influences 2001: A Space Odyssey



- An alien encounter going back to the dawn of humans.
- An AI powered computer that takes over a spaceship.
- Powerful visual effects and imagination that leaves you wondering.

My first looks at the Moon were like this...



Left, wide field photo of the Moon thru an 80mm refractor. Right, close up thru 14" RC scope.

Inspired to learn how to code...

```
void calcPlanet(double jd)
int i;
     double igmst, latsin, latcos;
     planets(jd, 0xFFFF, planet_info);
     igmst = gmst(jd);
     latsin = sin(dtr(siteLat));
     latcos = cos(dtr(siteLat));
     for (i = 0; i <= 9; i++) {</pre>
         planet info[i].lha = dtr(fixangle((igmst * 15) - siteLon - planet info[i].ra));
         planet info[i].az = rtd(atan2(sin(planet info[i].lha), cos(planet info[i].lha) * latsin -
                                 tan(dtr(planet info[i].dec)) * latcos));
         planet info[i].alt = rtd(asin(latsin * sin(dtr(planet info[i].dec)) +
                                 latcos * cos(dtr(planet info[i].dec)) * cos(planet info[i].lha)));
 // SET TM TIME -- Set time from Windows system or local time
 static void set tm time(struct tm *t, BOOL islocal)
 #define CtF(tf, sf) t->tf = s.sf
     SYSTEMTIME s;
     if (islocal) {
         GetLocalTime(&s);
     } else {
         GetSystemTime(&s);
     CtF(tm sec, wSecond);
     CtF(tm min, wMinute);
     CtF(tm hour, wHour);
     CtF(tm mday, wDay);
     CtF(tm mon, wMonth - 1);
     CtF(tm year, wYear - 1900);
     CtF(tm wday, wDayOfWeek);
     // tm yday never used
     t->tm isdst = GetTimeZoneInformation(&tzInfo) == TIME ZONE ID DAYLIGHT;
```

Which became a career...

Yardsticks: Astronomical Unit (AU)



• One Astronomical Unit (*A.U. for short*) = the distance between the Earth and Sun, which is about 93 million miles.

• The Earth is about *8 light-minutes* from the Sun.

Earth

• Jupiter is about 3.9 A.U. from Earth (5.2 A.U. from the Sun).

• Pluto is, on average, about *38 A.U.* from Earth.

A Light Year

- 670,616,629 mph (186,000 miles per second), or about 6 trillion miles.
- About 63,240 A.U.
- Parsec 3.26 light years



- Nearest star? Take a guess...
- Proxima Centauri about 4.2 Light years.

If the Milky Way Galaxy Were the Size of North America...



Our Solar System would be the size of a penny.

Above – I took this photo of a very distant galaxy in Leo (1.2 billion light years away).

The "rocky" planets...



The gas giants in relation to the inner planets.



The Sun in relation to the planets.



The Sun in relation to even bigger stars.



Source: http://www.rense.com/general72/size.htm (anonymous post): "Size of Our World: comparisons of stars/planets/big stars"

A Fun Project in 1994, Comet Shoemaker-Levy 9



We also had a 14" Newtonian Reflector telescope that we used for visual observation of the impacts – we were blown away.

Image Source: www.space.com

July, 1994, Me and Charlie Weidman standing by his Yagi Antenna. During the weekend of SL-9 impact we "listened" for cyclotronic radio bursts. Nigel Atkins (Harvard Smithsonian Center for Astrophysics) and Jim Carlson (Cape Cod Astronomical Society) were involved in this project.

"We live in an old chaos of the Sun. " - Wallace Stevens.



Asteroid 2005 YU55

Making a Telescope: Parabolizing the Mirror

- At this stage, we have already roughed out the curve of the mirror.
- We have completed the fine grinding stage with aluminum oxide.
- We are now parabolizing the mirror with a *pitch lap* and *cerium oxide*. The process works out the parabolic shape of the mirror with the pitch lap strokes.
- It also alters the glass to a highly smooth surface making it ready for the reflective coating.



Mirror, Bearings, Rings, Trusses...



12" (mirror) on Truss Mount (Dobsonian)



My First Observatory



A "Bird House" Observatory

Dig a Hole for the Pier



The pier is a12" diameter concrete post, 4' deep into the ground. The telescope mount sits on the pier.

A Little Quickcrete, Rebar, J-bolts...



The mount will attach to the J-bolts. Supervisor giving me that "get back to work" look.

Building the Deck, Mount Support, Wiring



The deck is 2'x4'. The USB-Cat5 and RS232 cables run via conduit (underground) up thru side of pier and into the deck.

Bird House Observatory







My Second (current) Observatory



Floor plan for a 10' x 12' roll-off roof observatory.

Another Hole, Pier, and We're Off





Building the Roll-Off Roof



Starhoo Observatory (I28)

www.starhoo.com





2024 Still Going...

Moon, Planets, Sun



Lunar Eclipse, February 2008

Moon, Planets, Sun, continued



Astrophotography Moon, Planets, Sun, continued





Moon, Planets, Sun, continued



Solar Eclipse 2024. Images taken with a Solar Telescope.

Deep Space Objects – Nebulae



"Christmas Tree" Nebula in Monoceros



The Pleaides in Taurus A Familiar Open Cluster in Taurus

Astrophotography Deep Space Objects – Nebulae



Deep Space Objects – Nebulae





M42 – The Orion Nebula

M57 – The Ring Nebula in Lyra

Deep Space Objects – Nebulae



M27, the "Dumbell Nebula" in Vulpecula



NGC 2244, the "Rosette Nebula" in Monoceros

Deep Space Objects – Clusters

Open ClustersM38, aka, "Starfish Cluster" (left) and NGC 1907 and 1931 (middle, right)

Deep Space Objects – Clusters



M3 (NGC 5272), Globular Cluster in Canes Venatici M5 (NGC 5904) in Serpens

Deep Space Objects – Clusters



M13, Globular Cluster in Hercules



M14, Globular Cluster in Ophiuchus

Deep Space Objects – Galaxies



Galaxy M81, in the Big Dipper

Galaxy M82, in the Big Dipper



Deep Space Objects – Galaxies



M31, The "Andromeda Galaxy" in Andromeda

NGC 4565 (aka the "Needle Galaxy") Edge On Galaxy in Coma Berenices

Deep Space Objects – Galaxies



M51, the "Whirlpool Galaxy" in the Big Dipper

M51 in March 2011 and then in June 2011 after a supernova. See the white spot, before and after.

I'm Available for Occasional Outreach

Barnstable High School Observatory



Wall of Fame, at BHS

Let There Be Night!

Thank You!

Let there be night!

