

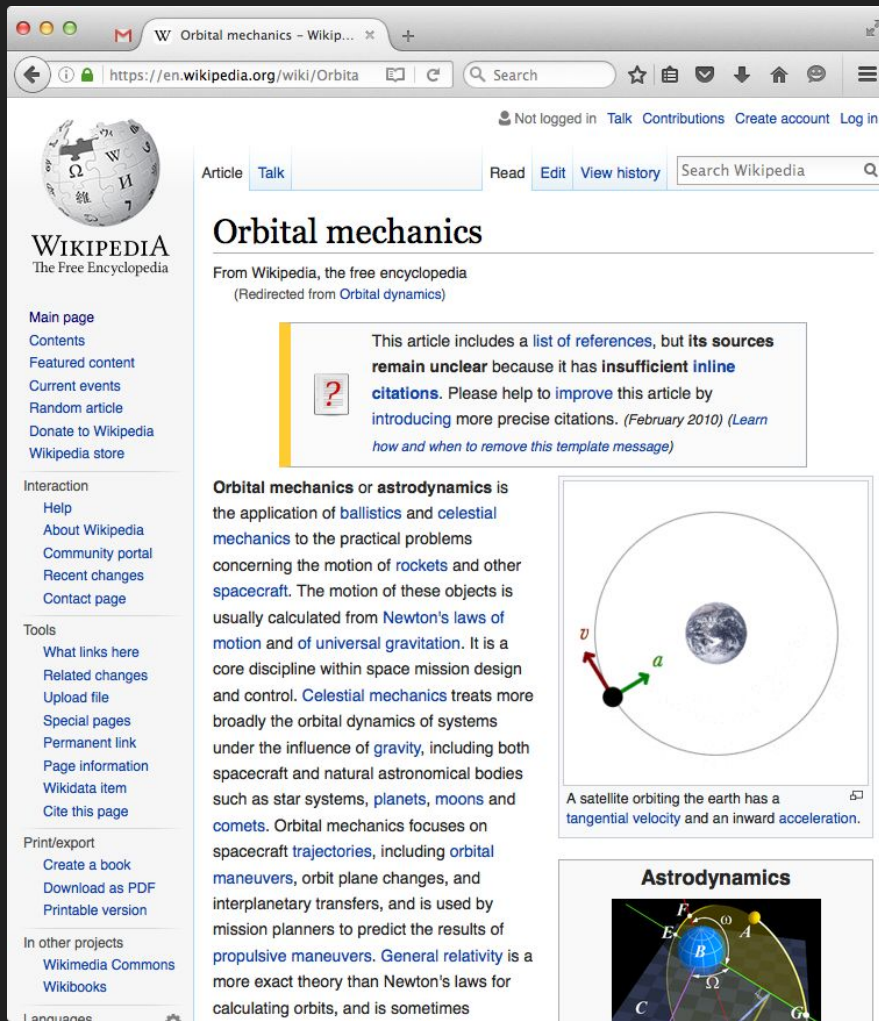
# Credit-Meter Assisted Learning

A parenting tool which stimulates free software development

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# The scenario:

You are stuck at the office until 5pm and your daughter, Jane, is at home. You want Jane to do something constructive before surfing the web or playing video games. Let's say you want to ensure that she reads this article on Orbital Mechanics ...



The screenshot shows a web browser window displaying the Wikipedia article titled "Orbital mechanics". The browser's address bar shows the URL "https://en.wikipedia.org/wiki/Orbital\_mechanics". The Wikipedia logo and navigation links are visible on the left side. The article content includes a red box warning about missing citations, a paragraph defining orbital mechanics, a diagram of a satellite orbiting Earth, and a section on astrodynamics with a corresponding diagram.

Wikipedia  
The Free Encyclopedia

Main page  
Contents  
Featured content  
Current events  
Random article  
Donate to Wikipedia  
Wikipedia store

Interaction  
Help  
About Wikipedia  
Community portal  
Recent changes  
Contact page

Tools  
What links here  
Related changes  
Upload file  
Special pages  
Permanent link  
Page information  
Wikidata item  
Cite this page

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Create a book  
Download as PDF  
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In other projects  
Wikimedia Commons  
Wikibooks

Languages

Article Talk

Read Edit View history

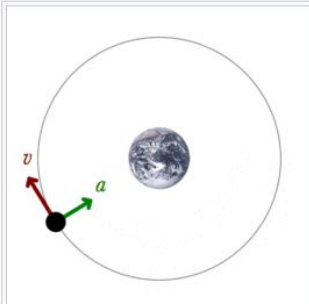
Search Wikipedia

## Orbital mechanics

From Wikipedia, the free encyclopedia  
(Redirected from *Orbital dynamics*)

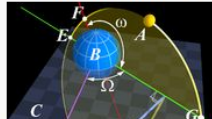
This article includes a [list of references](#), but **its sources remain unclear** because it has **insufficient inline citations**. Please help to [improve this article](#) by [introducing more precise citations](#). *(February 2010)* ([Learn how and when to remove this template message](#))

**Orbital mechanics** or **astrodynamics** is the application of [ballistics](#) and [celestial mechanics](#) to the practical problems concerning the motion of [rockets](#) and other [spacecraft](#). The motion of these objects is usually calculated from [Newton's laws of motion](#) and of [universal gravitation](#). It is a core discipline within space mission design and control. [Celestial mechanics](#) treats more broadly the orbital dynamics of systems under the influence of [gravity](#), including both spacecraft and natural astronomical bodies such as star systems, [planets](#), [moons](#) and [comets](#). Orbital mechanics focuses on spacecraft [trajectories](#), including [orbital maneuvers](#), orbit plane changes, and interplanetary transfers, and is used by mission planners to predict the results of [propulsive maneuvers](#). [General relativity](#) is a more exact theory than Newton's laws for calculating orbits, and is sometimes



A satellite orbiting the earth has a [tangential velocity](#) and an inward [acceleration](#).

### Astrodynamics



# Blank assignment

From the comfort of your office, use the assignment dashboard to select the plugin for the type of assignment you wish to create. For the current scenario you choose the “Force Reader” [1] plugin and click the + icon to create an empty assignment. The blank assignment will appear in the “All Assignments” section. Click “Edit” to open the plugin’s configuration interface ...

[1] The name Force Reader was a joke in our house of Star Wars fans which referred to the way Darth Vader “Force choked” his subordinate in the 1st movie.

The screenshot shows a web browser window with the URL [www.autoteach.net/parent/assignments](http://www.autoteach.net/parent/assignments). The page title is "Parent Online". The navigation bar includes links for Distribution, Configuration, Assignments (active), Help, and Logout. The main content area is titled "All Assignments" and features a table of assignments. The first row shows "French Vocab FlashCards" with a "ForceReader" plugin. The second row shows "Civil War" with a "ForceReader" plugin. Both rows have "Edit", "Test", and "Assign" buttons. A dropdown menu for "Jane" is visible next to the "Assign" button in the second row. Below the table, there is a section for "Student Assignments" which shows a single entry: "Civil War ForceReader 0".

| Title                   | Plugin      |                       |
|-------------------------|-------------|-----------------------|
| French Vocab FlashCards | ForceReader | Edit Test Assign Jane |
| Civil War               | ForceReader | Edit Test Assign Jane |

| Title     | Plugin      | Complete |
|-----------|-------------|----------|
| Civil War | ForceReader | 0        |

# Paste content

We'll just make a one-page assignment to illustrate the procedure. Click "Save" and return to your dashboard ...

Parent Online

www.autoteach.net/parent/plugins

Search

AutoTeach

Parent Online

Distribution

Configuration

Assignments

Help

Logout

Orbital Mechanics

% ReplaceCreditsRepeatableSaveNew Page

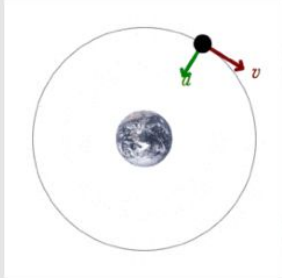
15%1800Not RepeatableSaveNew Page

Page 0

Paragraph TextImage

Orbital mechanics or astrodynamics is the application of ballistics and celestial mechanics to the practical problems concerning the motion of rockets and other spacecraft. The motion of these objects is usually calculated from Newton's laws of motion and of universal gravitation.

url: /media/8/54c5LX8dzy.gif



A satellite orbiting the earth has a tangential velocity and an inward acceleration.

# Add to queue

Now just click “Assign” and your new assignment will appear in Jane’s queue. Your work is done! What took you 5 minutes to create will keep Jane busy for considerably longer ...

The screenshot shows a web browser window with the URL [www.autoteach.net/parent/assignments](http://www.autoteach.net/parent/assignments). The page is titled "Parent Online" and features a navigation bar with links: Distribution, Configuration, Assignments (active), Help, and Logout. Below the navigation bar, there is a section for "All Assignments" with a dropdown menu set to "TuxMathScrabble2015". This section contains a table of assignments:

| Title             | Plugin      | Edit   | Test   | Assign   | Student |
|-------------------|-------------|--------|--------|----------|---------|
| French Vocab      | FlashCards  | [Edit] | [Test] | [Assign] | Jane    |
| Civil War         | ForceReader | [Edit] | [Test] | [Assign] | Jane    |
| Orbital Mechanics | ForceReader | [Edit] | [Test] | [Assign] | Jane    |

Below the "All Assignments" section is a section for "Student Assignments" with a dropdown menu set to "Jane". This section contains a table of assignments:

| Title             | Plugin        | Complete |
|-------------------|---------------|----------|
| Civil War         | ForceReader 0 |          |
| Orbital Mechanics | ForceReader 0 |          |

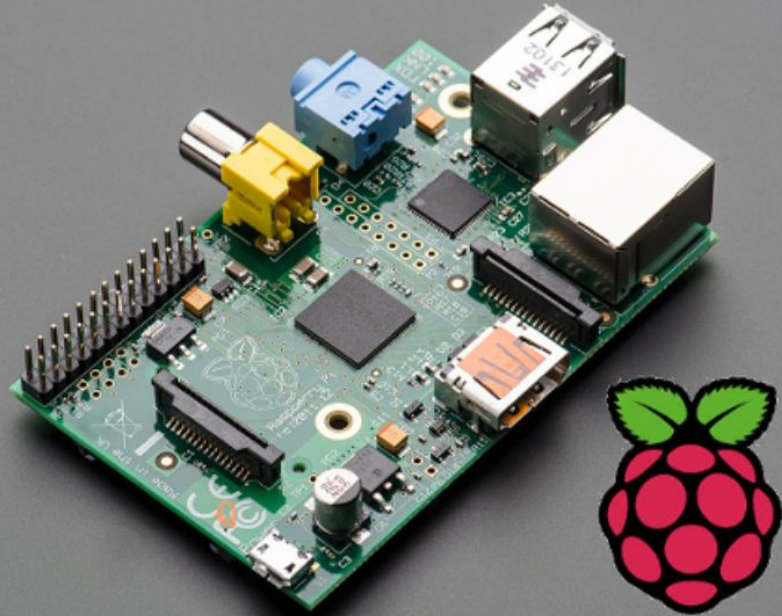
The bottom of the page has a "Home" link.

# Back at the house

Back at the house Jane is required to access the internet through a special device configured as a Wifi HotSpot.

The device is called a Raspberry-Pi and costs roughly \$50. It is slightly larger than a credit-card and can be purchased from many vendors.

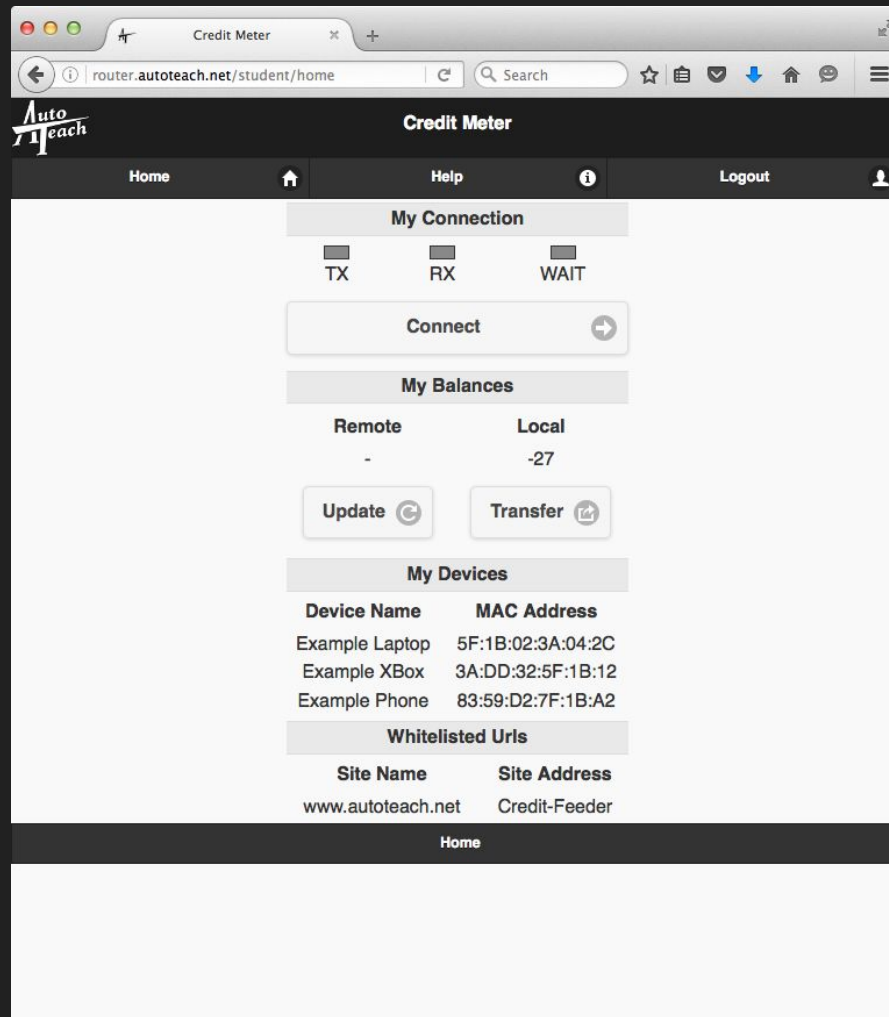
You can also buy a nice case for it!



# The credit-meter

In addition to being a Wifi HotSpot, the Raspberry-Pi runs a firewall and this credit-meter website.

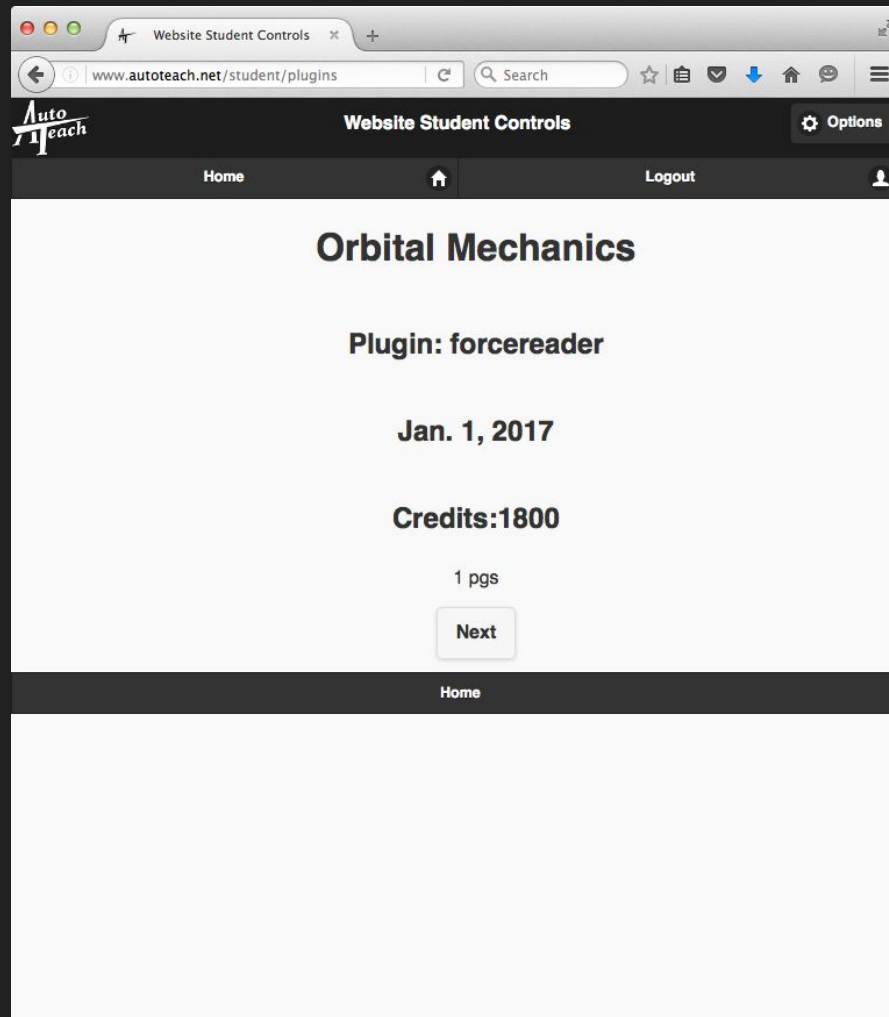
Jane must earn credits from the white-listed credit-feeder website, transfer those credits back home to the credit-meter, then run the credit-meter to open the firewall to her list of devices.



# Jane visits website

When Jane clicks the assignment in her queue she is presented with a title page telling her how many credits she will earn upon completion.

In this case 1800 credits, where each credit is one second of access, thus 1800 credits = 30 minutes.





# Paragraph intact

In the next screen Jane is presented with the formatted content you created earlier.

In this particular activity each page is displayed twice, first with the complete text, then with a configurable percentage of words replaced by choices so that she can reconstruct the paragraph and thus demonstrate that she read carefully.

Website Student Controls

www.autoteach.net/student/plugins

Search

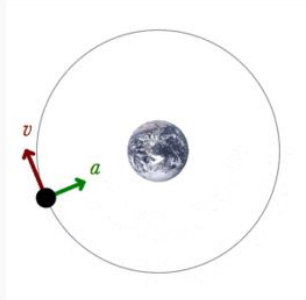
Autoteach

Website Student Controls

Options

Home

Logout



**Caption:** A satellite orbiting the earth has a tangential velocity and an inward acceleration.

Orbital mechanics or astrodynamics is the application of ballistics and celestial mechanics to the practical problems concerning the motion of rockets and other spacecraft. The motion of these objects is usually calculated from Newton's laws of motion and of universal gravitation.

Next

Home

# Paragraph reconstruction

In this prototype activity the default setting is to replace 15% of the words with choices.

She can repeat as much as necessary but each time a different set of words will be replaced.

Website Student Controls

www.autoteach.net/student/plugins

Search

☆

📁

🔒

⬇️

🏠

💬

☰

**Auto**  
Teach

Website Student Controls

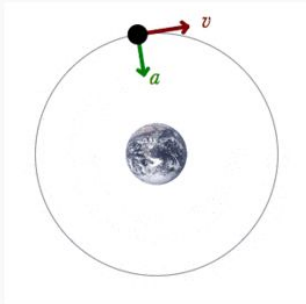
⚙️ Options

Home

🏠

Logout

👤



**Caption:** A satellite orbiting the earth has a tangential velocity and an inward acceleration.

Orbital mechanics or astrodynamics [choose] the application of [choose] and celestial mechanics to the practical problems concerning the motion of rock of other spacecraft. The [choose] [choose] these [choose] [choose] is calculated from Newton's laws of motion and of universal gravitation. ballistics is motion objects

Next

Home

# Read to check

Once she has finished the page is ready to check.

Website Student Controls

www.autoteach.net/student/plugins

Search

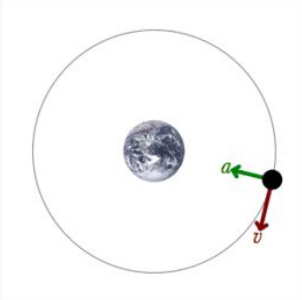
Autoteach

Website Student Controls

Options

Home

Logout



**Caption:** A satellite orbiting the earth has a tangential velocity and an inward acceleration.

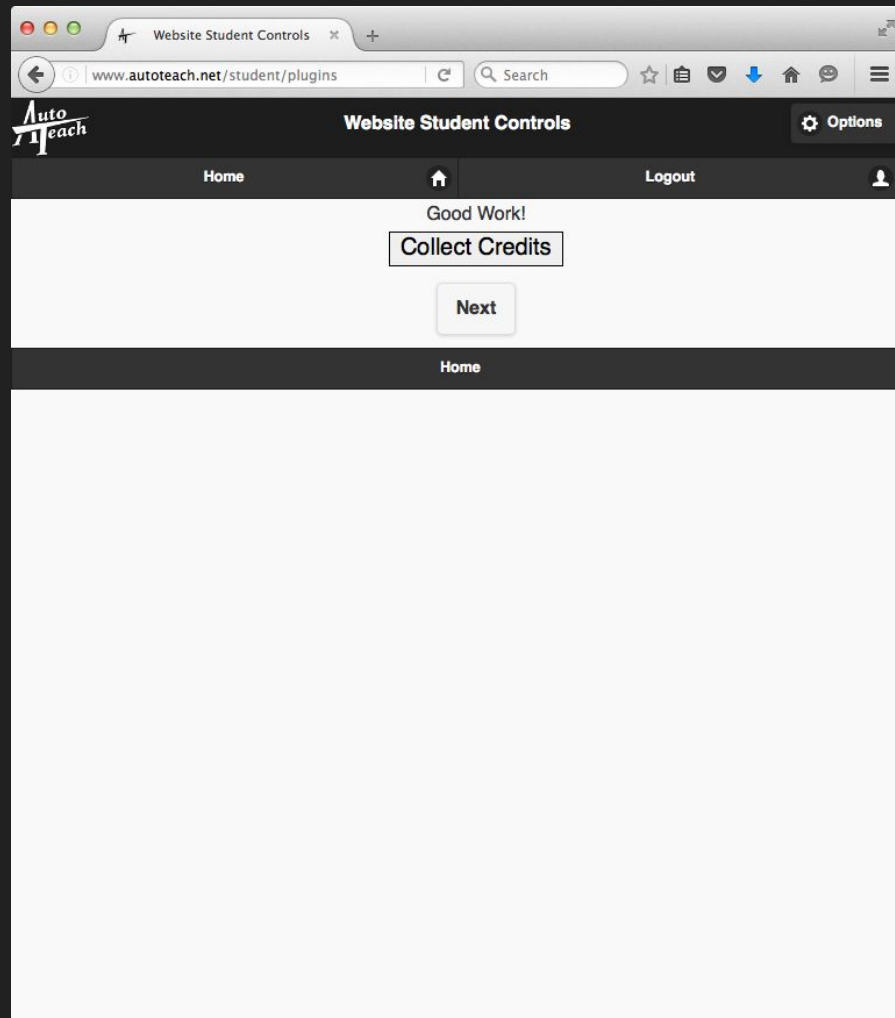
Orbital mechanics or astrodynamics **is** the application of **ballistics** and celestial mechanics to the practical problems concerning the motion of rockets and other spacecraft. The **motion of** these **objects is** usually calculated from Newton's laws of motion and of universal gravitation.

Next

Home

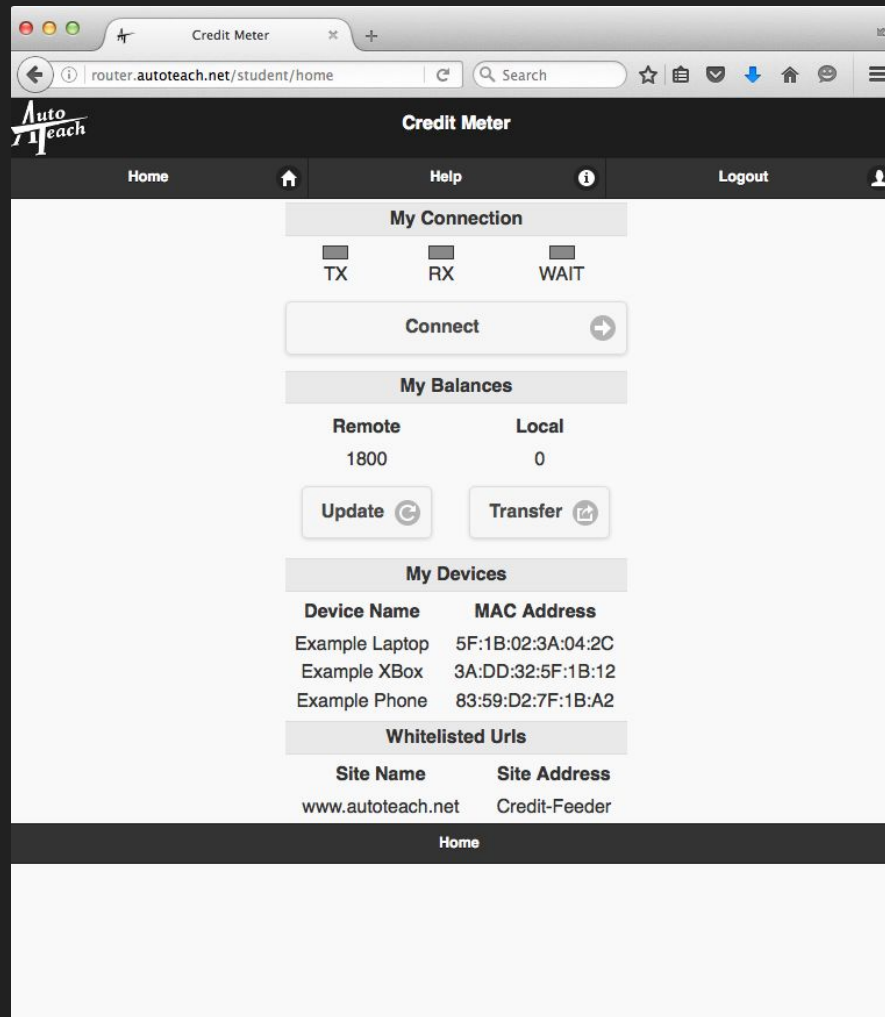
# Collect credits

By pushing the “Collect Credits” button she will be returned to her online dashboard where she will see the credits which she has just earned.



# Credit transfer

Using the credit-meter interface being served by the Raspberry-Pi device at home she can check her remote balance and transfer the credits from the online account to the credit-meter.



The screenshot shows a web browser window with the address bar displaying `router.autoteach.net/student/home`. The page title is "Credit Meter". The interface includes a navigation bar with "Home", "Help", and "Logout" links. The main content area is divided into several sections:

- My Connection:** Displays three status indicators: TX, RX, and WAIT, each with a corresponding bar chart. Below these is a "Connect" button with a right-pointing arrow.
- My Balances:** Shows two balance categories: "Remote" (1800) and "Local" (0). Below these are two buttons: "Update" (with a circular arrow icon) and "Transfer" (with a document icon).
- My Devices:** A table listing devices and their MAC addresses.
- Whitelisted Urls:** A table listing site names and their addresses.

The footer of the page contains a "Home" link.

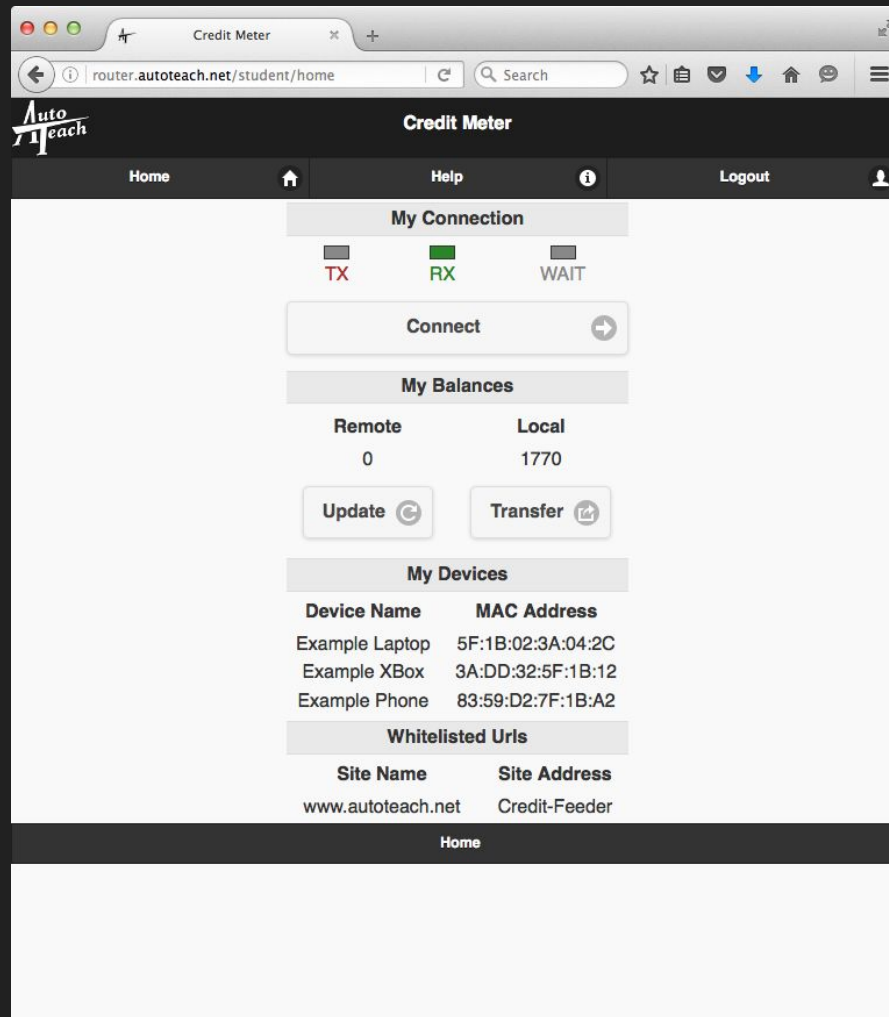
| Device Name    | MAC Address       |
|----------------|-------------------|
| Example Laptop | 5F:1B:02:3A:04:2C |
| Example Xbox   | 3A:DD:32:5F:1B:12 |
| Example Phone  | 83:59:D2:7F:1B:A2 |

| Site Name         | Site Address  |
|-------------------|---------------|
| www.autoteach.net | Credit-Feeder |

# Access granted!

Clicking the “Connect” button starts the credit meter and opens the firewall to her list of devices.

After 30 min ( = 1800 sec ) her credits will be finished and she will need to return to the white-listed credit-feeder website to (L)earn some more.



The screenshot shows a web browser window with the address bar displaying `router.autoteach.net/student/home`. The page title is "Credit Meter". The interface includes a navigation bar with "Home", "Help", and "Logout" links. The main content area is divided into several sections:

- My Connection:** Displays three status indicators: TX (red), RX (green), and WAIT (grey). Below them is a "Connect" button with a right-pointing arrow.
- My Balances:** Shows two columns: "Remote" with a value of 0 and "Local" with a value of 1770. Below these are "Update" and "Transfer" buttons.
- My Devices:** A table listing devices and their MAC addresses.
- Whitelisted Urls:** A table listing site names and their addresses.

The footer of the page contains a "Home" link.

| Device Name    | MAC Address       |
|----------------|-------------------|
| Example Laptop | 5F:1B:02:3A:04:2C |
| Example Xbox   | 3A:DD:32:5F:1B:12 |
| Example Phone  | 83:59:D2:7F:1B:A2 |

| Site Name         | Site Address  |
|-------------------|---------------|
| www.autoteach.net | Credit-Feeder |

# A brief history

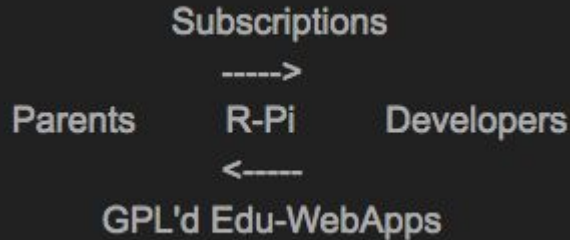
The evolution of this project was driven by necessity. As a parent I found it difficult to watch my children waste all their time on video games when they lacked so much knowledge about the world. As a physicist and software developer I took it as my personal challenge to explore new ways of teaching them using technology. Many people were advocating the use of games, so I tried my hand at that and created one called TuxMathScrabble, followed by several others. With the advent of browser technology I began focusing on web-based activities, and created an early version of the paragraph-reconstruction activity featured in this presentation. But there was always the problem of getting them to work carefully, to focus and to think. Direct supervision takes a lot of time and frequently results in drama! That's when the credit-meter was conceived. The credit-meter, known as the NetDispenser at the time, solved all problems by taking me out of the picture. The only thing I had to hear was my children asking for more work in order to earn more credits. Eureka!

# Project potential

The most important point about this project is that any activity can be substituted behind the credit-meter and the child will be motivated to make an effort just the same. This is something new, and it has the potential to accommodate a wide-range of new software for education. To reach its full potential the project should attract activity contributions from the largest number of developers possible. And this, in turn, requires complete openness and transparency with no gimmicks or lock-in, while providing some form of incentive at the same time. There is a simple way to achieve this ...



# Ecosystem concept



Charging parents a subscription in order to compensate developers would result in value flowing in two directions: money from parent to developer, and applications from developer to parent. Let the money be handled by a trustworthy foundation, and let each parent distribute their own subscription fee among developers as they see fit. Require each activity to run independently of the platform and to be licensed as free software. The result is a transparent and healthy new market for free education software.

# Conclusion:

This plan offers an opportunity to begin a new chapter in free education software development by providing incentive, an organized community, a user base, a market and an increased likelihood of developer satisfaction, at the same time as focusing positive attention on the Free Software Foundation.

There is plenty of room for new innovations in education software, and there are plenty of creative people who might be interested if there was an active community and some incentive beyond altruism. The tools are there, the ideas are there, the developers are there, but without an organized community, without strength in numbers, those ideas will wither and die.

Consider all of the people learning to program at this very moment. This platform could give them a meaningful context in which to develop their programming skills, complete with the possibility of being rewarded for their efforts. Doesn't that sound better than the same old exercises?

Charles B. Cossé

# Appendix 1: PyCon 2017 Edu Summit Abstract

Edu-FLOSS has the potential to change the world one application at a time. Free education software can reach untold numbers of children and empower them for the future. The fact that so much potential for Edu-FLOSS continues to go un-realized suggests that current motivations, i.e. personal satisfaction, are insufficient to stimulate large-scale Edu-FLOSS development. This talk provides an overview of a Django-powered eco-system to stimulate Edu-FLOSS development.

## Appendix 2: PyCon 2017 Poster Abstract

Requiring kids to earn their internet access from a self-serve education platform can serve as an effective means to supplement their education and develop a host of other life-skills, such as time management, accountability and attention to detail. The desire for credits serves as a single point of motivation which can be harnessed to teach any subject matter through well-designed activities. Enabling parents to control distribution of a subscription fee to activity developers of their choice keeps the user and developer communities connected with value flowing in both directions. Requiring FLOSS licensing and usability outside of this Django-powered credit-earning platform stimulates development of Edu-FLOSS software which thereby empowers children everywhere.