

Lowbrow Retrospective

The Year In Review: 2014

By President Charlie Nielsen

The year 2014 was yet another eventful and productive year for our club. As I was wrapping up last year's report I was writing about our 17.5 inch telescope project and how the crew working on it was enduring a very cold and snowy winter. As it turned out it was a record year for low temperatures, and even more so for snowfall. Many of us, including myself, stated that this was the worst winter of their lives. Yet the telescope team carried on in the garage of VP David Jorgenson until it was determined that the time had arrived to send the mirror to a coating company in Florida. This led up to us introducing the new scope to our club and the public at one of our first open houses of the season.

Everyone was impressed at how the scope performed, both optically and mechanically. It was used frequently during the rest of the observing season and a few more embellishments were added along the way, most notably the addition of an eyepiece box. This project was an outstanding example of what the combined talent of our club can achieve and everyone involved provided a fine asset for the club that will be utilized and enjoyed for many years to come.

Our April elections brought a couple of changes. Mike Radwick decided to step down as Observatory Director after several fine years at his post, with many improvements made during that time. Jack Brisbin was elected as our new

OD and he immediately dug into many cleanup and improvement projects during the ensuing months. Belinda Lee stepped down as VP. She was one of our most prolific speaker recruiters of all time and will be missed. New VP's Ken Ruble and Don Fohey were welcomed to the officer crew and went to work right away.

After many years of having our monthly meetings in the Dennison Building, we moved our meeting place to a room in Angell Hall. This was done due to the Dennison Building undergoing some renovation, and because the Astronomy Department was moving out. Our new room is larger, has better seating, and is in the same building as the U of M student observatory and planetarium. Parking is perhaps slightly easier as well, so we consider this an improvement over all. We moved into our new room in September.



Lowbrows braving last winter's cold and snow to focus test the 17.5 inch structure
Photo: Dave Jacobson



Young Astronomer Carly gathers some of the 17.5 inch telescope's first light last April.
Photo: Mike Radwick

Our meeting speakers were as follows: January was Dr. Laura Chomiuk from Michigan State University, who spoke to us about stellar evolution, novae and super novae, and the feedback mechanisms of star birth. February was Dr. Dave Pawlowski, who did a detailed presentation on modeling of space weather, in particular the effects of the solar wind. He also included solar flares and CME's. Near the end of the talk he spoke briefly about space weather on Mars and



Observatory Director Jack Brisbin rakes out limestone aggregate at the Observatory's 2014 Spring Cleaning Day. The limestone ramp makes for a safer entrance to the building and the strip of it around the foundation has improved drainage.

Photo: Jim Forrester

some of the surprising differences from Earth. March featured a presentation on the "Pursuit of Dark Energy" by Dr. Adam Sypniewski. For May we heard a Presentation from Dr. Claude Pruneau from Wayne State University titled "The Perils of Asteroids". Great information about the "Chelby" asteroid in Russia.

In June we had club member David Shindell, who spoke about his company's (Data Optics) involvement with the Officina Stellare line of telescopes, particularly their latest design. For July we took our annual trip to Sherzer Observatory at Eastern Michigan University to be entertained by Norb Vance. Our August meeting brought us an excellent presentation about PlaneWave telescopes by Kevin Iott, who is involved in nearly every aspect from conceptual design to final production. September was the return of Dr. Fred Adams, who we have as a guest speaker every few years. This

time he spoke to us about extra-solar planets. The October meeting was a presentation (mainly Jack Brisbin and David Jorgensen) by the team that refigured an old Coulter 17.5 inch mirror and built the new club telescope around it that I wrote about at the beginning of this article. In November we saw a very nice demonstration of a club member's remote observatory (Brian Ottum), but as luck would have it the weather was cloudy in New Mexico, but clear in Ann Arbor. So no images were taken, but otherwise it was a great presentation. We wrapped up in December (as is always the case) with long-time club member, Tom Ryan doing a presentation about optical and electronic correction of laser optics used in high power anti-missile defense systems. We also had a short presentation about naming exo-planets, by Assistant Professor, John Monnier. Kudos to Tom for putting his talk together at the last minute since our scheduled speaker had to cancel due to illness.

Our open house season started rather slowly with both March events being cancelled. Heck, last March we were still buried in the arctic regolith! We ran one open house in April, and it was a great one. It was still pretty cold and we battled some intermittent clouds, but we had an excellent turnout of club members and the public, and this was first light for our new club telescope. Did I mention the new telescope previously? May was odd in that our open houses were the first and the last Saturdays of the month.



John Causland setting up his hydrogen-alpha telescope for viewing last October's partial solar eclipse.

Photo: Melanie Maxwell

Maybe that gave us good luck because we were able to conduct both of them. June reversed that luck however, with both events being cancelled. July and August were the same in that we conducted the first open house, but had to cancel the second. We had one open house scheduled for September and it was cancelled. Our second open house was replaced by our annual Astronomy At The Beach two-day event. As usual it was at Kensington Metro Park and was very highly attended by the public. We had just under 1600 guests Friday night, and 2200 Saturday night. The skies cooperated both nights! In October we batted .500 on open houses and in November we were shut out.

Last year was another busy one on the public outreach front with appearances at Angell Hall for the Student Astronomical Society, the Ann Arbor District Library (for loaner telescope improvements), Camp Hazelwoods, Brighton State Recreation Area, Leslie Science and Nature Center, and Scio Farms Estates. We also held impromptu sessions at several locations for both a Lunar and a Solar Eclipse.

During the year we realized that though our treasury looked healthy at the moment, analysis showed that it was just beginning to decline and that this would be a worsening trend. It was decided that a dues increase would be brought before the club for decision and it was approved. This was the first dues increase that any of us seemed to remember, so we know it had to go back decades. The treasury is healthy as a result, and we have achieved what we think may be a record club roster of 122 members.

This was also the year that we decided we finally needed a social media presence. Our website is visited frequently and we hear positive feedback, but we were talking Facebook or Twitter. So our Webmaster Krishna Rao and VP Dave Snyder went to work on it. We now have a Facebook AND Twitter presence to go along with our Google Calendar and our site on Night Sky Network. We also have a cool way to post a message on FB, Tweet, and Google all with one email! How cool is that? But there is more. Dave Snyder also wrote an Android App that links to all the above...and more. It is free on the Google Play Store and is called; well you guessed it...The Lowbrow App.

2014 also saw us nurture a closer relationship with the U of M Department of Aerospace Engineering with some visioning meetings with our Liaison, Jamie Cutler, and later our first outreach event for them at an event they were conducting at the Peach Mountain Radio Telescope. There will be many more to come.

As you can see, your club keeps moving forward and some big steps were taken last year. It seems like there are several things I am forgetting to cover in this article, however, I always think that when I write this annual review. Hopefully I covered most of it and you are still awake to see me sign off for this edition. I look forward to another prosperous and fun year for the University Lowbrow Astronomers.

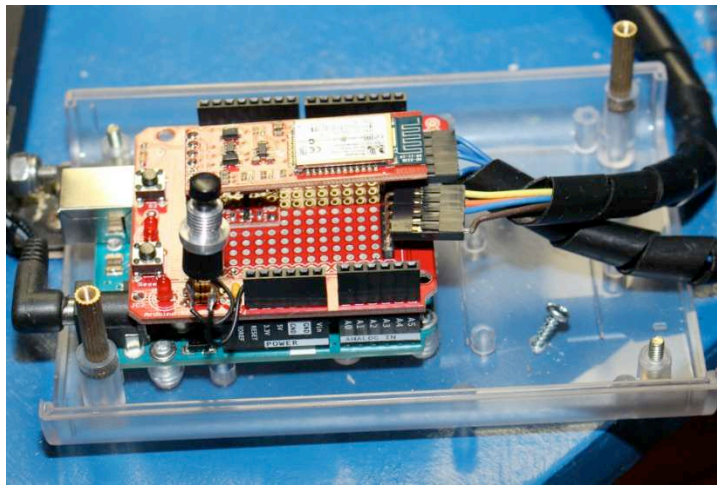


Brain Ottum blows us all away with this image of the Horsehead/Flame Nebula complex in Orion. Taken from his Rancho Hildago observatory in February with a Canon Mark 5D through a 10 inch newtonian reflector.

Digital Encoders for Sky Safari with *Arduino Uno*

By Don Fohey

It is remarkably easy for the electronic hobbyist to interface digital encoders to Sky Safari using an Arduino Uno and a Bluetooth Modem. There is enough information here to build your own. You will need to add cable, connectors and hardware details yourself. The Arduino components can be purchased at many places including Radio Shack. SparkFun Electronics (<https://www.sparkfun.com>) is an excellent source for the hobbyist; they have very good tutorials on how to work with Arduino. They also have detailed manuals on all the components. I will help any Lowbrow member who would like to build this.

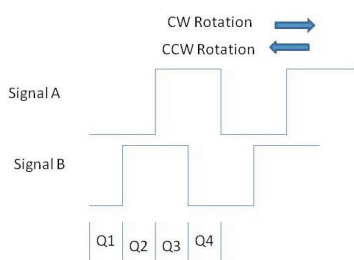


Major Components and Estimated Cost

| Qty | SKU | Description | Total |
|-----|-----------|---|-------|
| 2 | S1-1250 | US Digital Encoders | \$206 |
| 1 | DEV-11021 | Sparkfun Arduino Uno R3 | \$25 |
| 1 | DEV-07914 | Sparkfun Proto-Shield Kit | \$10 |
| 1 | WRL-11378 | Sparkfun Bluetooth for Makey Makey | \$30 |
| 1 | BOB-12009 | Sparkfun 3.3volt to 5.0 volt bi directional level converter | \$3 |
| 1 | | Plastic Enclosure of your choosing | \$15 |
| | | Connectors, Cables and Battery of your choosing | \$35 |

Estimated Total

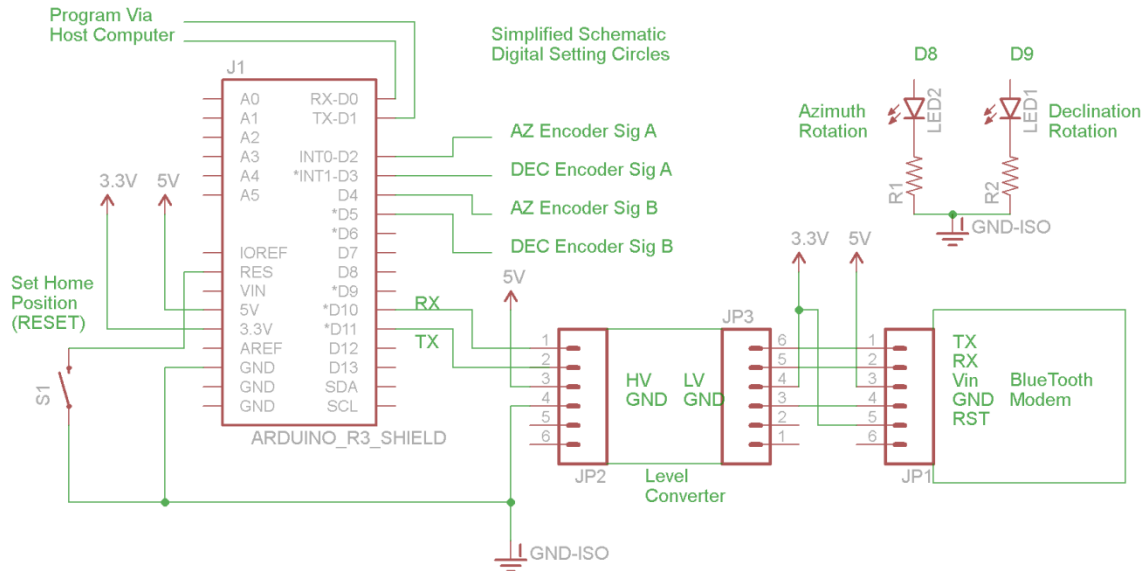
\$324



Use the encoder physical size and resolution of your choice. I chose the smaller S1 body with 1250 pulses per revolution. The Arduino software will determine position to a quadrant. A 1250 pulse encoder will provide Sky Safari with a count of 5000 per revolution. The Moon is about 30' $(360 \times 60) / 5000$ is 4.32' per count. Plus or minus one count is then about 1/4 of the moon. I consider this adequate, You may want more resolution. Mechanical alignments will introduce other errors.

Construction:

The Proto-Shield is where you install the encoder connectors, level converter and Bluetooth modem. Hand wire the components to the appropriate Arduino pins. Then you simply plug the Proto-Shield onto the Arduino Uno board. On my telescope the device is powered with a fused 3 cell 11 volt LIPO Battery. (See Reflections article November 2014 page 7.)

**Design Notes:**

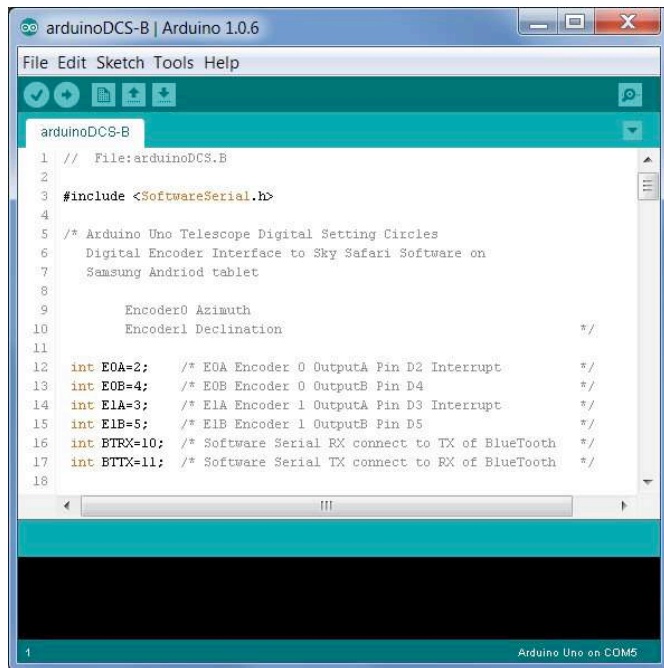
Arduino pins D2 and D3 are the only pins that will hardware interrupt the processor. They will be configured to interrupt on both the rising and falling edges of the encoders signal A. The Arduino Software Serial Library is used on pins D10 and D11 to communicate to the Bluetooth Modem. The program provides for pass thru so that the Arduino Serial Monitor on the host computer can see all traffic to and from the Bluetooth Modem during testing. This also provides for typing modem configuration commands. The LEDs connected to D8 and D9 flash whenever the encoders are in motion.

The SparkFun Makey Makey BlueTooth Modem is a 3.3 volt device, is initialized at 9600 BAUD, and as an HID device. It has an on board 3.3V regulator so I powered it with 5 volt from the Arduino. It's input and output levels are 3.3 volt requiring the logic level converter. It must be manually reprogrammed from an HID device to a SPP (Serial Port Profile) device to work with Sky Safari.

Type the modem configuration commands when connected to the host computer with the Arduino Serial Monitor. Within 60 seconds of power on, set the Serial Monitor to "No line ending", then type \$\$\$ to enter command mode. The modem will reply with CMD, then set the Serial Modem to "Both NL & CR". To exit command mode type ---. Type S~,0 to set SPP. This would also be a good time to customize the discovery string with the SN command. Type SN,YourName-DCS. Other modem commands are D (Display Basic Settings), E (Display Extended Settings), O (Display Other Settings). For configuration changes to be effective you must reboot the modem, type R,1. When using the Serial Monitor to observe data sent to the modem use the "Both NL & CR" setting. Manuals for the modem are available on the SparkFun web site. Other Bluetooth modems such as the BlueSmirf operate at 5 volt logic levels and would not require the level converter. It however defaults to 115,200 BAUD which may be too fast for the software serial library. (Continued: Page 7)

Lowbrow Monthly Meeting

March 20, Room G115 Angell Hall, 7:30 PM: Don Fohey (University Lowbrow Astronomers): "Build you own shaft encoder to Sky Safari device using Arduino Uno and a Bluetooth Modem." *That's right! If you can't parse it out from the newsletter article, Don is going it over live, in person at our next meeting.*



```

arduinoDCS-B | Arduino 1.0.6
File Edit Sketch Tools Help
arduinoDCS-B
1 // File:arduinoDCS.B
2
3 #include <SoftwareSerial.h>
4
5 /* Arduino Uno Telescope Digital Setting Circles
6    Digital Encoder Interface to Sky Safari Software on
7    Samsung Andriod tablet
8
9    Encoder0 Azimuth
10   Encoder1 Declination */
11
12 int EOA=2; /* EOA Encoder 0 OutputA Pin D2 Interrupt */
13 int EOB=4; /* EOB Encoder 0 OutputB Pin D4 */
14 int E1A=3; /* E1A Encoder 1 OutputA Pin D3 Interrupt */
15 int E1B=5; /* E1B Encoder 1 OutputB Pin D5 */
16 int BTRX=10; /* Software Serial RX connect to TX of BlueTooth */
17 int BTTX=11; /* Software Serial TX connect to RX of BlueTooth */
18
1
Arduino Uno on COM5

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Arduino:

Visit <http://arduino.cc>. The Arduino application is very simple to download and install. The programming tool is very basic and easy to use. Type in the DCS application program. Connect your Arduino Uno board to your computer via a USB cable. Upload your program and you are ready to connect to Sky Safari

Sky Safari:

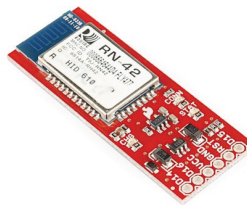
Put the telescope in the home position, horizontal pointing north, and touch the Arduino reset button to set the counters to zero. In Sky Safari SETTINGS select Telescope Setup, Basic Encoder System. Scope Type-Basic Encoder System. Mount Type-Alt-Az Push-To. Connect via Bluetooth. Readout Rate 4 per second (I have not tried higher rates). Under Mount Type Select Alt-AZ Push-To and enter the Encoder Steps Per Revolution (+5000,+5000). Do not check the Get Automatically box.



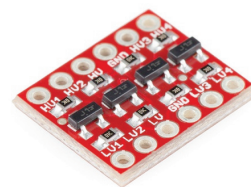
Arduino Uno Board



Prototype Shield



Bluetooth Modem



Logic Level Converter

The DCS Application Code: Will be available as an addition to the online edition of *Reflections*.

Lowbrow Meeting Minutes

Jan 16, 2015, 7:30PM

President Charlie Nielsen opened the meeting.

Speaker:

Charlie introduced Dr. Claude Pruneau, a physics professor at WSU. He has been working on understanding the fundamental particles that make up our world based on recent experiments at the Large Hadron Collider (LHC) developed and built by CERN on the Swiss/French border near Geneva and experiments performed at some USA facilities (Fermi at Batavia, Illinois and at Brookhaven National Labs, Long Island, NY). He began, however, by quickly reviewing the thoughts and discoveries from the time of the early Greeks (including Democritus and Aristotle) to the work of modern physicists. He continued by providing astronomical data which supports the expanding universe concept which has yielded estimates of the total mass of the universe at 2×10^{49} kg, at one time all being concentrated in only a few mm of space shortly after the Big Bang. Particle energies of 10¹⁹ GeV, corresponding to temperatures of 8 trillion deg K, (8×10^{12} K°) likely occurred then, much hotter than the sun's core temperature.

His work has been focused on trying to determine if a gluon/quark plasma is possible or has been realized with the current experimental equipment. He presented a theoretical phase diagram determined to estimate conditions under which this plasma can occur. Recent data and analysis appear to confirm that the LHC (and at other locations) has been able to achieve the required colliding energies. So, it is likely that a gluon/quark plasma occurred shortly after the Big Bang event.

Dr. Pruneau interspersed his talk with an emphasis on the vast amount of theoretical thought, computer resources, software development, and manpower required to achieve these conclusions.

Following his talk, he answered many questions from our educated audience.

p.s: Following Dr. Pruneau's review of this summary of his presentation to us he recommended adding this clarification: "I would only note that the quark gluon plasma was first discovered at the Relativistic Heavy Ion Collider (RHIC) located at Brookhaven National Laboratory (NY)."

Officer's Reports:

- Charlie Nielsen: Camp Haselwood event: May 12 and/or May13, depending on weather conditions
- LSNC event at Peach Mountain, July 16
- Request from "the Capitol Area Astronomy Association" to provide a dialogue regarding our work with telescope lending through Ann Arbor Public Library. Jack B. and Charlie discussed a possible presentation to them, perhaps on Skype.
- Jan 24 10AM – 4 PM, naming an exoplanet, Hands-on-Museum, Lowbrows are welcome. Perhaps a telescope display and explanation.
- VP, Ken Ruble discussed a possible meeting at Plane Waves to look at manufacturing techniques. I think he will follow up.
- VP, Dave Snyder mentioned that next month's speaker is Carl Akerlof
- Observatory Director, Jack Brisbin reported that he will download the data logger at the observatory this Saturday and he also discussed additions to the "Young Astronomers.org" changes to the website.
- Newsletter Editor, Jim Forrester mentioned that the Open House schedule has been emailed to members. The Astronomy Day in Ann Arbor received consensus. Of course he made a pitch for next month's articles for the Newsletter. He has only some photos and one article. So things are looking pretty slim. Jim mentioned the "Jupiter Triple Shadow" coming Jan 24, with three moons simultaneously shadow transiting Jupiter's surface.
- Treasurer, Doug Scobel reported membership at 121 members and the kitty at \$4300. Also mentioned that he still has unclaimed calendars (1) @ \$20, and Handbooks (2) @ \$27.
- Charlie adjourned the meeting at about 10:00 PM

Submitted, Jan 20, 2015

Dave Jorgenson,
Vice President

Lowbrow Meeting Minutes

February 20, 2015, 7:30 PM

President Charlie Nielsen brought the meeting to order.

Carl Akerlof (professor of Physics at the University of Michigan) was our guest for the evening. He gave a talk entitled "Radio Astronomy on the Roof – Two Undergrad Experiments in Astrophysics & Cosmology." He brought with him a cart that had a CMBR (Cosmic Microwave Background Radiation) apparatus along with a supply of liquid nitrogen.

Carl provided this abstract for his talk:

Astrophysics and cosmology are two extremely active areas of physics research. To alert our undergraduates to some of the opportunities in this area we have created two elective experiments in radio astronomy for our senior lab course. The first measures the galactic rotation of the Milky Way using the Doppler shift of the 21 cm hyperfine transition in atomic hydrogen to determine the tangential gas velocity as a function of distance from the galactic center. The second measures the cosmic microwave background radiation in a frequency band centered at 11.95 GHz by comparing the response from the sky with thermal calibration loads.

After the talk Carl allowed people to look at the CMBR apparatus and see how it worked. Earlier Carl had planned to take people up on the roof, but he decided it was too cold for that. We told Carl he could come back in warmer weather, and go up on the roof at that point. No specific date was agreed on, but we would keep in touch with Carl.

President Charlie Nielsen: This summer the Michigan Math and Science Scholars will come to Peach Mountain (they've come to Peach Mountain in previous years). This involves having a few Lowbrows plus a few people from the astronomy department spend time with a group of very bright high school students.

We had planned to have Pat Seitzer give the March talk, but Pat can't do it in March. Don Fohey had volunteered to do the March talk instead.

Vice President Dave Snyder: Treasurer Doug Scobel wasn't feeling well, he left early. So Dave is virtual treasurer for the rest of the meeting. There are 122 memberships, and \$4790.00 in the kitty. At this point Dave returned to being Vice President. Dave said that he had just printed out club flyers. If anyone wants to take some flyers and post them somewhere, see Dave.

Observatory Director Jack Brisbin:

There was a proposal to spend club funds to purchase a Multi Fold light weight ramp, to be used when moving the club's 17" telescope. 2 opposed, majority of club members voted in favor. The motion carries.

Discussion about the data logger, Jack informed the members that the data logger in the observatory would be downloaded at the end of the month.

Jack said he was going on vacation, (March 5 through March 18). Since there was only one key to the padlock, he would turn the key over to Jim Forrester. The ramp could be kept at John Causland's house with the 17.5 telescope until the snow is gone and we can drive down to the observatory.

There was a suggestion to etch the club's name on to the ramp, Jack said he would do that.

Jack led a discussion with members about using the 17.5 telescope at various events; Astronomy Day April 25, we would set it up somewhere on Ashley street with the rest of the group. Camp Hazelwood; it was decided not to take the 17.5 to the event.

Newsletter Editor Jim Forrester: We still don't have exact dates for the transplant event (In the past the UM transplant center has organized a raffle, and one of the prizes is a night on Peach Mountain. This involves a few Lowbrows coming out on a night yet to be determined. In the past Jim's wife has prepared food for the event).

Vice President Ken Ruble: Ken was trying to get Kevin Lott (from Planewave Instruments) to give a talk to the club, but so far he hasn't gotten a commitment.

Vice President Don Fohey: Nothing to report.

Webmaster Krishna Rao: If anyone has photos to post on the Facebook page, please do so.

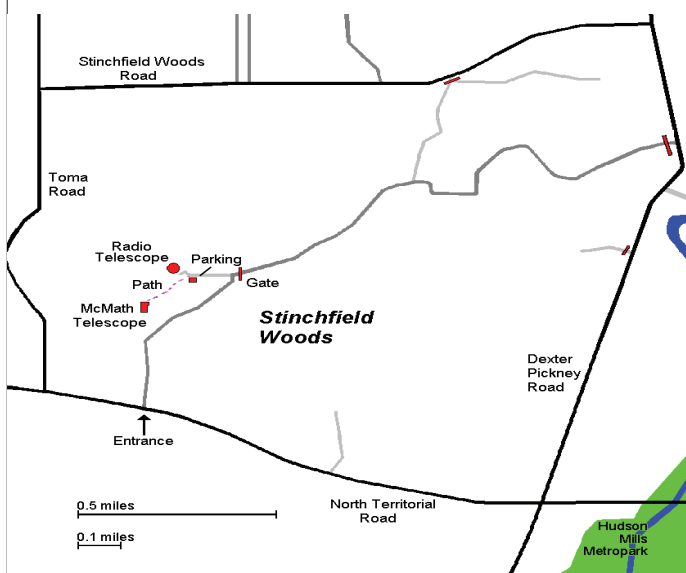
President Charlie Nielsen: Charlie asked if there was anything else. No one said anything, so he asked if there was a motion to adjourn. There was a motion and a second, and the meeting was over.

Respectfully submitted by Vice President Dave Snyder.

Places & Times

Monthly meetings of the University Lowbrow Astronomers are held the third Friday of each month at 7:30 PM. The location is usually Angell Hall, ground floor, Room G115. Angell Hall is located on State Street on the University of Michigan Central Campus, between North University and South University Streets. The building entrance nearest Room G115 is the east facing door at the south end of Angell Hall. A club observing session at the Peach Mountain Observatory, weather permitting, often follows the meeting.

Peach Mountain Observatory is the home of the University of Michigan's 25 meter radio telescope as well as the University's McMath 24" telescope, maintained and operated by the Lowbrows. Located northwest of Dexter, MI; the entrance is off North Territorial Road, 1.1 miles west of Dexter-Pinckney Rd. A maize and blue sign marks the gate. Follow the gravel road to the top of the hill to a parking area south of the radio telescope, then walk About 100 yards along the path west of the fence to reach the McMath Observatory.



Public Open House / Star Parties

Public Open Houses / Star Parties are generally held on the Saturdays before and after the New Moon at the Peach Mountain observatory, but are usually cancelled if the sky is cloudy at sunset or the temperature is below 10 degrees F. For the most up to date info on the Open House / Star Party status call: (734)332-9132. Many members bring their telescope to share with the public and visitors are welcome to do the same. Peach Mountain is home to millions of hungry mosquitoes, so apply bug repellent, and it can get rather cold at night, please dress accordingly.

Membership

Membership dues in the University Lowbrow Astronomers are \$30 per year for individuals or families, \$20 per year for students and seniors (age 55+) and \$5 if you live outside of the Lower Peninsula of Michigan.

This entitles you to the access to our monthly Newsletters on-line at our website and use of the 24" McMath telescope (after some training).

A hard copy of the Newsletter can be obtained with an additional \$18 annual fee to cover printing and postage. Dues can be paid at the monthly meetings or by check made out to University Lowbrow Astronomers and mailed to:

**The University Lowbrow Astronomers
P.O. 131446
Ann Arbor, MI 48113**

Membership in the Lowbrows can also get you a discount on these magazine subscriptions:

Sky & Telescope - \$32.95 / year \$62.95/2 years
Astronomy - \$34.00 / year or \$60.00 for 2 years

For more information contact the club Treasurer at:
lowbrowdoug@gmail.com

Newsletter Contributions

Members and (non-members) are encouraged to write about any astronomy related topic of interest.

Call or Email the Newsletter Editor: **Jim Forrester (734) 663-1638** or jim_forrester@hotmail.com to discuss length and format. Announcements, articles and images are due by the 1st day of the month as publication is the 7th.

Telephone Numbers

- President: Charlie Nielsen (734) 747-6585
- Vice Presidents: Dave Snyder (734) 747-6537
Dave Jorgenson
Don Fohey
Ken Ruble
- Treasurer: Doug Scobel (734)277-7908
- Observatory Director: Jack Brisbin
- Newsletter Editor: Jim Forrester (734) 663-1638
- Key-holders: Jim Forrester (734) 663-1638
Fred Schebor (734) 426-2363
Charlie Nielsen (734) 747-6585
- Webmaster: Krishna Rao

Lowbrow's Home Page

<http://www.umich.edu/~lowbrows/>

Email at:

Lowbrow-members@umich.edu





University Lowbrow Astronomers

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Reflections & Refractions



Website

www.umich.edu/~lowbrows/



Our snowbound Observatory at the beginning of March. The surrounding 12 + inches of snow made the trek down the hill a bit of a workout.

Photo: Jack Brisbin



University Lowbrow Astronomers
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Ann Arbor, MI 48113

DCS Application Code:

```
// File:arduinoDCS.C
/* Arduino Uno Digital Encoder Interface to
  Sky Safari Software on Samsung Andriod tablet
  Encoder0 Azimuth
  Encoder1 Declination */
#include <SoftwareSerial.h>
int E0A=2; /* E0A Encoder 0 OutputA Pin D2 Interrupt */
int E0B=4; /* E0B Encoder 0 OutputB Pin D4 */
int E1A=3; /* E1A Encoder 1 OutputA Pin D3 Interrupt */
int E1B=5; /* E1B Encoder 1 OutputB Pin D5 */
int BTRX=10; /* Software Serial RX connect to TX of BlueTooth */
int BTTX=11; /* Software Serial TX connect to RX of BlueTooth */

/* Designed for US Digital 1250 slot encoder
  Quadrature Signals B Leads A for CW rotation.
  This algorithm determines which quadrant the encoder is in.
  Each Quadrant is counted resulting in a 360 degree count of 5000
  Interrupt is detected on both edge of Signal A which is every two
  Quadrants. On Interrupt A Determines which half. B Determines which
  direction the encoder was moving, CW or CCW. The encoder may
  continue to move within the Half without an interrupt.
  Read final Quadrant position when Sky Safari request position.

  Half0 Half1
  A _____|_____|_____| CW rotation ->
  B _|_____|_____|_____
      Q0 Q1 Q2 Q3

I used a Sparkfun Makey Blue Tooth Serial Board.
It is hardwired to 9600 BAUD. Must manually change the profile
from HID (keyboard input) to SSP Serial Port Profile.
Enter Command mode with $$$ exit Command mode with ---
The command is S~,0 then R,1 for reboot. Note that other boards
such as Blue Smirf default to max BAUD rate of 115,200
*/
int Azimuth; // Quadrant Count for Azimuth Encoder
int FineAz; // Determine actual Quadrant and Fine adjust count
int Declination; // Quadrant Count for Declination Encoder
int FineDec; // Determine actual Quadrant and Fine adjust count
int ValueE0A; // Saved Reads of Encoder Input
int ValueE0B;
int ValueE1A;
int ValueE1B;
int HalfA; // Keeps track of Azimuth Encoder Quadrant Counts
int HalfD; // Keeps track of Declination Encoder Quadrant Counts
int ALedPin=8; // Leds to flash when encouter is in motion
int DLedPin=9;
char inByte; // Byte Read form BlueTooth Serial Port
char HostByte; // Byte from Arduion Serial Monitor.
SoftwareSerial BTSerial(BTRX,BTTX);
```