Could we ever go back in time?

Time machines are commonly seen in science fiction films and books, but no one knows how to build one.

However, it is possible to slow down time by travelling very fast relative to someone who is stationary. This was predicted by Einstein’s theory of relativity at the beginning of the 20th century and has since been proved many times.

One of the best examples of this was demonstrated by putting a very accurate clock on board a passenger jet. Another identical clock was kept on the ground and synchronised with the clock on the plane. After a number of long distance flights the two clocks were compared and the one that had been on the plane was running behind the clock that had stayed on the ground. The difference between the two clocks was exactly the difference predicted by the theory of relativity.

It is important to understand that this slowing down of time depends on the speed you are travelling at relative to someone else. None of the passengers on the plane would have noticed anything strange - as far as they are concerned time is passing as usual. It is only when they get off the plane and compare their watches with someone who has been stationary relative to them that they notice a difference.
Passenger jets fly at about 600 miles per hour which seems pretty fast. However, after the experiment described above the difference in time between the two clocks was less than a billionth of a second, which is why very accurate clocks were needed.

If you could travel at speeds close to the speed of light (about 186,000 miles a second) time would slow down significantly, from the perspective of someone who is not moving. Unfortunately we do not know how to build rockets that fast!