Sampling

By

Dr. Atul Kumar Dwivedi

Introduction

With the recent significant advancements in digital technology, continuous time signals are now being transformed into discrete time signals.
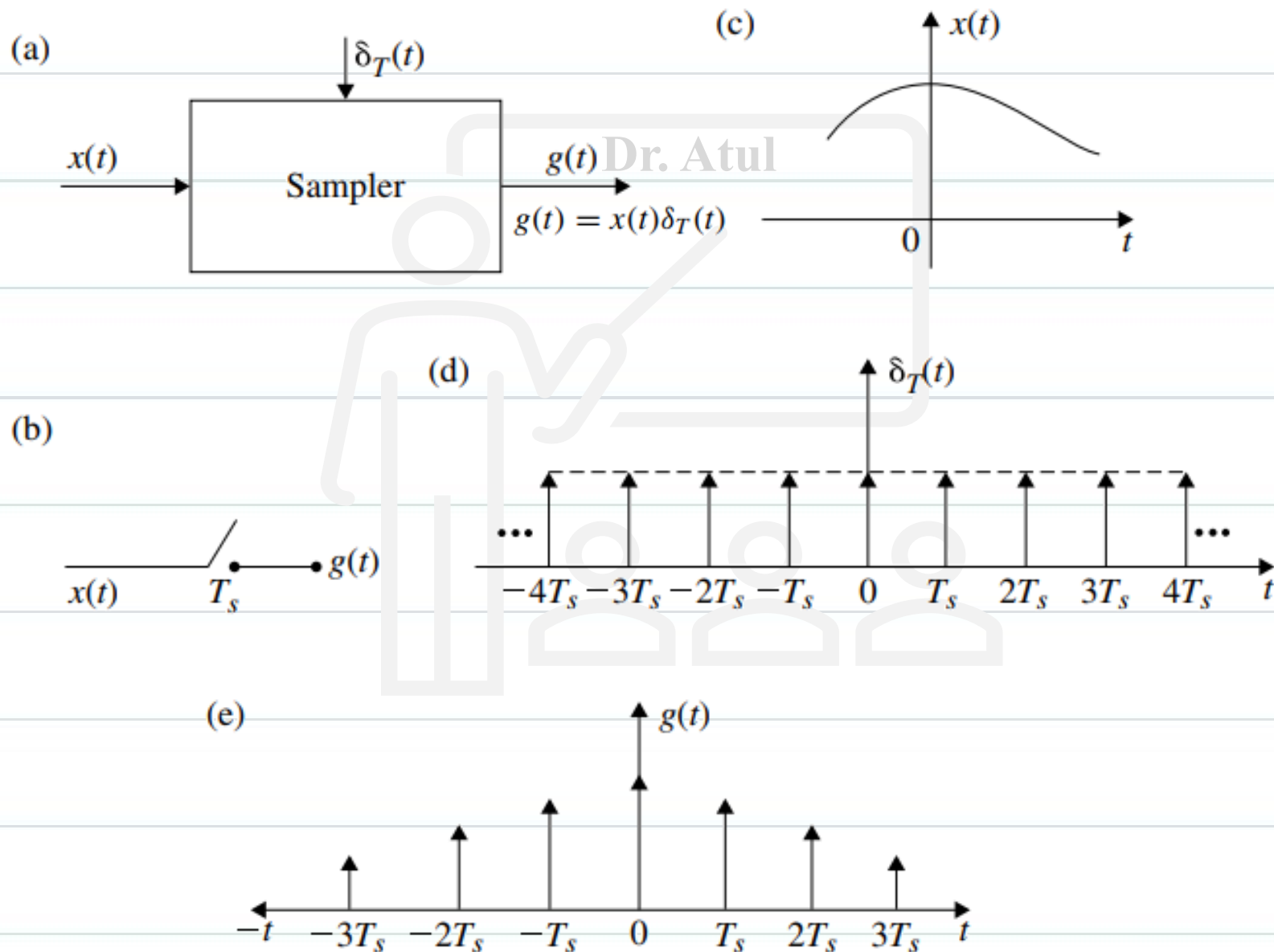
These signals are then processed by systems that operate in discrete time before being reconverted into continuous time signals for use in continuous time systems.

It is possible to fully capture and reconstruct a continuous time signal from its sampled values, which are evenly distributed over time.

This procedure is known as **sampling.**

Sampling process

Live

(a)

$\delta_T(t)$

$x(t)$ → **Sampler** → $g(t)$

$g(t) = x(t)\delta_T(t)$

(c) $x(t)$

0 t

(b)

$x(t)$ —/ T_s • → • $g(t)$

(d) $\delta_T(t)$

$-4T_s$ $-3T_s$ $-2T_s$ $-T_s$ 0 T_s $2T_s$ $3T_s$ $4T_s$ t

(e) $g(t)$

$-t$ $-3T_s$ $-2T_s$ $-T_s$ 0 T_s $2T_s$ $3T_s$ t

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Sampling process

- The block diagram representation of a continuous signal $x(t)$ being multiplied by a periodic impulse train $\delta_T(t)$ to get the sampled output $g(t)$.

- The device used for this is called a sampler. The sampler is also represented by a switch which opens and closes with periodicity Ts.

- The continuous time signal $x(t)$ is shown in previous slide. The periodic impulse train $\delta_T(t)$ is shown in Fig. d. The product of $x(t)$ and $\delta_T(t)$ which is the sampled signal $g(t)$.

$$g(t) = x(t)\delta_T(t)$$

Dr. Atul

Thank you for your attention!

Dr. Atul